Intentional, Pedagogically Driven, and Systematic use of Technology in Teaching Practice

by

Shakir Shahid Hussain

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2020

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ABSTRACT

With the ubiquitous use of technology in higher education, it is critical that instructors are intentional, pedagogically driven, and systematic in their use of technology in teaching practice. The purpose of this study was to evaluate how a structured educational development program supported instructors in thoughtful use of technology in their teaching. The study applied a gap analysis problem solving framework (Clark & Estes, 2008) to understand the knowledge, motivational, and organizational influences contributing to instructors' application of technology-based tools. Assumed influences on instructors' use of technology were formulated through a thorough review of published literature and scanning interviews. Data were collected in the form of semi-structured interviews with 12 instructors, along with a review of documents such as course syllabi, courses on a learning management system, and project charters. Data analysis validated the assumed influences and shed light upon two additional themes that emerged from the data. Key findings from the data included the ability of instructors to thoughtfully integrate technology in their courses, consensus among the instructors on the value of technology use in teaching, and differences between individual consultation models applied in the program. The study concludes with a discussion of recommended solutions along with implementation and evaluation plans.

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When life gives you wood, make ladders.

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DEDICATION

To all the educators who made me want to become an educator.

To Dad, the greatest one of them all.

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CHAPTER ONE: INTRODUCTION

As technology becomes ubiquitous in our daily lives, its impact can be seen and felt in all aspects of the human experience, and especially in education. In 2018, 98% of undergraduate students reported regularly using a computer to assist them in their coursework (Galanek et al., 2018), 97% of faculty were regular users of laptops and 93% of faculty used smartphones in 2017 (Pomerantz & Brooks, 2017). This ubiquitous access to technology has resulted in the use of new tools both inside and outside of the classroom. Encouraged by the use of such tools, more than half of undergraduate students also prefer some form of technology integration in their learning environments (Galanek et al., 2018).

In order for teaching and learning technologies to be effective, it is essential that their use by instructors is grounded in and aligned with pedagogy. An increasing number of institutions encourage instructors to integrate technology in their teaching practice, and it is crucial that the instructors develop the skillset to purposefully use technology to create a better learning experience for their students. While instructors are using technology in their teaching practice, these practices are often centered around "re-enactments of traditional activities in different media formats" (Price & Kirkwood, 2014). As such, the problem of practice addressed by this dissertation is the intentional, pedagogically grounded, and systematic integration of technology in teaching and learning practices in higher education.

Background of the Problem

Over the last 30 years, educational delivery models have progressed from traditional, face-to-face models to online delivery models, and more recently, a combination of online and traditional face-to-face teaching that has been called Blended Learning[1] (Graham, 2005; Graham et al., 2013). Blended Learning (BL) is a system that combines face-to-face instruction with

computer-mediated instruction (Graham, 2005). BL improves pedagogy, increases access and flexibility for students, increases efficiency and efficacy in teaching practice, and is cost-effective for institutions as compared to traditional programs (Brunner, 2006; Graham, 2005; Graham et al., 2005). BL's transformative potential to support deep and meaningful learning within higher education is especially significant (Garrison & Kanuka, 2004). Combining both face to face and online modalities, BL is more effective in students meeting learning outcomes than either delivery model individually (Rovai & Jordan, 2004; Weber, 2015). Furthermore, longitudinal surveys of students show an increasing preference among students to experience learning in a blended environment (Galanek et al., 2018).

A longitudinal survey of faculty in the United States found that 44% of the faculty taught an online course in 2018, as compared to 30% in 2013 (Jaschik & Lederman, 2018). Moreover, 38% of them have taught a blended course (Jaschik & Lederman, 2018). In developing countries, online education has supported massification and increased access to higher education. In India, the online higher education market is projected to grow from $33 million in 2016 to $184 million in 2021 (KPMG & Google, 2017). In addition to existing HEIs adopting online and blended models, for-profit companies have propelled the growth of online and blended programs (KPMG & Google, 2017).

While a growing number of tools are available to instructors to assist in their teaching, the efficacy of the tools is dependent on the pedagogical knowledge of instructors and their ability to ground technology use in pedagogical frameworks. The use of technologies in teaching practice and the redesign of courses to effectively incorporate them offers an opportunity for a reevaluation of the role of the instructors from content transmitters to facilitators and architects

of learning experiences (Becker et al., 2018). It is imperative that instructors are provided with the required support and guidance in order to develop teaching practices involving technology.

Higher education institutions (HEI) have been investing in resources to encourage faculty in enhancing their teaching practices and creating a better learning experience for students (K. H. Gillespie & Robertson, 2010). Universities have established teaching and learning centers focusing on faculty development, integration of technology in teaching, and evaluating and providing feedback on instructional practices. For instance, the Searle Center for Advancing Learning and Teaching at Northwestern University provides various programs to help instructors create engaging courses, integrate technology into their teaching, and assess student learning outcomes (Searle Center for Advancing Learning & Teaching, n.d.). Universities are also hiring and developing faculty support resources in the form of instructional designers and technologists, course designers, and learning engineers. This group of support resources helps instructors in designing courses, managing instructional projects, training instructors on technology and pedagogy, and providing technical support for various tools in use (Alexander et al., 2019; Graham et al., 2013; Intentional Futures, 2016).

Although tools, resources, and professional development options are being made available to higher educational instructors, technology is not often thoughtfully and effectively integrated within teaching and learning practices. It is critical to find and address ways to systematically improving pedagogy in light of technological innovations to harness the truly transformative potential of technology in higher education (Reigeluth & Joseph, 2002; Salomon, 2002).

Importance of Addressing the Problem

The problem of systematically integrating technology into teaching practice is vital to address for a variety of reasons. In the larger educational context, the increase in demand for higher and lifelong learning will be met by technology playing a key role in the development of the delivery of programs (Bonk & Graham, 2005). Clayton Christensen, credited with the theory of disruptive innovation, predicted in 2014 that due to the disruption from online education, half of US colleges and universities would be bankrupt within the next decade (Christensen, 2014; Christensen & Eyring, 2011). Institutions that offer innovative products and services will dominate their peers in the increasingly competitive landscape (Bonk & Graham, 2005). Traditional HEIs can meet the growing demand for higher and lifelong education successfully by BL programs. As new blended programs emerge, new models of education have to be mindful of pedagogical theories as they use new technologies to massify education.

Furthermore, developing countries such as China and India are investing heavily in the massification of higher education (Altbach, 2009). The government of India, through its National Skills Qualification Framework (Singh, 2012), paved the way for online and blended education, leading to credentialing starting from high school and all the way to advanced graduate and lifelong learning. The use of technological advances at such a large scale will require an intentional effort on the part of HEI administrators and instructors in order to graduate a skillful and employable workforce, and aligned with the 21st-century skills (P21, 2019). This problem of practice is important to address because the quality of good educational practice has to keep up with the disruption brought about by technology and to harness the truly transformative potential of BL.

Over the course of Spring 2020, the COVID-19 pandemic forced most higher educational institutions worldwide to transition to remote teaching practices to ensure instructional continuity (Crawford et al., 2020). The haphazard transition further highlighted the need for effective technology use in teaching practice. While the immediate transition focused on replicating the in-person experiences in the short term, successful remote teaching over the longer term due to COVID-19 will require thoughtful integration of technology at scale. The effects of the COVID-19 pandemic are also an opportunity for individual instructors and organizations to revisit their current teaching and learning practices. A planned and systematic approach to improving teaching and learning will require thoughtful integration of technology into teaching practice.

Organizational Context and Mission

Northwestern University is a private research university headquartered in Evanston, Illinois, USA, with additional campuses in Chicago, Illinois, USA, San Francisco, California, USA, and Doha, Qatar, with more than 21,000 students and 3,000 faculty members. It is home to 12 colleges and schools across its campuses. The mission of Northwestern is to be committed to excellent teaching, innovative research, and the personal and intellectual growth of its students in a diverse academic community. The university consistently ranks in the top 15 in the US, with highly regarded programs in business, education, journalism, and law.

With direction from the office of the provost, the Northwestern IT Services and Support group set up the Teaching and Learning with Technologies (TLT) team in 2012 with a goal to foster innovative learning experiences through the exploration of effective teaching techniques and technologies. The team is tasked with managing the Canvas learning management system and other digital learning initiatives, providing individual consultations and workshops for instructors, supporting instructional design for blended, fully online, and Massive Open Online

Course (MOOC) initiatives, and the development of innovative infrastructure and tools. TLT currently employs 10 staff members that coordinates with other school-specific instructional designers and technologists.

Northwestern currently administers 15 online and blended graduate programs through seven schools, with the School of Professional Studies offering a majority of the programs (Northwestern University, n.d.-d). The university also offers 37 MOOCs through the Coursera platform (Northwestern University, n.d.-c). Northwestern's campus in Qatar began offering online and blended graduate programs starting in Fall 2019. The office of the provost provides opportunities to advance these innovations through funding, structured faculty development programs, and the Digital Learning website, a resource hub for instructors aiming to incorporate technology into their teaching practice (Northwestern University, n.d.-e).

Organizational Goal

The goal of Northwestern University is to be a model of excellence in online and blended teaching and learning practices. Northwestern consistently ranks in the top 15 universities in the United States (US News and World Report, 2019; Wall Street Journal & Times Higher Education, 2019). Excellence in online and blended programs (Northwestern University, n.d.-e) is one of the university's strategic priorities, aligned with the focus on excellence in teaching and learning (Northwestern University, n.d.-f). Northwestern has invested in various programs, including the creation of the TLT team comprised of experts in technology and pedagogy, specifically for faculty support. The TLT team was originally created with the goal of migrating the learning management system (LMS) to a more robust service that allows for easier integration of innovations. The mandate of the team has subsequently evolved to include

incentivizing faculty to embrace digital learning, supporting additional technologies, and creation of structured faculty development programs to achieve these goals.

A critical part of this investment is faculty development programs, including the Educational Technology Teaching Fellowship (ETTF), the program being evaluated in this study. The ETTF program was established in 2015 when Northwestern successfully completed a two-year effort to transition the LMS from Blackboard to Canvas. The program was originally created with the goal of providing a structure to instructors in building upon the use of the Canvas LMS by integrating other technologies and enhancing the learning experience of the students. ETTF runs for an academic year from September to April, resulting in a showcasing of projects at TEACHx, the annual teaching and learning conference at Northwestern. Instructors from all three Northwestern campuses, Evanston and Chicago in the USA, and Doha, Qatar, and all 12 schools can apply to participate in the program. Between 20 and 30 instructors are accepted into the program each year; 104 instructors have completed the program by the end of the academic year 2018-19. The applicants to the program are generally self-selecting and would be considered "early adopters" and "early majority" in using technology in their teaching practice (Rogers, 2003). In order to justify this continued investment, it is critical to evaluate the success of the program and ensure that the organization is on the right path.

Stakeholders Pertinent to the Study

Several stakeholder groups are crucial to the success of the ETTF program at Northwestern. The TLT team administers the program and is responsible for attracting faculty to enroll in the program, matching instructors with mentors and providing the technical resources and support required for the successful completion of the projects, and administering the program ensuring the successful graduation of all members of the cohort. The consultants who

provide one-on-one mentoring throughout the year to the instructors are another crucial stakeholder in the success of the ETTF program. The consultants' expertise in digital pedagogies is crucial as they support the faculty in the program throughout the year. Finally, the faculty who have successfully completed the ETTF program are an essential stakeholder group in evaluating the success of the program as they demonstrate their learning from the program by employing successful technology integration into their teaching practice.

While various stakeholders contribute to the success of the organizational goal at various levels, it is essential to evaluate the integration of BL tools into the courses of instructors who have successfully completed the ETTF program. This goal also directly affects the organizational goal mission of excellence in teaching. Therefore, the stakeholder group in focus for this study will be the faculty alumni of the ETTF program located at the Evanston and Chicago campuses of Northwestern. The faculty ETTF alumni's goal to employ at least two new online or blended approaches in their classroom after graduation will be supported by the TLT team and the ETTF consultants during and after the program.

Purpose of the Project and Questions

The purpose of this project was to conduct an evaluation of the ETTF program to examine the knowledge, motivation, and organizational influences on faculty successfully completing the ETTF program and using the newly acquired tools and skillsets in their teaching practice. The analysis began by generating a list of possible or assumed influences on performances that were examined systematically to focus on actual or validated influences on performance. While a complete gap analysis would focus on all stakeholders, for practical purposes, the stakeholder group of focus in this analysis was the instructors.

As such, the questions guiding this study were:

1. What are the instructors' knowledge, motivation, and organizational influences related to achieving their goal of employing the newly acquired tools and skills in their teaching practice?
2. What is the interaction between organizational culture and context and stakeholder knowledge and motivation?
3. What are the recommended knowledge, motivation, and organizational solutions?

Conceptual and Methodological Framework

Clark and Estes' (2008) gap analysis is a systematic and analytical method to clarify organizational goals and identify gaps between the actual and ideal performance levels within an organization. This gap analysis was implemented as the conceptual framework for the study. The methodological framework used in the study was a qualitative case study with descriptive statistics. Assumed knowledge, motivation, and organizational influences that impact organizational goal achievement were generated based on stakeholder knowledge, scanning interviews, and related literature. These influences were assessed by using interviews, literature review, and document and artifact analysis. Research- and evidence-based solutions were recommended and evaluated comprehensively.

Organization of the Study

This study is organized in five chapters. Chapter One provides the reader with key concepts and terminologies related to a discussion around teaching practices involving technology and theoretical and pedagogical grounds for such practices. The organization's missions, goals, and stakeholder groups, as well as the initial concepts of gap analysis, are introduced. Chapter Two offers a review of the existing literature surrounding the scope of the study. Topics of understanding of teaching with technology, benefits of the practice, faculty

development programs to help implement such practice and its impact on student learning outcomes will be addressed. Chapter Three details the assumed needs for this study as well as the methodology with respect to the choice of participants, data collection, and analysis. Chapter Four provides the data and findings assessed as part of the study. Chapter Five discusses the findings from study, makes recommendations towards the improvement of the educational development programs at Northwestern, and provides a recommended implementation and evaluation plan to achieve the organizational goals.

CHAPTER TWO: REVIEW OF THE LITERATURE

This chapter begins with the review of evolving technology use in education and the interplay between technological advances and pedagogical theories. The application of technology use in teaching leading to BL and its pedagogical grounding in constructivism is also discussed. Various frameworks to support integration of technology in teaching will be explored, along with challenges instructors face in effectively incorporating technology in their teaching practice. An examination of institutional support mechanisms to support instructors in effective technology integration follows. The chapter concludes with a discussion of knowledge, motivational, and institutional influences affecting effective technology integration in teaching practice.

Technology and Pedagogy

In order to effectively integrate technology into teaching practice leading to an enhanced learning experience for students, it is imperative that the sustained use of technology by educators is grounded in pedagogical principles supported by frameworks to help integrate the technology effectively into teaching practice. Kanuka and Anderson (1999) argued that the "approach taken to the design, delivery, selection, and utilization of appropriate and effective technologies" predict how successful technology will be at "facilitating higher order thinking skills." They further asserted that an educator's philosophical and pedagogical orientation can guide decision-making, resulting in a reflective and rational application of technology in teaching.

Early History of Instructional Technology Use in Higher Education

Technology has played a vital role in the development of educational delivery, while also serving as the stalwart of educational change and transformation (Selwyn, 2011). One of the

early examples of technology in education was Pressey's teaching machines, a device to administer multiple-choice questions (Pressey, 1926). Such an approach was grounded in rote memorization of learning and behaviorist theories of learning, which supported the view that knowledge existed outside of the student (Daly, 2010). Skinner's machines, an evolution over Pressey's machines, allowed for students to construct their own answer, allowing them to input a number or a word as a response, but were largely based on similar behaviorist learning theories (Fry, 1960; Skinner, 1958).

While theories of learning evolved over the mid-20th century from behaviorism to cognitivism to sociocultural theory, the manifestations of these theories in educational technologies resulted in a teacher-centered use of technology focused on instructivism. The core argument of instructivism is that the instructor decides what is to be taught and how it is to be taught (Kanuka & Anderson, 1999), thereby rooted in the objectivism in that the knowledge exists outside of the student and in the instructor. While technology evolved rapidly in the mid-20th century, leading to the development of distance education, these integrations were still grounded in instructivism.

Distance and Online Education

While the first manifestation of learning at a distance came about through mail correspondence, the inventions of radio and television and their use in distance education further contributed to the evolution and acceptance of this novel modality of education (Anderson & Simpson, 2012; Casey, 2008; Selwyn, 2011). The use of radio and television for delivery of education led to a significant increase in access to higher education. The learning experience for students during this period was still grounded in instructivism, illustrated by instructional technology being defined at the time as "any device available for teachers to use in instructing

students in a more efficient and stimulating manner than the sole use of the teacher's voice" (Cuban, 1986, p. 4).

The invention of the World Wide Web (WWW) in 1991 played a significant role in opening up new forms of distance education, resulting in online education. Online courses were offered as early as 1993 by Jones International University in the USA, and within a decade universities in other countries also started offering online programs (Casey, 2008). The growth of the WWW also allowed for tools to be developed that supported face-to-face classroom instruction. LMS, web-based software applications accessible over the internet, were developed to distribute reading materials to students, communicate outside the classroom, and structure the course material for the students. Blackboard and WebCT were among the very first LMS that allowed for instructor-student communication using technology.

Constructivism and Blended Learning

The opposite of objectivism is constructivism, with the core belief that knowledge is constructed by the learner, and signaling a radical change in the ontological position of objectivism (Jonassen, 1991; Kanuka & Anderson, 1999). Constructivism as a theory of learning was first discussed by Piaget (1970), and then expanded upon by Vygotsky (1978) to include and emphasize the role of social relationships in the construction of knowledge. Early manifestations of constructivism in the design of instruction took the form of negotiated instructional goals and objectives (Jonassen, 1991) resulting in instructional methods such as case studies and brainstorming (Kanuka & Anderson, 1999).

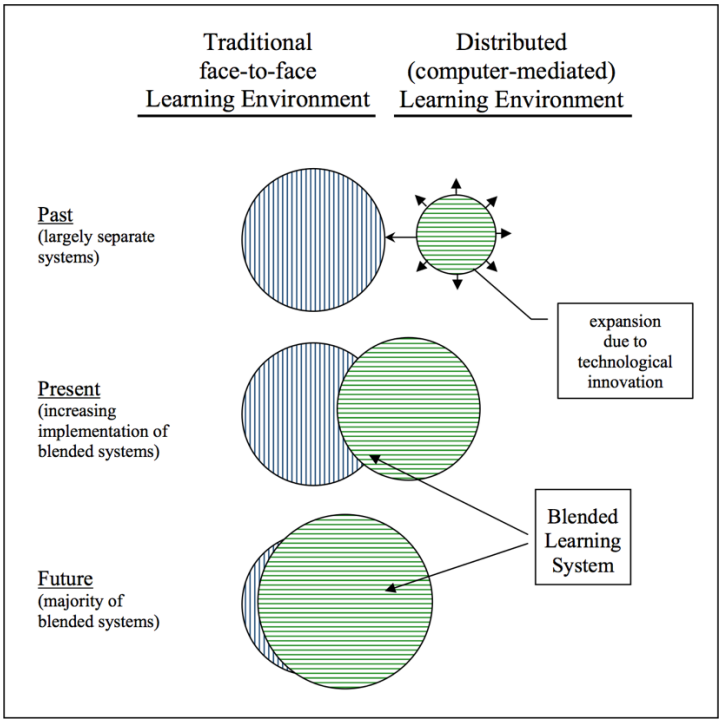
The use of technology in education often mirrors the instructional approach in the classroom (Zucchermaglio, 1993), which is guided by the pedagogical beliefs and ontological and epistemological positions of the instructor. While constructivism has been discussed for

more half a century, current classroom practices still mirror instructivist practices with the instructor occupying the role of the "sage on the stage" (King, 1993; Kramer, 2017). While technologies such as social annotations, use of wikis, and student response systems (Han & Finkelstein, 2013; Uskoković, 2018) are grounded in social-cognitive theories, their use is highly dependent on the instructional approach of the instructor. The combination of constructivist practices by instructors and development of technologies to enable such practices led to a combination of face-to-face and online learning environments.

Over the past 20 years, technological tools have been increasingly used in conjunction with traditional, face-to-face instruction, combining the historically separate models of teaching and learning. The resulting form, known as Blended Learning (BL)[1], is a continuum of education delivery models that incorporate technology into traditional face-to-face teaching and learning practices (Graham, 2005; Graham et al., 2013) as shown in Figure X. The combination of delivery models allows for personalization of learning, thoughtful reflection, and differentiated instruction (Watson, 2008). The adoption rate and promise of BL is such that it is predicted to be "the new normal" (Dziuban et al., 2018) in educational delivery (Graham, 2005), as illustrated in Figure 1.

Figure 1

Blended Learning Over Time



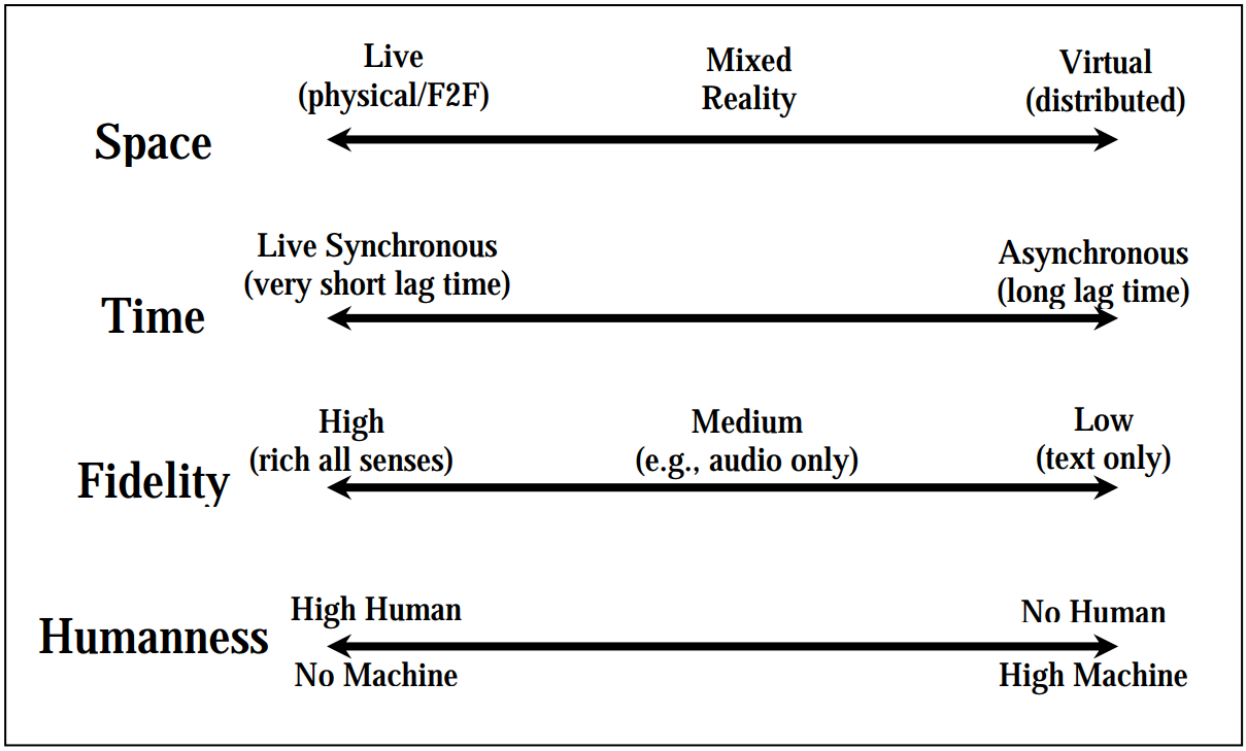
Note. Progressive convergence of traditional face-to-face and distributed environments allowing development of blended learning systems. From Graham, C. R. (2005). Blended Learning Systems: Definition, Current Trends, and Future Directions. In The Handbook of Blended Learning: Global Perspectives, Local Designs (pp. 3–21). Pfeiffer.

The blending can happen over an activity in a classroom, over the delivery of a course, to deliver a complete program, or even at the institution level (Graham, 2005). For instance, Jung and Suzuki (2005) describe a week-long debate activity in an English course that integrated both online and face-to-face modes for participation for mainly nonnative English speakers. Course-level blending can take the form of pre-class readings being assigned on an online social annotation tool that leads to a face-to-face classroom discussion (Miller et al., 2018). Program-

level blends in higher education allow students the freedom to choose between online, face-to-face, or blended courses to complete their degree programs (Ross & Gage, 2005). Describing an institutional-level blend, Dziuban, Hartman, Juge, Moskal, and Sorg (2005) explained how "mixed-mode courses" at the University of Central Florida, available to all students, experienced a 10-fold increase in enrollments over a seven year period. Graham (2005) further elaborated that BL as a spectrum on only space and time, but also fidelity and humanness, as represented in Figure 2. Fidelity here is in comparison to the traditional face-to-face experience and how well BL emulates that. Another important dimension to be considered in BL is the human interaction. Online aspects of BL experiences often include primarily virtual interactions, enabled by communication technologies.

Figure 2

Dimensions of interaction in learning environments



Note. Four dimensions of interaction in face-to-face and distributed learning environments. From Graham, C. R. (2005). Blended Learning Systems: Definition, Current Trends, and Future Directions. In *The Handbook of Blended Learning: Global Perspectives, Local Designs* (pp. 3–21). Pfeiffer.

Technology Adoption

Frameworks and Models for Technology Integration in Teaching

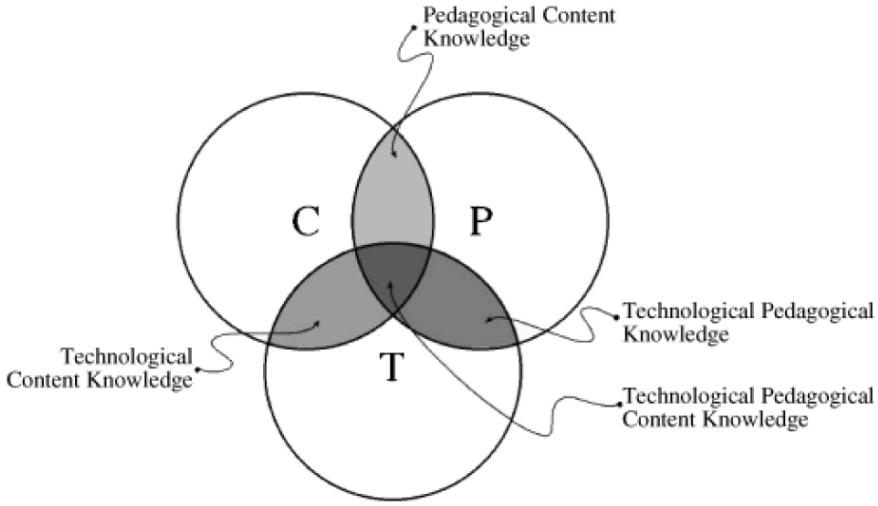
To effectively and thoughtfully integrate technology in their teaching, faculty can utilize a number of frameworks that help in identifying, assessing and implementing the right tools aligned with their pedagogical knowledge, instructional practice, learning objectives, and the content to be taught. In addition to designing instruction and incorporating technology, these frameworks can serve as guides for evaluating the use of technology and making improvements to teaching practice. While there are numerous frameworks available for educators to use, a subset of these pertinent to this study are discussed in this section.

Technological Pedagogical Content Knowledge Framework

The Technological Pedagogical Content Knowledge (TPACK or TPCK) framework developed by Koehler and Mishra (Koehler & Mishra, 2009; Mishra & Koehler, 2006) illustrated in Figure 3 requires that technology to be used in the classroom be aligned with faculty pedagogy knowledge and the content to be taught. TPCK builds on the Pedagogy Content Knowledge (PCK) framework (Shulman, 1986), which argues that instructors' pedagogical knowledge and content knowledge must be thoughtfully aligned for effective instruction, which happens at the intersection of pedagogy and content.

Figure 3

The TPACK Framework



Note. From Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teachers College Record*, *108*(6), 1017–1054.

Content Knowledge (CK) is the instructor's knowledge about the factual and conceptual subject matter to be taught to the students. Pedagogical Knowledge (PK) is the instructor's knowledge about methods of teaching and their internalization of their own approaches. The TPCK framework extends the PCK framework by adding Technology Knowledge (TK), knowledge about available technologies and the skills required to use them, and emphasizing the "connections, interactions, affordances, and constraints between and among content, pedagogy, and technology" (Mishra & Koehler, 2006, p. 1025). Similar to Shulman's (1986) assertion that effective teaching happens at PCK, the intersection of PK and CK, TPCK asserts that effective teaching with technology happens at the intersection of all three types of knowledge, or the TPCK. In order to understand and reach TPCK, it is critical to understand the Technological Content Knowledge (TCK) and Technological Pedagogical Knowledge (TPK). TCK is the

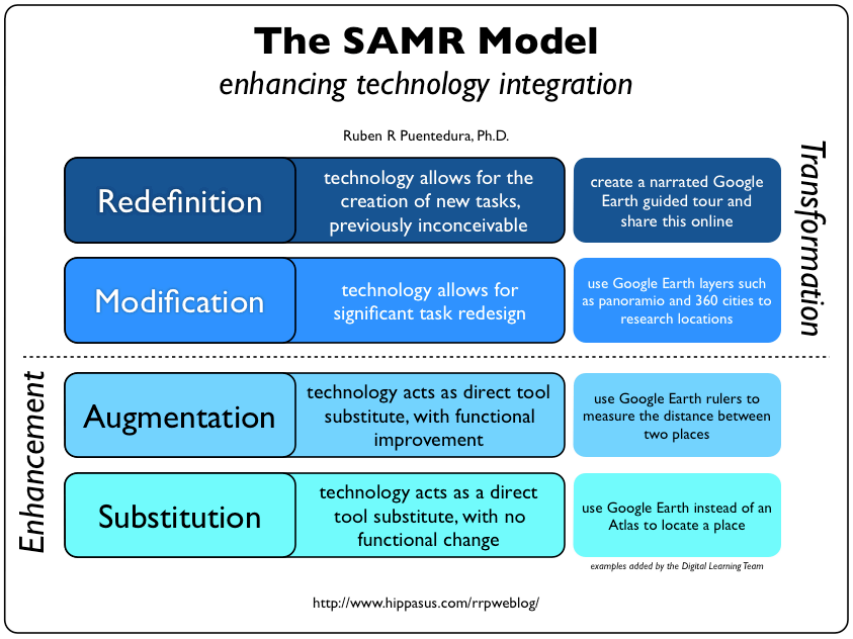
instructor's knowledge of how well a particular technology-based tool can be used to teach specific subject matter and TPK is the instructor's knowledge of how well a particular technology-based tool is aligned with principles of pedagogy and their own instructional approaches.

Substitution, Augmentation, Modification, and Redefinition Model

The Substitution, Augmentation, Modification, and Redefinition (SAMR) model (Puentedura, 2006) illustrated in Figure 4, while more widely used in K-12 settings, has significant implications in higher education as well. The SAMR model demonstrates how much and to what extent a technology-based tool is used in the classroom, between enhancing and transforming the students' learning experience.

Figure 4

The SAMR Model



Note. From McNeill, S. (2013, November 19). Teaching the Teachers – Introducing the SAMR Model. Retrieved from StAC e-Learning Stories website: https://eblog.stac.school.nz/2013/11/19/teaching-the-teachers-introducing-the-samr-model/

At the level of Substitution, technology directly replaces face-to-face instruction or an earlier tool without functionally changing it. At the Augmentation level, technology improves the functionality of direct instruction or previously used tool. The Modification level of use implies the redesigning of a task, thereby significantly changing student's previous experiences of learning. Finally, at the Redefinition level, technology allows for the creation of novel and previously inconceivable tasks.

SAMR is often used in conjunction with TPCK to enhance the student's learning experience in the classroom, with TPCK used in identifying and analyzing the tool to be used and SAMR utilized for identifying the level of use in instruction (Hilton, 2016; Kriek, 2016; Puentedura, 2014).

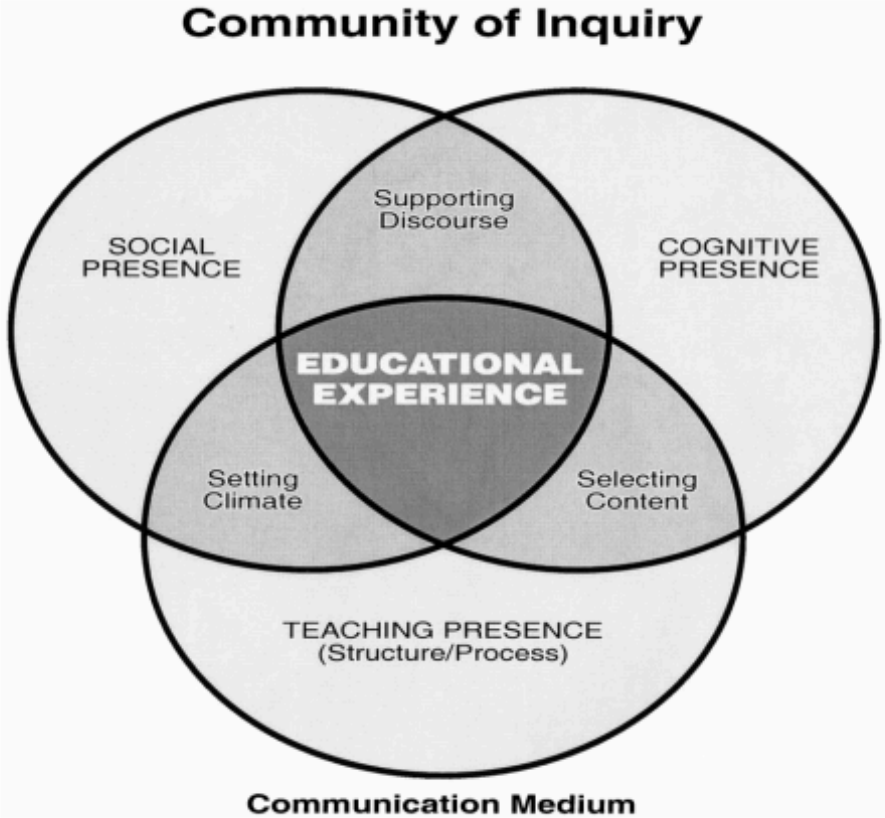
Community of Inquiry Framework

The Community of Inquiry (CoI) framework (Garrison et al., 1999; Garrison & Akyol, 2013) is a conceptual framework built on the socio-constructivist theory of learning that guides the use of "instructional technologies in creating and sustaining deep and meaningful learning through reflection and discourse" (Garrison & Akyol, 2009, p. 23). While CoI can be used in face-to-face and fully online environments as well, it is most effective in blended environments. The framework, as illustrated in Figure 5, explains that a worthwhile educational experience is comprised of three interdependent elements: teaching presence, cognitive presence, and social presence. Teaching presence of the instructor includes design, facilitation, and direct instruction. Cognitive presence is the core purpose of the community of learners, to engage deeply and

meaningfully leading to shared meaning making. Finally, social presence is the ability of students to identify, communicate, and develop relationships with the rest of the community (Garrison & Akyol, 2009).

Figure 5

The Community of Inquiry Framework



Note. Community of Inquiry model. From Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education. *The Internet and Higher Education*, *2*(2), 87–105.

Instructors can use various technologies to create a mix of the three elements prescribed by the CoI framework. LMS are central to teaching presence in a blended environment that

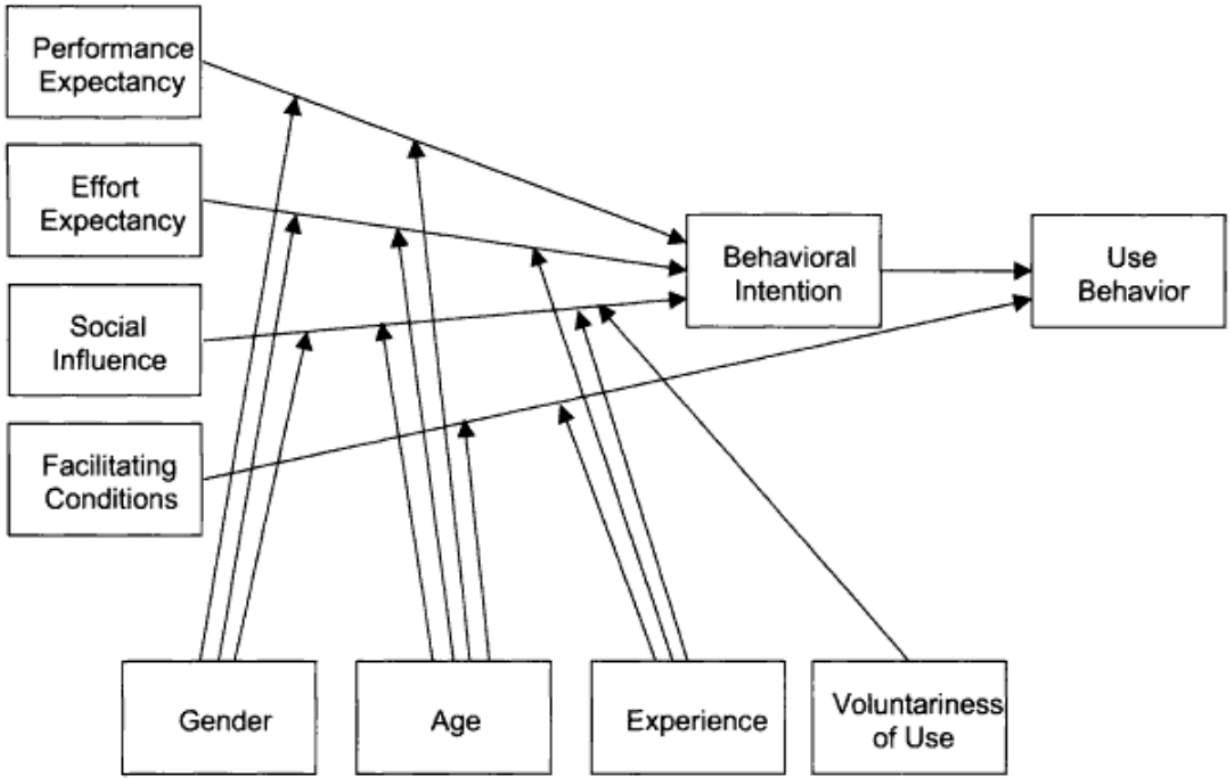
provide tools for communication and facilitation of learning activities (Rubin et al., 2013). Cognitive presence is supported through prescribed tools, such as discussion boards, or tools that students deem useful for their learning (Kovanović et al., 2015). Social presence is provided by social media, personal blogs, and other web-based communication tools to keep students engaged with each other (Garrison & Akyol, 2009). The CoI model is especially effective in blended environments as it allows for students to demonstrate their social presence in multiple ways. For instance, a face-to-face meeting between students at the beginning of the course may lead to deeper, thoughtful, and trusting discussions in the asynchronous activities (Dennen, 2013; Garrison & Akyol, 2009).

Technology Acceptance Model, and its Derivations

The Technology Acceptance Model (TAM) developed by Venkatesh and Davis (1996) is a seminal framework that predicts how well a computer system will be accepted and used by users. The framework explained that the intention and subsequent actual usage of a computer system can be predicted by how useful and how easy the system is perceived to be by its potential users. TAM was later expanded to include more explanations and details relating to usage of computer systems in the form of TAM2 (Venkatesh & Davis, 2000) and TAM3 (Venkatesh & Bala, 2008). The Unified Theory of Acceptance and Use of Technology (UTAUT) illustrated in Figure 6 (Venkatesh et al., 2003) was developed by studying previous theories and has been used in various contexts, including education. UTAUT theorizes that the constructs of performance expectancy, effort expectancy, social influence, and facilitating conditions predict the acceptance of a computer system leading to individual's intention to use and subsequent use of it.

Figure 6

Unified Theory of Acceptance and Use of Technology



Note. From Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, *27*(3), 425–478. https://doi.org/10.2307/30036540

While TAM and its derivations, including UTAUT, were not specifically developed in the context of education, they have been used widely in understanding and evaluating the use of technology-based tools in this domain in various parts of the world (Fathema et al., 2015; Marques et al., 2011; Oye et al., 2014; Thomas et al., 2013).

Challenges to Faculty Adoption of Technology-enhanced Teaching Practices

Kuhlenschmidt (2010) identified four major challenges that faculty face in effectively integrating technology into their teaching practice, including remaining current in instructional

content, instructional design knowledge, understanding the technology, and integrating the three challenges stated. Through a review of empirical literature, Brown (2016) identified six influences that were most prominent. External factors influencing technology adoption were faculty member's interactions with technology, academic workload, institutional environment, and students' ability to use technology. Factors internal to the faculty were their attitudes and beliefs about teaching, and their own learning practices.

Access to reliable and appropriate technology, or lack thereof, is a major factor in technology adoption in teaching (Bates & Poole, 2003; Reid, 2014). Another technological factor is the understanding of specific features provided by tools, the learning curve associated with it, and the amount of time required to configure it for use in teaching (Jeffrey et al., 2014; Schoonenboom, 2014). Faculty commitment to other aspects of their academic relationships, such as their teaching load, research productivity, and service and administrative responsibilities, are other major factors that affect technology adoption (Drent & Meelissen, 2008; Meyer & Xu, 2009). Since integrating technology effectively is viewed as a time-consuming task, the existence of additional responsibilities inversely affects integration of technology-based tools (Meyer & Xu, 2007). The institutional environment and context are other significant factors influencing faculty adoption of technology. Graham, Woodfield, and Harrison (2013b) developed a framework for institutional adoption around strategy, structure, and support as core factors that could increase adoption of technology in teaching practice. They further suggested classifying institutions into three stages based on their current level of institutional adoption: Stage 1 is an awareness/exploration stage during which the institution lacks a formal strategy but is aware of individual faculty integrating or looking to integrate technology in their teaching. Stage 2 is an adoption/early implementation stage during which policies and procedures are being created or

just have been created to support widespread adoption of technology in teaching. Stage 3 is mature implementation/growth where well-established practices and policies are internalized by the institution. Further research by the authors showed the importance of institutional factors in the adoption of technology by faculty (Porter & Graham, 2016; Porter et al., 2015). Finally, interaction with students is an important external influence that plays a part in faculty adoption of technology. Lack of technology skills or access to computing resources is a major inhibitor of technology adoption from the faculty's perspective, but can also be used to develop the technological skills in the students (Tshabalala et al., 2014; Wach et al., 2011). Feedback from the students is also crucial in sustaining the use of technology in teaching practice (Calderon et al., 2012).

As part of his theory of diffusion of innovation, Rogers (2003) classified adopters of new innovation into five types: (a) Innovators, (b) Early Adopters, (c) Early Majority, (d) Late Majority, and (e) Laggards. This classification can serve a framework to view adoption of technology within faculty through a different lens. While innovators and early adopters score high on the adoption, they can also provide modeling (Bandura, 1988) and serve as influencers in the rest of the individuals adopting technology.

Institutional Support for Technology Integration in Teaching Practice

Effective and sustainable use of BL approaches and tools by instructors requires institutional support, in addition to instructors' own motivation and pedagogical training. In creating an institutional framework of adoption of BL, Graham et al. (2013b) identified strategy, structure, and support as the key markers in driving strategic adoption of BL practices at an institutional level. Specifically, technical support and pedagogical support were highlighted as key factors in supporting faculty adoption of BL practices. Another study identified pedagogy

and learning technology support as one of six key factors of a holistic framework to support adoption of BL practices at an institutional level (Adekola et al., 2017). Empirical studies have further substantiated the role of technical and pedagogical support as key institutional support factors leading to successful and effective integration of technology in teaching practice (Porter & Graham, 2016; Porter et al., 2015). The following sections discuss avenues where faculty can seek out technical and pedagogical support at an institutional level.

Instructional Design and Technology Support

Redesigning and redeveloping courses to include blended approaches and tools is a time-consuming process and requires faculty to gain additional pedagogical and technical expertise. Learning engineers[2] are hired by institutions to support faculty in incorporating new tools in their courses. As experts in designing learning experiences, the core responsibility of learning engineers is to collaborate with faculty and provide support with the design of instructional materials, manage projects throughout the course redesign and redevelopment process, train faculty to effectively use technology, and provide troubleshooting and technical support (Berrett, 2016; Dede et al., 2018; Intentional Futures, 2016; Milosch, 2018; Seeto & Herrington, 2006). Learning Engineers are the conduits between the information technology services provided by a university, a school, or a department and the faculty, specifically focusing on instructional technology. Learning Engineers play the critical role of providing faculty with both technical and pedagogical support.

Centers for Teaching and Learning

Professional development centers such as centers for teaching and learning (CTL) have played a central role in supporting teaching excellence at universities for more than half a century. Since the establishment of the first such center in the US, the Center for Research on

Learning and Teaching at the University of Michigan in 1962, more than a 1400 such centers (at the time of writing this) exist throughout the world to assist faculty in developing their pedagogical and teaching skills (K. H. Gillespie & Robertson, 2010; POD Network, n.d.). The Professional and Organizational Development Network in Higher Education (POD Network) maintains a searchable directory of these 1400 centers and programs engaged in educational development at various levels (POD Network, n.d.).

CTLs provide faculty, instructional, and organizational development opportunities through consultations, funding, workshops, and institutes (K. H. Gillespie & Robertson, 2010; Sorcinelli, 2002). A survey of POD Network members identified a single, centralized unit responsible for educational development as the most common form of a CTL (Sorcinelli et al., 2005). Other forms taken by CTLs include an individual faculty member leading the effort with or without a physical center, a committee supporting faculty development, a clearinghouse of programs and offerings, and system-wide structures responsible for a larger number of CTLs (Robertson, 2010). While the appointments and staffing levels vary greatly between CTLs, these are usually led by a faculty member with some background and interest in faculty development (K. H. Gillespie & Robertson, 2010). Graduate students and teaching assistants may also be employed to support the mission of the CTL (Rudenga & Lampert, 2018). Professional and pedagogical development programs most commonly take the forms of workshops, individual and departmental consultations, and classroom observations (Aitken & Sorcinelli, 1994; Lee, 2010). Other program offerings may include orientations at the beginning of a term or a semester, grants provided to faculty members to support course or curriculum development, and creation and management of teaching circles of faculty learning communities (Kuhlenschmidt et al., 2010; Lee, 2010).

The evolution of CTLs has more recently included close collaboration with other institutional structures such as libraries, administrative departments, global offices, academic units, and information technology groups (M. K. Brown et al., 2015). Increasing use of technology in teaching and learning has paved the way for an emerging model of CTLs combined with or closely aligned with instructional technology units (Lee, 2010). Some CTLs, such as the Searle Center for Advancing Teaching and Learning at Northwestern University, work closely with instructional technology units to provide opportunities for faculty and develop programming such as internal conferences focused on teaching with technology (TEACHx, n.d.). Other CTLs, such as the Center for New Designs in Learning and Scholarship at Georgetown University, were established with the explicit mission of bridging pedagogy and technology (CNDLS, n.d.). Such partnerships are critical to the future of faculty development in technologically focused higher education paradigms (Schumann et al., 2013).

Faculty Development Programs

Another avenue for faculty to develop their technological skills is through faculty development programs or institutes, ranging in duration from a single day to a year, incorporating a mix of discussion and hands-on projects (Cagle & Hornik, 2001; Garrison & Vaughan, 2007). In order to promote real change, professional development must be an ongoing activity that takes into account faculty's personal beliefs, needs, and characteristics (Slavit et al., 2003). Such programs provide faculty with "time to clearly link theory to practice and to also create a sense of community," including interaction with fellow participants in the program (Garrison & Vaughan, 2007, p. 51). Using the CoI framework illustrated in Figure 5 (Garrison et al., 1999; Garrison & Akyol, 2013), Garrison and Vaughan (2007) advocated for a blended faculty CoI that allows faculty to engage in reflection and discourse about their teaching

practices over time, with a focus on how faculty teaching practices affect student learning. Faculty development programs can also lead to Faulty Learning Communities that allow faculty to "create connections for isolated teachers, establish networks for those pursuing pedagogical issues, meet early-career faculty expectations for community, foster multidisciplinary curricula, and begin to bring community to higher education." (Cox, 2004, p. 5).

The ETTF at Northwestern University (Northwestern University, n.d.-b) is an example of a year-long cohort-based faculty development program focused on exploring the use of BL approaches in courses. Each faculty member partners with a mentor from the TLT team, who provides technical and pedagogical support. The cohort regularly meets as a community multiple times a semester to discuss ideas and experiences, and individually with the mentors to meet the specific needs for their courses. At the end of the program, participants are encouraged to share their work and experience at a teaching and learning conference attended by faculty at Northwestern University and other peer institutions.

Faculty Knowledge, Motivation, and Organizational Influences

Knowledge and Skills

In order to successfully achieve the goal of employing at least two technology-based teaching and learning tools in their classroom, it is imperative that the faculty knowledge and skills, as it pertains to technology integration, are understood. The exploration of such knowledge needs to be multi-faceted. Incorporating all aspects of teaching and learning, Anderson and Krathwohl (2001) provide a taxonomy to support thinking about the different types of knowledge and how the different types of knowledge can be combined for a holistic understanding of the knowledge and skills. Factual knowledge, the knowledge of "discrete, isolated content elements" (L. Anderson & Krathwohl, 2001, p. 27) is the most basic form of

knowledge that individuals must be acquainted with in a domain. Conceptual knowledge is the knowledge that helps the individual understand the "interrelationships among the basic elements within a larger structure" (L. Anderson & Krathwohl, 2001, p. 29), enabling abstractions and a deeper understanding of the content. Procedural knowledge provides individuals with the knowledge of how to go about a given task. Finally, metacognitive knowledge is the knowledge about "one's own cognition" that allows individuals to engage in self-reflection leading to improvements in their skills and abilities (L. Anderson & Krathwohl, 2001, p. 55).

To successfully integrate technology-based tools into teaching practice and create an enhanced learning experience for their students, faculty must be able to bring together their knowledge about all aspects of teaching and learning, along with technology. The TPACK framework (Mishra & Koehler, 2006) serves as a guide for faculty and designers to effectively integrate technology, pedagogy, and content to create a meaningful learning experience for students. Using Anderson and Krathwohl's (2001) taxonomy, the factual knowledge here would be the faculty knowledge about the names and functions of different technologies available to them, such as the LMS, plagiarism detection systems such as TurnItIn, and online assessment systems, such as the LockDown Browser. Knowledge of how specific tools can be used for specific activities and the tools' alignment with pedagogical practices would be an example of conceptual knowledge. An example of procedural knowledge in action would be faculty's ability to seek out support from technology and design teams. Finally, the reflective element of engaging in such an exercise of incorporating BL tools leading to improvements in their teaching would be an example of the metacognitive knowledge in action.

Knowledge of Aligning the Tool with Pedagogy and Content

Shulman (1986) asserted that for faculty to be effective instructors, they must combine CK, i.e., knowledge of the subject matter to be taught, with PK, i.e., knowledge of how to teach into Pedagogical Content Knowledge (PCK). In light of new educational technologies, Mishra and Koehler (2006) extended PCK to include TK, leading to the development of the TPACK framework. In order to successfully and meaningfully use technology to enhance learning, it is imperative that faculty consider the content to be taught, the teaching methods best suited to the context, and the affordances of the specific technology to be used. For instance, an online discussion board would be best suited to expand on student's understanding of the concepts but not to assess factual knowledge. This conceptual knowledge is critical for faculty to employ new technologies in their teaching practice. This study will explore how faculty who have completed the ETTF program select and align tools they use with their instructional approach and the content to be taught.

Ability to Integrate the Tool in the Course

A crucial aspect of using BL tools in a course is the faculty ability to provide easy access to the tool for the students, to communicate the importance of using the tool to the students, and to directly connect the tool with the course objectives and student learning outcomes (Bonk & Graham, 2005; Davis & Fill, 2007; Garrison & Vaughan, 2007). Access to the tool is usually provided using a hyperlink prominently placed in the course on the LMS, which serves as a hub for course communication and distribution of course materials. If an LMS is not utilized, instructions on how to access the tool can be provided via an email at the beginning of the course. Faculty must also introduce the tool to students early in the term, and potentially model the expected use of the tool. For example, if an online discussion board is to be used in the class

for asynchronous discussions outside the classroom, examples posts can be provided along with the rubrics that will be used to assess the participation of the students. It is also important to tie in the use of the tool with the course objectives and student learning outcomes of the course, while specifically stating which of these will be augmented by the use of the tool (Davis & Fill, 2007). In addition to explaining these connections to the objectives and outcomes explicitly in the syllabus, faculty can also elaborate on these in a class session early in the course term.

In addition to communicating the importance of the tool to the course, faculty must also make available support resources to the students (Garrison & Vaughan, 2007). These resources, such as the IT department, or an online support resource, can help students troubleshoot technical issues and help them better understand how to go about using the tool in the way it is intended for the course. Specific access and contact details can be made available via the syllabus and during the introduction of the course. Faculty members may also invite learning engineers to demonstrate the use of the tool, who may have deeper knowledge of the technical and pedagogical aspects of the tool.

Table 1 presents the assumed knowledge influences of the instructors as they incorporate technology in their teaching practice. While there are numerous types of knowledge and skills instructors need to have to successfully use technology to enhance learning, two specific influences that were essential to the study are listed.

Table 1

Assumed Knowledge Influences

Assumed Knowledge Influence	Knowledge Type
Knowledge of how to select and align blended learning tools with pedagogy and content.	Declarative (Conceptual)
Ability to integrate blended learning tools in the course.	Procedural

Motivation

In addition to knowledge and skills, motivation to improve teaching by incorporating technology-based tools has a critical influence on faculty performance. Mayer (2011) defined motivation as "an internal state that initiates and maintains goal-directed behavior" (p. 39). While engaging in performance, motivation can be examined through three motivational indices, namely active choice, persistence, and mental effort (Clark & Estes, 2008). Active choice is the decision of an individual to move from intention to action. Persistence is the individual's ability to continue to engage in their work towards the intended outcome while faced with other goals and distractions. Mental effort is the investment of the individual towards meeting the intended outcome.

Motivational influences can be examined through various theoretical motivational constructs. These are the underlying factors that cause us to take action, persist in the task, and apply the appropriate amount of mental effort leading to the successful execution of the task. The expectancy value theory focuses on the questions around whether the task can be performed and whether the individual wants to carry out the task (Eccles, 2010; Eccles & Wigfield, 2002). Responses to the constructs above are strong predictors of the three indices of motivation. Attribution theory of motivation is centered around the perception of causes of events, including performance successes and failures (Anderman & Anderman, 2010; Linnenbrink & Pintrich, 2002). The attributions made about the perceived reasons behind the success or failure of the performance predict investment into the motivational indices in future performances (Linnenbrink & Pintrich, 2002; Weiner, 1982).

Self-efficacy motivational theory explains the relationship between an individual's self-judgments about their capabilities to succeed in specific tasks and their motivation to engage in a

performance (Pajares, 2010). Another social-cognitive theory of motivation, goal orientation theory examines the reasons behind why individuals engage in a task (Yough & Anderman, 2010). Mastery goals are those in which individuals intend to master tasks, and performance goals are those in which individuals intend to demonstrate their competencies in comparison to that of others. Goal orientation theory examines the relationship between motivation and the achievement of the individual's goals.

While various motivational theories and constructs can be employed to explore and examine the motivations behind the faculty use of BL tools, this study will focus on the utility value of using such tools to the faculty and their attributions of the successful or unsuccessful integration of the tools in their teaching. These constructs can help explain whether or not faculty intend to use such tools, explaining active choice, how likely they are to continue using the tools, explaining persistence, and how much cognitive investment they are willing to make to ensure the success of the use of online and blended tools in their teaching, suggesting the magnitude of mental effort.

Value for Technology-based Teaching and Learning Tools

In order to effectively incorporate technology-based teaching and learning tools in their teaching practice, it is imperative that faculty see the utility of using blended or online tools in their teaching. From a teaching perspective, technology can improve instructional efficiency (Garrison & Kanuka, 2004). For instance, the use of LMS provides an efficient way for faculty to disseminate materials and interact with the students (Assaf Alfadly, 2013; Atkinson & Lim, 2013; Yadova et al., 2016). Online assessment systems can save a significant amount of grading time, while also providing efficient ways to provide feedback on assessments (Atkinson & Lim, 2013; Lothridge et al., 2013). Another potential value of using technology in teaching is to

engage students in the classroom. Multiple studies have shown that engagement tools used in the classroom, such as clickers or polling devices, support active learning experiences (Han & Finkelstein, 2013; Lane & Harris, 2015). Using the expectancy value theory of motivation, instructors are likely to be motivated to use technology-based tools in their teaching if they see the utility value in using these tools. This study will explore the degree to which faculty perceive technology to be valuable for their instructional practices.

Perception of Attribution for Success or Failure of Technology-based Tools in Teaching

In order for faculty to be motivated to start and continue to use technology tools, it is critical that they perceive that the success or failure of their use is due to the effort applied rather than an innate ability to use technology. Faculty members often claim to be "technologically challenged" and may have had negative experiences with technology use in the past (Georgina & Hosford, 2009; Georgina & Olson, 2008). Even when faculty have positive experiences with the general use of technology in their personal and professional contexts, their perceptions of the use of technology for pedagogical use may vary greatly (Georgina & Olson, 2008; Kopcha et al., 2016). If the reasons for success or failure are attributed to their level of effort, they are more likely to invest an adequate amount of effort in ensuring the success of the tool.

Table 2 presents the motivation influences of the instructors as they incorporate technology-based tools in their teaching practice. While there are various constructs that can help with faculty motivation, three specific influences that were essential to the study are listed.

Table 2

Assumed Motivation Influences

Motivation Construct	Assumed Motivation Influence
Utility Value	Faculty need to perceive using blended learning tools in their teaching practice as facilitating increased student engagement or their efficiency.
Attributions	Faculty should attribute their level of success in employing at least two new blended learning tools is due to their efforts rather than an inherent technological ability or lack thereof.

Organizational Influences

In addition to knowledge, skills, and motivation, organizational processes, resources, and culture play a significant role in faculty integrating technology-based teaching and learning tools in their teaching practice. Clark and Estes (2008) argued that even for those individuals who have a high level of knowledge and skills and are motivated to achieve their performance goals, the organizational setting can sometimes be a hindrance in their achieving said goals. Ambrose et al. (2010) add that an individual's learning and development is affected by the social, emotional, and intellectual environment around them. In the context of higher education in general, and specifically this study, it is vital to understand how the organizational and cultural environment affects faculty ability to engage in enhancing the learning experience for students.

Sociocultural theory (SCT) provides a framework to identify, analyze, and evaluate the role of social interactions in the learning and development of an individual (S. Scott & Palincsar, 2010). Specifically, the concept of the zone of proximal development (ZPD) is key to understanding the role of context in learning (Vygotsky, 1978). The ZPD is the difference between what an individual can learn independently and learning that requires guidance or peer interaction. An example of ZPD in action is the ability of individuals to engage in "just-in-time" learning with the help of training or coaching provided by their organization (Hung, 2001).

In the context of this study, it is important that faculty are provided an appropriate amount of resources and support to enable them to effectively incorporate technology-based teaching tools in their practice. This can be accomplished by implicit organizational influences such as cultivating a culture of experimentation for teaching effectiveness, and more visible support structures such as encouragement of learning communities and providing scaffolding.

Time and Support Resources

Once faculty have the knowledge, skills, and motivation to begin using technology-based tools, it is critical that the institution supports them in actually materializing the development of their teaching practice. This support must be a combination of time provided to the faculty, access to support resources and other material resources, such as the actual technology-based tools that are best aligned with their Pedagogical Content Knowledge. Support for time can come in the form of a reduced teaching load, administrative responsibilities, research requirements, or a combination of these activities. Pedagogical and technological support includes instructional support resources, centers for teaching excellence, and educational resources to integrate technology-based tools. Finally, it is imperative that the institution strives to provide the monetary and material resources to the faculty to use the tool that best aligns with their instructional approach and the content to be taught. This study will explore the extent to which Northwestern faculty are provided with adequate time and support resources to effectively integrate BL tools in their teaching practice.

Learning Communities

A concrete implementation of SCT is demonstrated in the participation of faculty in learning communities related to enhancing their teaching practice. The CoI framework asserts that a rich educational experience comprises of cognitive, social, and teaching presence

(Garrison & Akyol, 2013). While this framework was developed primarily in the context of blended and online education with students in mind, it has significant implications in the context of faculty development as well. Cognitive presence reflects the ability and effort of faculty to internalize the use of technology-based tools in their practice to create a better learning experience for students. Social presence allows faculty to discuss their practices and learn from each other. Finally, the teaching presence is reflected by facilitators of a faculty development program by leading faculty to and supporting them in their ZPD (Vaughan et al., 2013).

Table 3 presents the organizational influences of the instructors as they incorporate technology-based tools in their teaching practice. While there are various categories that can help with organizational culture, three specific influences that were considered to be essential to the study are listed.

Table 3

Assumed Organizational Influences

Organizational Influence Category	Assumed Organizational Influence
Cultural Setting Influence	The university needs to provide adequate time, support, and resources to assist faculty in integrating technology-based tools into teaching practice.
Cultural Setting Influence	The university needs to encourage learning communities within the institution to support the integration of technology-based teaching and learning tools in faculty teaching practice.

Conclusion

This chapter reviewed the evolution of technology use in education, heuristics instructors can use to aid in technology integration, and institutional support mechanisms available to instructors to support effective technology use in education. Specific knowledge, motivational, and organizational influences to guide the study were also analyzed. Chapter Three discusses the

methodological approach the study will followed by an examination of the findings in Chapter Four and a detailed discussion of the results in Chapter Five.

CHAPTER THREE: METHODS

The purpose of this study is to examine the knowledge, motivational, and organizational factors affecting faculty integration of technology-based teaching and learning tools in their teaching practice at Northwestern University. These factors were examined in the context of the ETTF, a faculty development program at Northwestern that will had more than 100 graduates by Fall 2019, when the study was conducted. The research questions guiding this study are:

1. What are the instructors' knowledge, motivation, and organizational influences related to achieving their goal of employing at least two technology-based teaching and learning tools in their teaching practice?
2. What is the interaction between organizational culture and context and stakeholder knowledge and motivation?
3. What are the recommended knowledge, motivation, and organizational solutions?

This chapter discusses the methodological framework for the study, including the rationale behind employing a qualitative methodology, the characteristics of the participants for the study and the sampling strategies involved, and the instruments used in the data collection and analysis. This is followed by a discussion of the credibility and trustworthiness of the qualitative methods used. The potential ethical concerns surrounding the study will be followed by a discussion of the limitations and the delimitations of the study.

Methodological Framework

This study employed a qualitative methodology. Rooted in the constructivist worldview, a qualitative approach emphasizes on the diversity, subjectivity, and multiplicity of meanings constructed socially and historically through the participants' experiences (Creswell & Creswell, 2018; Merriam & Tisdell, 2016). Specifically, this study primarily employed a basic qualitative

research design, combined with aspects of narrative inquiry and qualitative case study. The core characteristic of a basic qualitative research design is the importance placed on understanding "how people make sense of their lives and their experiences" (Merriam & Tisdell, 2016, p. 24) from the responses of the participants. Narrative inquiry involves the use of participants' first-person accounts of their experiences as data in the form of a story. With the unit of data in this study being a faculty member at Northwestern, a case-study approach further allowed for the study of their specific experiences in their courses and the ETTF program as a "bounded system" for analysis (Merriam & Tisdell, 2016, p. 37).

Relationship with Conceptual Framework(s)

The overarching conceptual framework guiding this study is the gap analysis model developed by Clark and Estes (2008) that examines the knowledge, motivation, and organizational (KMO) influences on an individual's performance. The three dimensions of the KMO framework in the context of this study are inherently individual, the understanding of which requires a constructivist worldview (Creswell & Creswell, 2018). Every faculty member has an individual pedagogical approach and incorporates specific instructional and content-oriented practices that best fit their worldview, training, and meets the needs of their students. Incorporating technology to this approach adds to the individual nature and as such cannot be assessed merely through surveys. As a qualitative method, interviews provide rich, descriptive data, are inductive, and provide an opportunity to focus on "process, understanding, and meaning" (Merriam & Tisdell, 2016, p. 15). Therefore, interviews were used for the assessment of KMO influences.

Another essential framework contributing to the design and strength of the study was the TPACK framework. Developed by Koehler and Mishra (2009), TPACK helps in understanding

how well technology use in teaching is aligned with the pedagogical approach of the faculty and the content to be taught. The TPACK framework is central to the design of the interview questions in this study. Kirkpatrick's evaluation model (J. D. Kirkpatrick & Kirkpatrick, 2016) is a seminal framework used for program evaluations and therefore also contributed to the study as the evaluation framework for the recommended practices.

Participating Stakeholders

The stakeholder population of focus for the study was all faculty members at Northwestern who have completed the ETTF program. At least 100 faculty members had completed the program by the end of the academic year 2018-19. Data collection and analysis was conducted during the Fall 2019 and Spring 2020 terms.

As part of the qualitative research design, interviews and documents served as the primary instruments for data collection and analysis. Mixed Purposeful sampling (Creswell & Creswell, 2018; Johnson & Christensen, 2014; Maxwell, 2013; Merriam & Tisdell, 2016; Patton, 2014) was employed for the qualitative data collection methods. The interviews employed maximum variation sampling (Creswell & Creswell, 2018; Merriam & Tisdell, 2016) to incorporate a variety of perspectives.

Interview Recruitment Strategy and Rationale

Recruitment for the interviews was primarily carried out in partnership with the TLT team, which administers the ETTF program. Preliminary interviews were first conducted with members of the TLT team and those who served as consultants in the ETTF program. Program-specific documents were collected and analyzed to identify participants eligible for the study. The interview recruitment process involved emailing a listserv of all alumni of the program through the TLT program director to avoid direct solicitation. Participants who provided a

positive response to the email and reminders were recruited for the study. Furthermore, in an effort to ensure representation of gender, experience with teaching, including teaching at Northwestern, and the ETTF cohort, the TLT team further recruited additional participants for the study. Respondents for the interviews were selected to ensure representation of a wide number of departments, schools, and programs, including both undergraduate and graduate programs. In addition to instructors who specifically incorporated at least two BL tools in their teaching practice, the interviews also included faculty members who completed the program but did not start integrating BL tools in their regular teaching practice, thereby incorporating extreme-case sampling (Johnson & Christensen, 2014) resulting in maximum variation in the participants. Participants who either had a negative experience during the program, whose expectations were not met and those who did not complete the program were also recruited to incorporate negative-case sampling (Johnson & Christensen, 2014) and enrich the variability of perspectives in the study.

Interview Sampling Criteria and Rationale

Criterion 1. Interview participants must be faculty employed at Northwestern University who have completed the ETTF program. The scope of the study is limited to the evaluation of the ETTF program, which provides a natural restriction on the participants.

Criterion 2. Interview participants identified must be available for a 45-minute to one-hour online interview during the data collection period in Fall 2019.

Criterion 3. Two or three participants were selected from each school or department at Northwestern to help in the recruitment of a maximum variation sample.

Data Collection and Instrumentation

The primary instruments for data collection and analysis for the study were individual interviews and documents. In addition to interviews with the faculty, which were central to the study, scanning interviews with the TLT team and faculty consultants provided important context for the study. Documents and artifacts were collected early in the field research, were analyzed throughout the process, and informed the broader study-wide analysis. Details of each data collection method are provided in this subsection.

Interviews

Interviews are an important data collection method in qualitative studies that allow researchers to view the world from the participant's perspective and help understand "how people interpret the world around them" (Merriam & Tisdell, 2016, p. 108). Interviews are a source of rich, descriptive data and are especially useful when feelings or behaviors cannot be directly observed, and to gather a historical perspective from the participants, and the interaction between the two (Merriam & Tisdell, 2016; Patton, 2014; Weiss, 1993).

The primary objective behind conducting interviews in the study was to assess the knowledge influences on faculty integrating technology-based teaching and learning tools in their teaching practice. In addition to this, the interview also contained questions about the motivation and organizational influences, and some questions around the ETTF program. Interview questions were designed in the context of Clark and Estes' gap analysis framework (Clark & Estes, 2008), the TPACK framework (Koehler & Mishra, 2009), and Anderson and Krathwohl's taxonomy of the knowledge dimension (L. Anderson & Krathwohl, 2001), specifically around the conceptual and procedural knowledge. The interview protocol was finally

created using the research questions guiding this study as the filter and a realignment tool (Maxwell, 2013).

The interviews in the study were semi-structured, with the ability to contextualize further questions and probes based on the direction of the conversation with the participant. The semi-structured nature of the interviews allowed for the focusing of the interview questions during the interview, change their order, or probe in different ways to gather rich, descriptive data and truly capture the participant's perspectives (Bryman, 2016; Merriam & Tisdell, 2016).

Interviews were scheduled for time slots of 45 minutes to one hour, scheduled at the participant's convenience, and were conducted once per participant. The interview protocol is provided in Appendix B.

Online Interviews. In recognition of the geographical distances between the participants and myself, interviews were conducted online over a video conferencing platform. Bryman (2016) and Merriam and Tisdell (2016) discuss various limitations of online interviews that were incorporated while planning and scheduling interviews. Primarily, technical issues were avoided on both ends of the interview by providing specific and detailed instructions to the participants. Furthermore, rich observations, comments and memos were used during the interviews to document the non-verbal cues in the online environment.

In contrast to the limitations, online interviews also provide certain benefits over face-to-face interviews. Online interviews have the advantage of flexibility in scheduling, rescheduling, and last minute-adjustments in order to be more accommodating with the participants. Bryman (2016) also argued that convenience of online interviewing may encourage increased participation in the interview process. Another significant benefit of engaging in online interviews was the ease of recording and transcription.

Documents

In addition to interviews, documents were an essential and indispensable source of information in my study. Existing documents, those not created for a study, can be of vital importance in qualitative research (Bogdan & Biklen, 2006; Bryman, 2016; Merriam & Tisdell, 2016). Since the quality of documents within a context can vary, Scott (1991) recommends evaluating documents based on their authenticity, credibility, representativeness, and meaning. Since documents played a critical role in my research process, these lenses provided me with a way to filter documents down to ones that were core to my study.

Official documents were the largest category of documents that were collected, analyzed and included in the study. These primarily included course syllabi, courses on LMS, individual project charters, program management documentation, and other documents of a similar nature that provided insights into the ETTF program implementation and instructors' teaching practices. The documents provided the context and background to the study, in addition to informing the knowledge influences. These documents were primarily provided by the TLT team. Instructors were also asked for permission to access their course sites and syllabi to gain a better understanding of their teaching practice. Confidentiality and security of these documents were paramount, specific steps taken to safeguard these are discussed in the Ethics subsection later in this chapter.

Documents primarily served to assess knowledge and organizational influences for my study. Evidence of language, instructions, and purpose of technology use in course syllabi and courses on the LMS shed light on the level of integration and use of technology-based tools in courses. In addition to this, documents about policies and support structures helped in the understanding and analysis of critical organizational influences that affected the integration of

technology by faculty. In addition to assessing knowledge and motivational influences, documents also provided background information to the study and helped triangulate data from the interviews.

Data Analysis

Data analysis is the process of eliciting meaning out of the data collected. In a mixed-methods study, while data analysis is conceptually similar in meaning making, different strategies were used to analyze the qualitative components of the data (Creswell & Plano Clark, 2017). Data analysis in the study also involved consolidating the analyses from both components coherently.

In the qualitative paradigm, data analysis involves "consolidating, reducing, and interpreting what people have said and what the researcher has seen and read" (Merriam & Tisdell, 2016, p. 202). Keeping in mind that rich, descriptive data can be quickly generated, it was critical that the data analysis process began early in the data collection process (Bryman, 2016; Corbin & Strauss, 2007; Harding, 2013; Merriam & Tisdell, 2016). Thematic analysis was employed as the core data analysis strategy with coding playing a critical role in this inductive process. In addition to data collected by way of documents and interviews, memos and observer's comments recorded during data collection also played a central role in analysis.

A four-stage process for thematic analysis was used to iterate from the raw data to assertions, supported by the use of the atlas.ti software. A priori codes developed from the conceptual frameworks, such as knowledge, motivation, organizational influence, instructional approach, and technological fit, along with open coding formed the first stage of the analysis for both interview data and documents. To help with this, analytic tools such as questioning and making comparisons proved essential (Corbin & Strauss, 2007). The next stage of analysis built

upon the discrete codes to identify axial codes in the data. Building upon these, the third stage led to consolidation of themes and patterns. Finally, the themes and patterns were analyzed and consolidated leading to assertions.

Credibility and Trustworthiness

Credibility and trustworthiness of a qualitative study are essential for it to have an impact on the theory or practice in the domain (Merriam & Tisdell, 2016). The demonstration of these constructs in a study is a representation of the rigor with which it was carried out, both methodological and interpretive. Since qualitative research is inherently interpretive, establishing the validity of credibility of the outcomes of a qualitative study is relative and is dependent on the ontological and epistemological worldviews of the researcher and the consumers of the research (Creswell & Creswell, 2018; Merriam & Tisdell, 2016). The strategies used in establishing the credibility, trustworthiness, dependability, transferability, and confirmability of the study included triangulation, reflecting on my reflexivity, and peer-review, as recommended by seminal methodologists (Bryman, 2016; Creswell & Creswell, 2018; Maxwell, 2013; Merriam & Tisdell, 2016; Patton, 2014).

Triangulation served as my principal strategy to demonstrate the credibility and trustworthiness of my study. The study used multiple methods, in the form of interviews and documents, to establish the validity of my research. These multiple methods and sources of data were used to justify the themes and results, thereby ensuring that the research is not restricted by a single method or source (Patton, 2014).

Furthermore, I engaged in the data collection process adequately to achieve saturation. Interviews were conducted until such time when the responses are saturated in the attempt to amass all possible perspectives on the topic. Extending this strategy, the study also strived to

purposefully seek out data that may disconfirm my expectations as part of a negative or discrepant case analysis (Creswell & Creswell, 2018; Merriam & Tisdell, 2016), which was also supported by the sampling strategy for interviews.

Another strategy used to demonstrate the credibility and confirmability of the research is to not allow the researcher's "personal values and theoretical inclinations" to affect the conclusions (Bryman, 2016, p. 386). By being explicit about their biases in the dissemination of the findings and by being mindful of my reflexivity during data collection and analysis, the researcher ensured that the study's confirmability is well established. To ensure dependability and trustworthiness of the research, an audit trail was kept, meticulously documenting every step of the data collection and analysis process, rechecking transcripts for errors, ensuring consistency on coding, and using memos and observer's comments during data collection and analysis.

Finally, the dissertation proposal defense and the final dissertation defense served as a review process of the highest rigor to establish the credibility and trustworthiness of the study. This was complemented by the constant review during discussions with the dissertation chair and with other members of the program cohort.

Ethics

The focus of this study is to understand the context and interactions between faculty at Northwestern and their implementation of pedagogically grounded practices in teaching with technology aligned with the content to be taught, to analyze these by way of mixed-methods research, and to effectively communicate this to those interested. While planning the study, interacting with the participants during the data collection process, and analyzing data thereafter, well-established ethical practices laid out by scholars on the topic rooted in the principles of respect, beneficence, and justice were followed (Creswell, 2014; Glesne, 2011; Merriam &

Tisdell, 2016; Orb et al., 2001).

Permission was sought from the TLT team and Northwestern IT leadership to conduct the study as part of the planning and designing the study. This study, especially the evaluation aspect, will be beneficial to the TLT team and the ETTF program in making improvements. This purpose was also be communicated clearly to the participants of the study. As part of putting general ethical principles around human subjects research into practice, approval was sought for the study protocol from the Institutional Review Board (IRB) at the University of Southern California (USC). While enlisting participants for interviews and before engaging with them for data collection, participants were provided with information sheets that spoke to the details of the study, voluntary nature of their participation, their right to withdraw from the study at any point, the study's benefits to them and the broader community, and how the data would be analyzed and finally presented as part of the dissertation. During interviews, permission was sought from the participants to record the interview for the purposes of transcription. Furthermore, confidentiality of all data collected was ensured by storing digital data on a password protected and encrypted computer and physical documents and recordings in a locked storage compartment. Furthermore, pseudonyms were used for all participants and personally identifiable information was not used in the data analysis or the communication of the findings. Finally, instructors were asked to submit redacted versions of their course documents to avoid exposure to protected data. Having completed a series of trainings in the Family Educational Rights and Privacy Act of 1974 (FERPA), the researcher was also aware of their responsibilities and bound by law to protect personally identifiable information of the students.

In the interest of transparency, the researcher clearly spelled out their affiliation with Northwestern University and ensured the participants that participation, or lack thereof, in this

study will not affect any future engagements or opportunities and that my role in the context of this study is that of a researcher and not a Northwestern staff member. In the same vein, it was also made clear that the participants of the study would not be favored in future programs of a similar nature.

While there is not a specific set of rules to be followed in the collection and analysis of data in a qualitative study due to its descriptive and inductive nature, it was necessary to acknowledge the researcher's own assumptions, biases, power structures, and relationships with the study and its participants (Creswell & Creswell, 2018; Glesne, 2011; Merriam & Tisdell, 2016; Patton, 2014). Specific importance was placed on not disclosing information collected by documents that could potentially harm any direct or indirect participants of the study.

As a practitioner of instructional design and learning engineering, the researcher was also cautious and mindful of their values and principles and considered ethical sensitivities to ensure that their notions did not interfere with the data collection or analysis. In order to accomplish this, the researcher was diligent during the interviews to not lead the participants to a personal worldview and conducted the interview in the role of a researcher and not as an instructional designer. Furthermore, during the analysis of data, the coding process focused on the responses and the interpretations of what was answered rather than interpreting responses in the context of what were considered to be promising practices. Glesne's (2011) discussion of the various interactions of the roles between the researcher and the researched served as a guiding light as the findings of the study were collected, analyzed, and communicated.

Limitations and Delimitations

An important part of designing a study is to understand the inherent limitations and delimitations that interact with the various components and processes of the study. One limitation

of the study was the truthfulness of the participants. While it is expected that the respondents were truthful in their responses, this cannot be taken for granted. Another potential limitation is the recruitment of participants for interviews, especially during the semester when they have multiple responsibilities and priorities.

A significant delimitation of my study is centered around the use of specific research methods. Although class observations could potentially have been a rich source of data, it was decided to use interviews and document analysis in the interest of time constraints, potential disruptions in the classroom, and being cognizant of the geographical distances between the participants and the researcher. While there could have been several assumed KMO influences drawn from the conceptual frameworks, the scope of these were restricted to those most pertinent to effective technology integration.

Conclusion

This chapter discussed the methodological components of the study including the description of the stakeholders, specific qualitative methods that were used for data collection and analysis, and a discussion of ethical considerations surrounding the study and the role of the researcher. Chapter Four will provide an overview of the findings, including an assessment of the KMO influences. Chapter Five will discuss the findings and provide recommendations for future iterations of the ETTF program.

CHAPTER FOUR: FINDINGS

The purpose of this study is to examine the KMO influences affecting faculty integration of technology-based teaching and learning tools in their teaching practice through the ETTF program at Northwestern University. Chapter One introduced the problem of practice and laid out the following research questions for the study:

1. What are the instructor knowledge, motivation, and organizational influences related to achieving their goal of employing at least two technology-based teaching and learning tools in their teaching practice?
2. What is the interaction between organizational culture and context and stakeholder knowledge and motivation?
3. What are the recommended knowledge, motivation, and organizational solutions?

Chapter Two provided a review of pertinent literature and identified assumed KMO influences to be studied as part of the study. Chapter Three discussed the methodology and research plan guiding the study.

Chapter Four presents the findings from the data that were collected through semi-structured interviews and analysis of documents such as course syllabi, courses on the Canvas LMS, and ETTF program-specific documents. Data collected were coded, analyzed, and triangulated to evaluate the impact of the ETTF program on assumed KMO influences using the gap analysis framework (Clark & Estes, 2008). Assumed influences were determined to be validated as a continuing need if 55% or more participant responses, through interviews or document analysis, addressed the respective assumed KMO influence, and validated as a current asset if 80% of more participant responses addressed the respective assumed KMO influence. In the context of this study, validation of an influence as a continuing need suggests that there is a

need to address the influence as part of an intervention, whereas validation as a current asset suggests that there is less need to address the respective influence as part of an intervention.

This chapter is organized into sections discussing the profile of the study participants, followed by the presentation of findings corresponding to each aspect of the KMO influences. The themes section following the KMO findings discusses findings that were discovered from the data collected that transcended the KMO influences and were not a direct response to specific questions.

Participant Profile

The participants for the study were instructors from Northwestern University who had completed the ETTF. A total of 12 participants were interviewed from the participant pool. In order to protect their identity, participants have been assigned pseudonyms and are referred to with gender-neutral pronouns. The participants represent six of the 12 Northwestern University schools and each of the ETTF cohorts from the past five academic years is represented in the participant pool. Nine of the 12 participants also provided access to their syllabi and Canvas course as part of the document analysis for the study. Table 4 presents the characteristics of the study participants along with the domain of their teaching, mode of instruction, the primary technology-based tools and pedagogical approaches utilized by them, and a breakdown of the extent of their participation in the study.

Table 4

Participant Characteristics

Pseudonym	Domain of Instruction	Mode of Instruction	Primary Tools/Approaches	Participation	
				Interviews	Document Analysis
Alex	Journalism	Face to face	Experiential Learning	√	√
Bobby	Language	Face to face	Flipped Classroom	√	√

Charlie	Language	Face to face	Flipped Classroom	√	√
Drew	Language	Face to face	Flipped Classroom	√	√
Eli	Language	Online	Experiential Learning	√	√
Francis	Education	Online	Online discussions	√	√
Glen	Communication	Face to face	Video conferencing	√	
Harley	Political Science	Face to face	Interaction in a large class	√	
Indiana	Language	Face to face & online	Online discussions	√	
Jesse	Journalism	Face to face	Alexa	√	√
Kim	Engineering	Face to face	Video-based tools	√	√
Lee	Language	Face to face	Video conferencing	√	√

Knowledge Findings

The knowledge section of the study focused on examining how the participants of the ETTF program selected technology-based tools or approaches and aligned these with the content to be taught using their own instructional approach. This section also explored participants' ability to effectively integrate these tools and approaches in their courses and provide scaffolding and support to their students, leading to an enhanced learning experience. The two knowledge influences were identified as conceptual and procedural based on Anderson and Krathwohl's (2001) taxonomy of knowledge types, which includes factual, conceptual, procedural, and metacognitive. No new influences were discovered. Table 5 presents the two assumed knowledge influences of the participants and whether these were validated.

Table 5

Assumed Knowledge Influences

Assumed Knowledge Influence	Knowledge Type	Validation
Knowledge of how to select and align technology-based tools with pedagogy and content.	Conceptual	Continuing Need
Ability to integrate technology-based tools in the course.	Procedural	Current Asset

Each of the participants made significant use of the university-provided LMS, Canvas. This included the use of Canvas to share course material, post the syllabus, communicate with students, deliver and grade assessments, provide feedback on assessments, verify attendance, and conduct class-wide discussions. For the ETTF projects, the participants worked with their consultants, comprising of instructional design practitioners primarily from the TLT team, on identifying and functionalizing an advanced Canvas feature or an external complementary tool. While some of the participants entered the program with a specific tool in mind, nine of the 12 participants approached the program with a problem they faced or an opportunity to enhance the learning experience of the students and decided on a specific tool or approach in collaboration with their ETTF consultant. Interview data revealed that participants were evenly split between those wanting to attempt something novel using technology in their courses and those going through an iterative development in enhancing the students' learning experience through technology-based tools.

Selection and Alignment of Tools and Approaches with Pedagogy and Content

The first assumed knowledge influence, "Knowledge of how to select and align technology-based tools with pedagogy and content" was assessed through a combination of interviews and the analyses of course syllabi and Canvas courses. The interview questions that supported the validation of the assumed influence were:

- Would you please tell me about your ETTF project and discuss some of your reasons for integrating a new tool in your teaching practice?
- How did you go about selecting this tool?
- What role do learning objectives and outcomes play in the selection and integration of blended learning tools in your courses, if any?

The participants were further probed on the details of each of these questions to further understand the depth of their responses.

A majority of the participants successfully selected tools that were well-aligned with the content they taught and their pedagogical approach. As explained in Chapter Two, the TPACK framework explains that meaningful use of technology rests on the alignment between the content to be taught, the pedagogical approaches of the instructors and the feature set of the technology to be used (Koehler & Mishra, 2009). Participants used textual, audio and video-based tools to provide experiential learning opportunities, video conferencing tools to enhance students' learning, discussion tools for reflective opportunities, and various thoughtful approaches for effective language instruction. In cases where such alignment was missing, participants often intentionally made such choices in the interest of efficiency or future enhancements to the courses.

Experiential Learning

Six of the 12 participants had experiential learning at the core of their ETTF projects and made use of technology-based tools to mobilize the goal. Experiential learning is a form of learning in which the student is in contact the realities of lived experiences as opposed to classroom learning from lectures, books, and other course material (Keeton & Tate, 1978; Kolb, 2014). The participants provided students the experience of situating themselves in authentic environments through class work and providing a platform for reflection through technology-based tools. In one of their courses, Alex's students were engaged in a term-long internship at the time of the course and were asked to reflect weekly on their ongoing experiences through directed questions in a discussion-based format. Lee, a language instructor, brought in chefs, who were also native speakers of the target language, through video conferencing technology for

authentic exchanges. These interactions were well-aligned and complemented by the culinary theme of the course. Lee's students also engaged in cooking and discovering food of different regions where the target language was the most commonly spoken language. Figure 7 shows Lee's students in one of the course sessions engaging with the culinary theme of the course. Kim provided opportunities for students to prepare for video-based job interviews by supporting them in practicing such interviews and providing detailed and specific feedback to ensure success in their actual interviews. Jesse brought in Alexa, a voice-based assistant, as a marketing technology tool that was being studied in class for students to interact with and build upon. In addition to interacting with the tool, Jesse also led the students through the creation of ways to create conversational frameworks for Alexa. Eli, another language instructor, included museum visits as part of their course work and required students to reflect on their experiences through web pages created on Canvas. Reflecting on the outcome of the students' reflections, they explained that the course site "also became kind of like its own type of museum for the class because all of their little projects, you they could go back and see what others had posted, see the websites. The web page is created by students. So then it was like the mini museum for that class. That was the experience."

Figure 7

Lee and their students engaging with the culinary theme of their course

Analysis of course syllabi and the actual Canvas courses shed further light on the alignment of the tool, pedagogy, and content for experiential learning. Eli structured their Canvas course using modules to highlight the different forms of art the students were expected to engage with during their museum visits throughout the course. This allowed the students to engage use the digital courseware without additional cognitive load. Alex's use of social media was front and center on their Canvas course, highlighting how all students were expected to engage with the tool. In addition to this, they gave detailed instructions to the students on how to engage with each other on a weekly basis and encouraged the students to use media as part of their reflections in addition to text-based responses. Francis structured their course in a way such that their students were able to bring in their learning experiences from their life experiences, discuss and reflect on these experiences, and think about how their practice would change with the help of

what they learned in the course. Kim's assignments provided students with opportunities to engage with their assignments through video-based interviews as preparation for the authentic experiences the students would experience outside the classroom. They also provided detailed feedback to students on their submissions both on the content and the delivery of their video-based submissions. Through an analysis of interviews and documents, experiential learning as a pedagogical approach was well supported by modern technology and the examples above demonstrate a strong alignment between the pedagogical approach and the use of technology.

Video Conferencing Tools

A number of participants made use of video conferencing tools for different purposes. Participants Alex and Lee, internship supervisor and language instructor respectively, used videoconferencing to bring in expert guests to their courses. Alex wanted to provide students an opportunity to interact with experts in their field and better prepare for their upcoming experiential opportunities. Lee set up a time with experts in their field who were also native speakers in the target language from a number of different countries to provide an opportunity for students to ask questions and improve on their language skills. Lee preceded this activity with a preparation opportunity, during which students individually came up with questions and further curated them to be asked to the expert guest. Figure 8 shows Lee's students in one of the course sessions engaging with the guest chef, who is also a native speaker of the target language. Glen taught a communications course and wanted to provide a more organic experience to their online students. In addition to requiring them to use video conferencing to meet synchronously, they further asked the students to record these meetings and included a reflective assessment in which the students critiqued and evaluated their own communication approaches in group settings.

Jesse, who also teaches online courses, used videoconferencing for synchronous sessions and to discuss case studies.

Figure 8

Lee and their students engaging with the culinary theme of their course

While the participants who used video conferencing tools in their courses made it easy for the students to access the tool through their Canvas courses, the tool itself served in an auxiliary function to enhance the course. Francis, who taught their course online asynchronously, held optional synchronous sessions through video conferencing on a regular basis during which the students could interact with each other and the instructor to clarify concepts being taught.

Online Discussions

Ten of the 12 participants used the discussions tool within Canvas to provide an opportunity for students to reflect on their learning and experiences. Class-wide asynchronous

discussions are frequently used as an interactive pedagogical activity to complement live in-classroom discussions. These asynchronous interactions can also serve as an important reflective and metacognitive tool through deeper, thoughtful and trusting discussions (Dennen, 2013). Glen allowed their students to contribute to discussion in a textual, voice, or video-based format to "get a little bit more involved." Francis incorporated a gamification-based approach where they used game elements to make the discussions more fun and incentivize participation. Indiana used an external tool for their students' discussion that provided for a more social media-like experience and as a brainstorming space, which was then used for an in-class activity moderated by student groups. In Kim's course, attendance was mandatory and essential, but they were not happy with the existing attendance tracking tools. They used the discussions feature as an attendance tracking mechanism, where students were required to respond to a prompt provided at the end of the class in a discussion format. In addition to tracking attendance, this further allowed the students to reflect on their learnings from the class.

Participants who used online discussions as a core tool in their course provided detailed instructions and expectations within their syllabi and on their Canvas courses. Francis provided their students with "Discussion Board Etiquette Guidelines" as part of scaffolding students experience and encouraging inclusive and interactive discussions. Furthermore, since Francis used a gamification-based approach to their discussions through a custom-built tool, they provided a detailed introduction to the tool on how to engage with it. Examples of these instructions can be seen in Figure 9 and Figure 10. Alex laid out what the students had to turn in as part of the weekly logs and provided an example of a "well-written weekly log."

Figure 9

Francis provided detailed instructions on how to engage with the tool

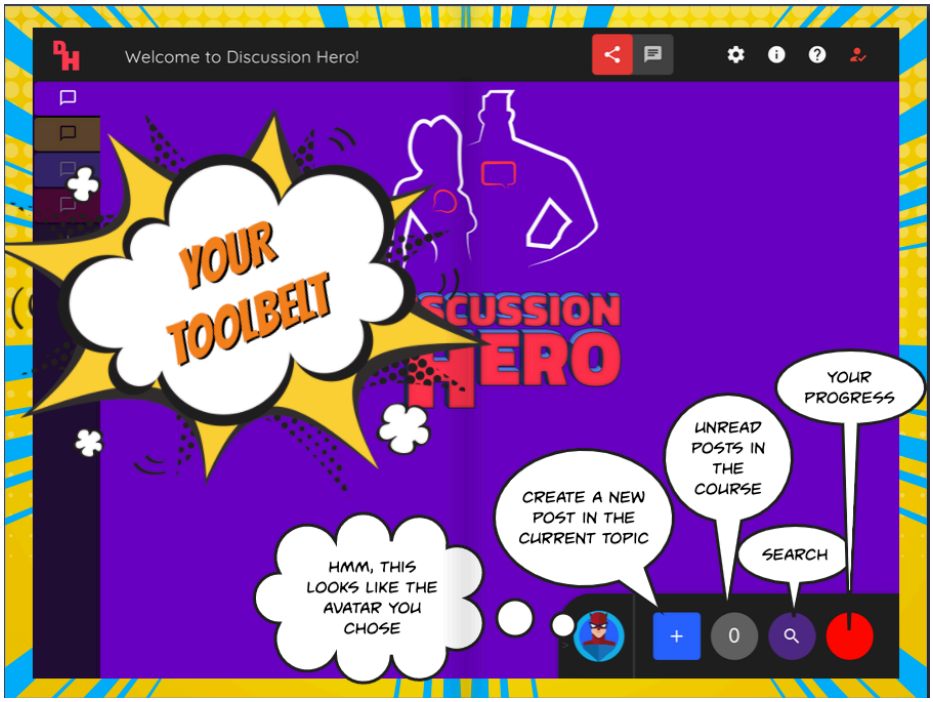
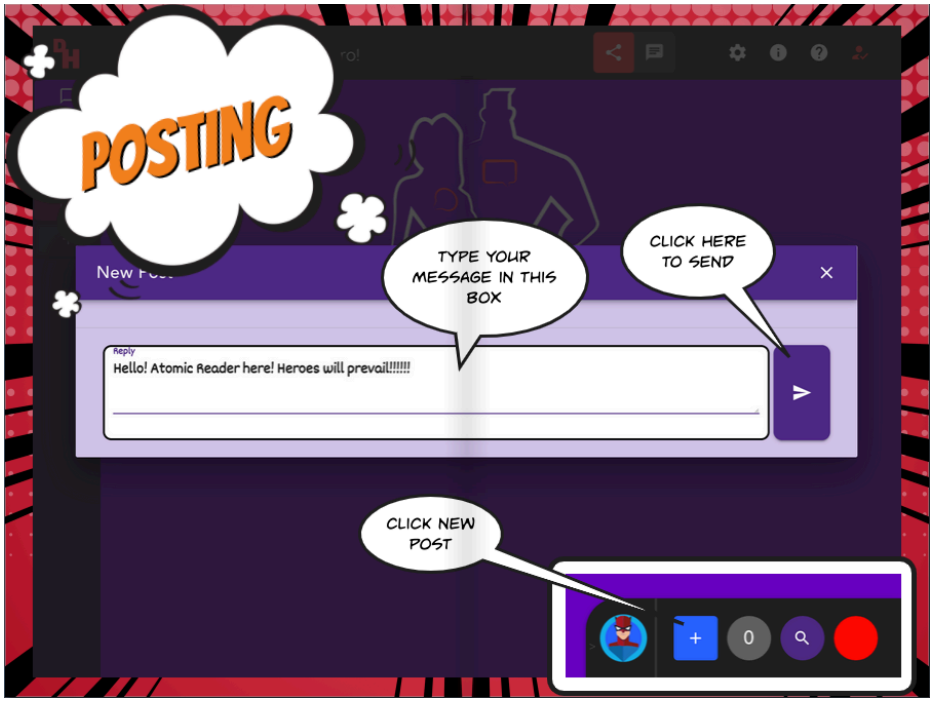


Figure 10

Francis provided detailed instructions on how to engage with the tool



Language Instruction

Six of the 12 participants in the study were language instructors and used a variety of tools and innovative approaches to provide their students with multiple opportunities to engage in language learning and practice at different levels of their language education. Participants Bobby, Charlie, and Drew worked together on a project to create short videos to allow students to learn and practice skills in a flipped classroom format. This allowed the students to work through the content at their own pace and in a comfortable setting. The participants explored multiple tools with their ETTF staff consultant to find the best fit to meet their objectives and decided on one that effectively combined ease of use for both themselves and the students. Two other instructors approached language instruction from an experiential learning perspective. Eli required students to visit museums as part of their class and reflect on their visits through discussions in the target language. Lee invited guest speakers located across the world in the target language speaking countries to interact with the students around a common theme. All six participants explored ways to best align their pedagogical approaches with a variety of tools that allowed them to innovatively enhance students' learning experiences.

While all the participants who were engaged in language instruction created a syllabus in English, their Canvas courses were primarily in the target language, providing an opportunity to students to immerse themselves in the language learning experience. Participants Bobby, Charlie, and Drew structured their Canvas courses in such a way that highlighted and emphasized their flipped classroom approach. Drew's Canvas course structure reflected the timeline and the content of the target language-based art that the students were expected to engage with as they progressed in the course.

While a majority of participants demonstrated the knowledge of selecting a tool and aligning it with pedagogy and content, the interviews also shed light upon some examples where such alignment was missing or unclear, and those in which the participants decided not to use a tool that was best aligned with the pedagogy and content. In one such instance, a participant wanted to involve the entire class in a thought experiment and used a built-in Canvas assessment tool to carry out the experiment. While various purpose-built polling tools exist for such a function, the participant asserted that such tools "weren't suiting my purposes" and had too many features for a simple experiment and found the built-in tool to be "kind of like it's a workaround, it ends up working well." In another instance, one of the participants went over the course material and structure in detail with their consultant to explore what enhancements could be made and finally decided to work on the course design and decided against using any technology-based tools. Even though a technology-based tool was not used in this case, such a decision demonstrates the participant's knowledge of the importance of alignment of the tool with pedagogy and content.

Integration of Tools and Approaches in the Course

The second assumed knowledge influence, "Ability to integrate technology-based tools in the course" was also assessed through a combination of interviews and the analyses of syllabi and Canvas courses sites. As part of the interview, the participants were asked to walk through the integration of the technology-based tools that they used with the help of the following probes:

- How do you introduce the tool to students, if at all?
- How do you discuss these in your syllabus, if at all?

- How did the ETTF program and mentor help you, if at all, in the integration of the tool in your class?

As highlighted in Chapter Two, the instructors' ability to effectively integrate technology-based tools in the course entails ensuring easy and sustained access to the tool, communicating the importance of the tool and its usage to the students, and connecting the use of the tool to learning objectives in the course (Bonk & Graham, 2005; Davis & Fill, 2007; Garrison & Vaughan, 2007). Additionally, Davis and Fill (2007) placed special emphasis on the instructor's ability to tie the use of technology-based tools to specific course objectives and communicating this to the students. Each of the participants made use of the Canvas LMS for their courses, ensuring simple and sustained access of course material to the students. Furthermore, a majority of the participants emphasized the importance of an organized Canvas course during the interview. Alex, Glen, and Kim explained that effective organization of their Canvas courses was one of their primary goals for participating in the ETTF program and that their consultants had supported them in achieving this goal. Alex explained that through Canvas, they had a "living, breathing syllabus" that could be adjusted as the class progressed. For the participants who used advanced Canvas features, these features were made easily accessible either through the course navigation, course modules, assignments, and sometimes in multiple ways through all of these. Participants who used tools beyond the Canvas in-built features ensured access to these tools from within Canvas as links or the Learning Tools Interoperability (LTI) standard, which allows various educational technology tools to interact with each other. For instance, the videoconferencing tool used by five of the 12 participants was made available through the LTI connected into the Canvas LMS.

Document analysis of the actual Canvas courses and syllabi provided by the participants further demonstrated the participants' ability to effectively integrate the technology-based tools in their courses. While most of the course syllabi discussed the use of the tool, none of them provided any instructions on how to contact support in case of technical issues. Although students can easily approach the information technology team for technical support related issues, providing such information explicitly in the syllabus can potentially save the students time, especially since every course invariable uses some form of technology-based tool in the form of the Canvas LMS or external tools. It is also important to note that Canvas-specific support can also be accessed from within the LMS itself.

In addition to making the tools easily accessible, a majority of the instructors discussed how it would be used in the course and demonstrated the use of the tool to the students. Nine out of the 12 participants discussed the tools that will be used in the course at the beginning of the semester. Interview participants Bobby, Charlie, and Drew accompanied their students to a computer lab for the introduction and the first demonstration of the tool, with technical support present in the lab in case of any issues. Jesse walked through an example of the use of the tool before having the students pair up and use the tool themselves:

> I'll walk through live, actually creating along with a very simple one. Show them how it works and then say, Okay, now pair up in groups of two and go off and create this one and then send it to me. And then the way it works is you can you can share one with somebody else. And then I'll say, Okay, let's play a couple who want to volunteer, and have them come up and explain what they were trying to do. And then they'll show off the thing. And it takes them, you know, the simple thing they could do in 15 minutes or less or its not a long time.

Indiana invited their ETTF consultant for a quick demonstration of the tool before opening it up to the students who "caught on very quickly." Francis discussed the purpose of the tool and engaged in a conversation about the importance of tool in an attempt to "engage them authentically." Harley projected a PowerPoint slide with explicit instructions whenever the students needed to the use the tool to engage with class material.

Analysis of the Canvas KPMG & Google courses provided further evidence supporting participants' ability to effectively integrate the tools and approaches in their courses. While all participants who provided access to their Canvas courses used a robust combination of various Canvas features to structure their courses chronologically or thematically, some courses were observed to be more structured than others. In Francis' course, each module was comprised of a video introduction followed by materials to read and analyze. The modules ended with an assessment that the students were expected to submit to successfully complete the module. Kim structured their Canvas course chronologically, with each module providing information on the materials and assessments for that week. Alex's course, centered around an internship, and took a simpler approach to Canvas providing simply a syllabus and the assignments for the students. Since the students were primarily engaged in work outside the classroom, this practice helped reduce their cognitive load and engage with the course easily. In general, the participants demonstrated good design practices in structuring their Canvas course, thereby validating the knowledge influence regarding their ability to effectively integrate the technology-based tools and approaches in their Canvas courses.

Connection to Learning Objectives

Almost all the participants were able to explicitly or implicitly connect the use of the technology-based tool to their learning objectives. In the case of two participants, the tool in

question was explicitly what was being learned and therefore had specific learning objectives associated with it within a specific module of the course. For a majority of the participants, the use of the tool was implicit in the learning objectives. One of the language instructors explained that they don't see "don't see how the tools help us match the objective except that they allow for independent learning like autonomous learning." Another participant rationalized that "there wasn't a specific objective that said that [use of tool], but there was a broader objective about being able to analyze effective teamwork." Half of the participants had a course objective that involved discussion in the class for which they all used a technology-based discussion tool in addition to in-class discussions.

In general, participants were able to demonstrate their knowledge of selecting appropriate tools and aligning them to their own pedagogical approach and the content to be taught to the students in a direct and precise manner. They further appreciated the support provided to them by their ETTF consultants on helping them think through the use of technology. Participants were also able to demonstrate their ability to effectively integrate the tools in their courses through the interviews and through an examination of their course syllabi and actual Canvas courses. Additionally, the support from their ETTF consultant was deemed to be essential to the success of their ETTF consultants.

Motivation Findings

The motivation section of the study probed the participants on why they decided to use the technology-based tool or approach in their teaching practice and examined influences that encouraged the sustained use of the tool, or the lack thereof. The interview questions in this section of the study also sought to understand the confidence of the participants in using a given tool and how they went about troubleshooting technological issues they may have faced during

the program. Table 6 presents the motivational influences of the participants and whether these were validated.

Table 6

Assumed Motivation Influences

Motivation Influence	Motivation Construct	Validation
Faculty need to perceive using blended learning tools in their teaching practice as facilitating increased student engagement or their efficiency.	Utility Value	Current Asset
Faculty should attribute their level of success in employing at least two new blended learning tools is due to their efforts rather than an inherent technological ability or lack thereof.	Attributions	Continuing Need

Faculty Value for Technology-based Teaching and Learning Tools

The first assumed motivational influence, "Faculty need to perceive using BL tools in their teaching practice as facilitating increased student engagement or their efficiency" was assessed and validated primarily through interview questions with support from document analysis. The specific question that supported the validation was:

- Would you please tell me about your ETTF project and discuss some of your reasons for integrating a new tool in your teaching practice?

This was followed by context-specific probes. Participants' Canvas courses, syllabi, and project charters and timelines were also part of document analysis to examine their role in this influence.

The salient finding from the questions probing participants' motivation in using a technology-based tool or approach was the ability of the tool or the approach to add value to their teaching practice. Chapter Two discussed how important it is that the instructor believe in the technology-based tools' ability to add value to their courses. This additional value can be in

the form of instructors' added efficiency by using tools (Atkinson & Lim, 2013; Garrison & Kanuka, 2004; Yadova et al., 2016) and by supporting the creation of an active learning environment by engaging students more (Han & Finkelstein, 2013; Lane & Harris, 2015). All but one participant asserted that technology was key to their course and they would not have been able to teach the course in the same if they did not have access to or did not use technology in the way they did. Interview participant Harley used the technology-based tool as an interactive system for a class-wide activity that could have been done without the tool, but would have been more time consuming or logistically difficult. All participants described at least one example in which the tool or approach supported the students in engaging with their instructor, their peers, or the course material. A majority of the participants also explained that they used various features of the tools they used to improve their teaching efficiency in processes such as communication, grading, distribution of course material, gathering student input, and in preparing for future courses. Other factors that participants listed as motivations for using a tool included reducing the monetary burden on students, improving their pedagogical approach, learning a new technological skill themselves, bringing out shared values among the students, and iteratively improving upon their courses.

Engagement

There was consensus among all the participants that the use of technology-based tools aided in engaging the students with their peers, instructor, the course material, and, in some cases, guest speakers and experts invited to the class to interact with the students. Alex explained that they break their long class into smaller pieces and use different ways to engage students using technology-based tools. Often, this included inviting guests using video conferencing and administering quizzes to break the monotony of the class. They added that it is difficult to keep

students engaged for the entire duration of the class and they "didn't care if it's Oprah Winfrey [lecturing], someone's not going to listen." One participant engaged a large lecture-based class by "doing things like poll the audience and show results of a poll in a visually accessible way."

Interview participant Francis used a gamified discussion in an online course as part of incentivizing students to "engage more authentically" with each other. Explaining that "it changes the dynamic between the students," they explained that the "student to student learning changes most dramatically" and the "student to teacher may change a little bit" resulting in peer interaction and peer instruction. Glen, who also taught online using video conferencing tools, asserted that it made the class "feel more organic, like an on-ground classroom to a certain degree" to avoid the feeling of being "put off by an online course."

Six participants were engaged in language instruction and each one of them used technology-based tools in a different way to engage their students and support the pedagogy of language instruction. Indiana used a social media-like discussion board to enhance their face-to-face classroom to have students "engage with the material in a more thoughtful and reflective manner." Using cultural diversity as the theme, they added that,

> …students led a portion of the instruction for the given day, the "cultural ambassadors" for the week led their fellow students in a reflection of the culture they were studying. They posted relevant videos and articles on the course-specific social discussion board. They then led the class in a discussion around their topic, how the culture influences the topic, and how it was similar or different from their own cultural experiences.

Lee invited chefs to the course, who were also native speakers of the target language for an authentic conversation in an interview format around the theme of food. Lee's students could "interact with their classmates, but [they] wanted to go a little farther." As preparation for the

interaction, students curated questions for the interview with the native speaker and even participated in a mock interview with the Lee as the interviewee. Bobby, Charlie, and Drew created interactive videos for students to engage with as they practiced the target language in their own time as part of a flipped classroom approach (Gilboy et al., 2015). Students could access these instructional materials on their own time, practice as many times as they would like, and proceed at their own pace. Another participant taught language using a historical perspective and required their students to visit museums as field trips. Students were expected to create multimedia documents during and about their visit and would use Canvas as an organization tool, thereby creating a "mini class museum within Canvas itself."

Analysis of documents in the form of ETTF program applications and project charters shed further light on the importance of engagement through technology-based tools. Eight of the 12 participants made direct references to the engaging nature of technology in their teaching practice. Lee said that students often learn about new cultures and languages from text and the internet, "but first-hand experience or learning about the culture from the native [language speaking] people can provide a richer learning experience." Another language instructor, Indiana, wanted "the students to engage with the material in a more thoughtful and reflective manner" and they wanted to achieve this by supporting students in posting "relevant videos and articles on the course-specific social discussion board. This would help the students in their preparation for leading a portion of the class instruction for a given day, during which they would "lead their fellow students in a reflection of the culture they are currently studying." Interview participant Eli took a similar approach in a language instruction class, in which they wanted to "give students a platform outside of the classroom to share their work and experiences." While Kim was not sure about what specific tool they were going to use at the beginning of the project, they

felt that "there [were] instructional tools/technologies that [they] could incorporate to make the class more engaging, and which could help individualize some of the concepts better for students."

Efficiency

A number of participants provided examples where the use of technology-based tools made them more efficient. These examples primarily revolved around the use of Canvas as a system that aided teaching and allowed them to reclaim time to be used for other purposes. While all participants used Canvas for course management, communication with students, and to administer and grade assignments, five participants placed special emphasis on the organizational features of Canvas and explained that the ability to share course materials easily and quickly was extremely important to them. Referring to their Canvas course as a "living, breathing thing," Alex said that sharing up-to-date PDFs was among the most important priorities and they often updated their courses with fresh material on a weekly basis. Reflecting on using Canvas as a common space for all students, Eli said,

> …certainly on the days when students would present everything was already there, they had posted it to, let's say, this discussion board. So then I didn't have to have wait for each student to come up and hook up their own computer and get to their Google page or whatever or their email. It was all right there, which made that day that we were sharing much easier and even the for the final project. You know, time is always of the essence… and if we didn't finish, I could even say, well, you guys are up next time and they wouldn't have to worry about that they would forget to bring it or you know, it was all there.

Glen spoke highly of the analytical data available in Canvas that helped to ensure that the students were engaging with the course material. With the help of student data on what was accessed on Canvas and when Glen was able to monitor and potentially intervene in cases where students may have fallen behind. Harley used the quiz feature on Canvas as a makeshift replacement for a student polling system since the tool recommended by their consultant "seemed too complicated" and students "are all familiar with Canvas and know where to go. It just seem[ed] simpler." Several participants also spoke highly of the ability to embed multimedia content within Canvas, thereby removing the need to share links to external resources through an alternative communication medium. For Kim's course, attendance was crucial for the students' success in the course and they were able to devise a way to use Canvas discussion boards as an attendance tool for students.

In addition to the interviews, analysis of ETTF program applications and project charters received from the participants further supported the use of technology-based tools in increasing instructor efficiency. Documents from eight of the 12 participated referenced the use of Canvas explicitly as a tool for efficiency in classroom management, course material management, grading, and attendance. Francis used multiple Canvas provided features "such as quizzes, assignments, custom learning outcomes, and third-party LTIs" to develop a gamified approach to online discussions. This allowed them to focus on the interaction between the students more than the creation of new features. Bobby, Charlie, and Drew utilized a flipped approach to their language instruction to "allow [their] students to get more exposure to the language outside of the classroom while [they] devoted class time solely to communication purposes." Alex used Canvas as a central hub where students "turned in all their academic assignments and I can read and comment on everything." Harley decided against a purpose-built engagement tool in favor of

a workaround on Canvas, primarily for efficiency with the aim of "minimizing confusion with process and time spent struggling with technology."

Reasons for Success or Failure

Faculty self-efficacy with technology use for pedagogical innovation is critical to their sustained use of technology-based tools and approaches. While participant involvement in the ETTF program through an application implies that they have confidence in the value of technology in teaching practice, their sustained utility of technology-based tools and approaches depend on how successful they are, what they attribute their success or failure to, and the quality of support and guidance they receive from their ETTF consultants. Moreover, technological proficiency in personal or professional contexts may not directly translate to the successful use of technology in pedagogical practice (Georgina & Olson, 2008; Kopcha et al., 2016). The second assumed motivational influence, "Faculty should attribute their level of success in employing at least two new BL tools is due to their efforts rather than an inherent technological ability or lack thereof" was validated primarily through interviews and an analysis of documents acquired from the ETTF program and the participants themselves. The specific question that was central to the assessment of this influence were:

- How would you characterize your comfort level with technology in general?
    - Did you face any technological hurdles during the project?
    - How did you go about solving them?
- What support did you have from the mentor in solving these?

All participants interviewed were proficient in their general use of technology, demonstrated through their extensive use of Canvas and their participation in the video conferencing-based interviews for the study. As discussed in Chapter Two, instructors' previous

experiences with use of technology may impact their motivation in using the tools in their teaching practice (Georgina & Hosford, 2009; Georgina & Olson, 2008). Eight participants provided specific examples of technological proficiency over the course of their ETTF projects. Alex explained that they were an early adopter of Canvas when the tool was introduced at Northwestern and was able to significantly improve skills in using it and other instructional technology services provided by the university. Jesse demonstrated awareness of a learning curve and had internalized a process for "adaptation and refinement" of tools that they would want to use in their teaching practice. With specific examples, they demonstrated a pattern of picking the right tools and services that met the teaching objective and discarding ones that did not. Charlie explained that they had to switch the tool they used mid-way during the semester due to the discontinuation of the previously selected tool. While the new tool was identified with the support of their consultant, they individually taught themselves the tool through practice, online resources and the documentation provided by the vendor. Jesse said they approached the ETTF program with a goal rather than a specific tool in mind and were open to learning whatever tool met the needs of the project. Harley said that they "always approach any piece of technology assuming that [they are] going to be able to figure it out," demonstrating self-efficacy.

There was a general consensus among the participants that their ETTF consultants were critical to the success of their projects. Eli "had a couple ideas … that [they] weren't sure how to implement those" and through the course of the ETTF program, they "worked with someone who had that technical knowledge to help" them and achieve the "kind of project based learning that was going to happen in this class." A number of participants had a preliminary conversation about the tools with their consultants and were confident in their ability to proceed without any support. They only reached out to their consultant when they ran into an issue they could not

solve their problems with basic troubleshooting. Three participants asserted that while they could use technology, they required continuous support from their consultant when it came to implement the idea or the design of their projects. Four participants stated that while their consultants were supportive in their ETTF projects, they did not necessarily feel like their consultants were more knowledgeable in regard to that specific technology.

Analysis of documents and Canvas courses demonstrated the successful use of technology-based tools but did not provide any insight into the process of setting those tools up. Moreover, the process of troubleshooting by the instructors, either individually or with support from their consultant, was not documented in a formal manner. While the use of the tools suggests successful use of the technology, it was not possible to triangulate this specific finding.

In conclusion, participants were able to express and demonstrate their motivations behind using technology-based tools in their teaching practice. Several participants asserted that technology-based tools added value to their teaching experience and their students' learning experience. Using technology-based tools also provided a means of being efficient for several participants. Participants also showed a willingness to troubleshoot problems by themselves and ask for help from their consultants and other technology experts.

Organizational Findings

The organization section of the study concentrated on understanding how the ETTF program supported the participants through interaction with the consultants and providing them with technical support, scaffolding, and resources. The participants were also probed on the what pedagogical and technological support resources they were aware of and had utilized outside the framework of the program to understand the organizational setting from a departmental or

university-wide perspective. Table 7 presents the organizational influences of the participants and whether these were validated.

Table 7

Assumed Organizational Influences

Organization Influence	Category	Validation
The university needs to provide adequate time, support, and resources to assist faculty in integrating technology-based tools into teaching practice.	Cultural Setting	Continuing Need
The university needs to encourage learning communities within the institution to support the integration of technology-based teaching and learning tools in faculty teaching practice.	Cultural Setting	Current Asset

Interaction with the Consultants

While the depth of interactions with the consultants varied widely, all participants asserted that they had a positive working relationship with their ETTF consultant. Each of the interview questions in the protocol built around the knowledge and motivation influences probed the participants on how the ETTF program or the consultant influence their decisions. While the interactions between the participants and the consultants were guided by a "Working Relationship" document (see Appendix C), individual participant-consultant paid interactions varied widely. The importance of these interactions and the ensuing relationship between the participants varied from long-lasting relationships in some cases to purely task-focused in others. The frequency of the interactions with the consultant varied widely among the participants and included scheduled face-to-face meetings, impromptu conversations with the participant dropping by the consultant's office, and asynchronous conversations over email.

Seven of the 12 participants explained that they worked closely with their consultant on exploring ideas for their courses and thinking about instructional approaches that would best suit the needs of the course. Glen described the initial interactions with their consultant as overarching conversations during which they "went through each module" and explored "areas where they could strengthen [the course]." Charlie explicated that their consultant "helped in finding what [tool] was available on the market" to meet the project objectives and also "helped set up meetings with the people from the company to really ask them if it could be a long-term solution for us and also what was in development on their side to see how much more interactivity we could get in the future." They further explained that they had been using a tool earlier that was discontinued, and the consultant took this into account to ensure a long-term solution for the project that would continue beyond the scope of the ETTF. Reflecting on the search for the right tool to engage students in her large lecture class, Harley said that their consultant "talked about a number of options" during the early conversations. While Harley ended up using the quiz feature in Canvas as a workaround, it was helpful to go through the exercise to look at different tools in depth. Another participant, Kim, said their consultant "was super helpful in terms of bouncing ideas back and forth."

Over the course of the project, different participants took different approaches in interacting with their consultants. While all the participants were assigned a consultant, some of the participants also involved other resources that were available to them through a previous engagement or from the school or unit they were a part of. Interview participant Francis had been discussing ideas about engaging online students with a faculty colleague, and collaborated with both their consultant and colleague over the course of the project. They enjoyed working with the consultant, who brought "great contacts, great resources, great ideas to the projects," but their

interaction with the consultant was limited to "two or three times over the course [of the project]." They elucidated that "it seemed like [the consultant] was always running, had a lot on their plate" and therefore chose not to "harass or bother" them. Jesse also explained that they missed out on developing a strong relationship with the consultant due to a variety of reasons that included missing some of the meetings and that the consultant left the organization towards the end of the program. Through the program, they started working with a colleague who was not the ETTF consultant but a dedicated resource for the school. Another participant, Kim, only had "a couple of meetings" with her consultant in addition to "one or two video calls," and further added that they "felt that [the consultant] was very accessible."

Project charters provided by the TLT team suggested several meetings between the participants and their consultants throughout the ETTF year. The length, frequency, and content of these meetings were determined primarily by the participants, the details of which were available for analysis. Participants often engaged with their consultants over email, the contents of which were also not available for analysis.

Support from the Organization

The assumed organizational influence, "The university needs to provide adequate time, support, and resources to assist faculty in integrating technology-based tools into teaching practice" was assessed through an interview question, with probes, and an analysis of publicly available institutional resources. The interview question and probes that were used to validate the influence were:

- What kinds of support are provided by Northwestern, both technological and pedagogical, that you are aware of?
    - Which of these have you utilized?

- (Probe) What did the ETTF mentor primarily support you with?

In addition to the ETTF program, there are a number of other resources available to the instructors at Northwestern to support pedagogical and technological needs. Interview participants were probed on their knowledge of the existence of these resources and to what extent they engaged with these before, during, or after their ETTF engagement. Participants identified the Searle Center, the TLT team, the technology support team within their units, and the digital learning website as resources.

The Searle Center for Advancing Teaching and Learning is a university-wide resource dedicated to pedagogical support available to the whole Northwestern community. While the ETTF program does not directly involve interactions with the Searle Center, the team that runs the program collaborates with the center frequently. The center independently consults with Northwestern faculty on an individual basis and runs a number of events throughout the year around faculty development, academic support, and assessment, evaluation, and education research. Five of the interview participants made direct references to engaging with the Searle Center when asked about other pedagogical resources provided by the university. Harley explained that they had participated in another program run by the Searle Center and found that while it was helpful, it had "a number of external requirements" while put a lot of demands on their time and contrasted this experience with the ETTF program which was relatively less time consuming. Interview participant Jesse said that they had independently reached out to the Searle Center when his class size changed and had attended at least five of their workshops. Kim was aware of the Searle Center and had participated in the piloting of another tool with them but did not engage with them much over a longer period. Francis used the resources provided by the Searle Center as a complement to the ETTF program:

> …the other thing that I really paid a lot of attention to was Searle. I went to a number of workshops over at Searle … so I used to go to a number of a number of workshops there, that was a great resource. … during the ETTF, I would regularly visit Searle's website, and I would look at how they, you know, would prepare rubric models, for example, assignment rubric models, and we ended up using the Searle model essentially for the rubric design, as part of [the tool used in ETTF] just because it was, you know, solid I mean they they've got a lot of really good material on this site as well.

An additional important source of ongoing pedagogical and technological support for the interview participants was the centralized TLT team and the IT teams in each school or unit. Alex had developed a personal relationship with a number of people in the TLT team and always "felt just so comfortable walking over and asking them a question" and that "they're so unscary and they never ever made me feel technically inept or anything, they just would help me figure out how to build it." Glen had developed a similar relationship with the TLT team and explained,

> I feel very comfortable, like calling up and asking questions, if I need to. That, and I feel like it's sort of an infinite resource because they're people I have relationships with, though, you know, so I can just say, hey, can you help me with this? Or can you help me with that? And they do. I don't know if that's how other people feel. But that's how I feel about it.

Harley also engaged often with the TLT team and utilized a mix of "Canvas walk in hours" made available by the team and scheduled consultations.

In addition to the central TLT team, different schools or units have their own dedicated teams that provide technological support to the students, faculty and staff. Six of the 12 participants described awareness or engagements with their own unit's dedicated teams. Francis

and Glen explained that their school had dedicated learning designers to support faculty teaching online. In addition to the human resources, their school also had a blog offering examples, suggestions, and recommendations around promising practices in effectively using technology in teaching practice. Describing the ease of soliciting support from their IT support team, Eli explained:

> …there are people right in the building if you have day to day little issues in the active classroom, so like when the light bulbs would burn out, or you have a mouse, I had a mouse the other day that was doing really weird things like it just wasn't working. And it turned out though, the cord was frayed. So, you know, it was just doing crazy things. And so there's that first line of defense is that there's you can pick up the phone in the classroom, and you can call someone.

Learning Communities

The second assumed organizational influence, "The university needs to encourage learning communities within the institution to support the integration of technology-based teaching and learning tools in faculty teaching practice." was assessed through an interview question, with probes, and an analysis of publicly available institutional resources. The interview question and probes that were used to validate the influence were:

- What are some avenues where you are able to discuss challenges around integrating technology into teaching in an ongoing manner, if any?
    - In what ways do you participate, if at all, in the community of current and former ETTF awardees?
    - In what ways do you participate, if at all, in a department, school, or university-wide communities to discuss these challenges?

Participants identified three examples of learning communities (LCs) at Northwestern in which they participated. Chapter Two discussed the importance of cognitive, social, and teaching presences provided by a community in enriching educational experiences through the CoI framework (Garrison & Akyol, 2013). The LC that was directly connected to ETTF involved regular meetings in which the cohort came together to discuss their projects, learnings, and challenges. These meetings often involved a speaker in the form of an expert or an ETTF alumnus sharing their experiences. Another example that was closely connected with the ETTF program was TEACHx, an annual teaching and learning-themed conference organized by the TLT team in collaboration with the Provost's office. Finally, a number of participants also participated in conversations with other members from their unit or department, or the university, outside of the ETTF context.

Regular ETTF Meetings

While all ETTF fellows were required to attend the ETTF kickoff meeting and other meetups over the course of their participation, participants explained that the interest and participation in these meetings tapered off as the year progressed. Over the course of years in which ETTF has run, the structure of the program has changed to accommodate the varied participant schedules and has moved away from numerous all-cohort meetings towards smaller group meetings. Five of the 12 participants provided examples of these meetings, which helped them in successfully completing their projects and learning about technology-based tools and approaches that supported them in improving their instructional approach. Describing the ETTF meetings, Eli said that they enjoyed participating in the "demonstrations of different possibilities" that could "incorporate in their classroom." Alex further added that they "felt

inspired" by what was shown and discussed in these meetings. Jesse reflected on the first ETTF meeting,

> The ETTF meetings were wonderful. I met so many colleagues, you know, when I went to my first ETTF meeting, I really didn't know anybody you know. I was just, it was like, my first time getting to know the community there at Northwestern. And people were so friendly. People were so inviting you know, showed me different resources.

Kim said that they weren't aware that the ETTF meetings were required, but they did attend "some lectures about Universal Design for Learning and these kind of concepts." Jesse elaborated that while they were aware of the cohort meetings, they felt the meetings were "pretty inactive" and did not serve as "an ongoing, vibrant resource" that they expected but did develop a relationship with some individuals within the cohort "for help with some particular thing."

The ETTF application clearly specified that attendance to regular cohort-wide meetings were required for all participants of the program. When the specific dates were known, these were made available to the participants at the beginning of the program. Other dates were made available as they were confirmed. Records of these meetings were not made available to me and therefore I am unable to confirm the participants' frequency of attendance to these meetings.

TEACHx

TEACHx is an annual teaching and learning focused conference organized at Northwestern by the TLT team in collaboration with the Provost's office towards the end of each academic year. TEACHx began in 2016 as a showcase for ETTF projects and quickly evolved into a larger gathering for the entire Northwestern community as an avenue to discuss opportunities, challenges, and promising practices around teaching and learning, usually involving technology. While presenting at TEACHx was a requirement of the early ETTF

cohorts, now they are only required to attend TEACHx, with a recommendation to make a presentation.

Of the 12 participants interviewed, eight participants have presented at TEACHx, with some participants presenting on multiple topics over multiple years. One additional participant explained that they attended TEACHx but did not present. Francis said that they have attended TEACHx every year and "it's just been fantastic … finding out what people are doing and how." Kim added that they "love TEACHx" and it's one of their "favorite conferences."

TEACHx program details and presentation information from the past four years supported the validation of the participants' presentation and attendance (TEACHx, n.d.).

Other Learning Communities

In addition to ETTF meetings and TEACHx, participants also provided examples of participating in other structured or unstructured LCs within their units or schools, across Northwestern, and even outside the university. Alex, who ran an internship program, shared their experiences with another internship program that later adopted the use of Canvas within their program. They described the increased use of Canvas in this way as "more bang for the buck" since "a ton of students now use it for these for-credit internship experiences and not just for traditional classes." Six of the 12 participants interviewed were language instructors in a variety of languages and explained their participation in the "council of language instruction" as a learning community for all language instructors. Eli explicated on her interaction with the council and cross-pollination between the LCs that they participate in,

> … council is open to anyone who's faculty or teaching faculty in languages and we meet a couple times a quarter. And once a quarter, usually we have what's called a breakfast meeting where people can share if, you know we're if we're teaching... And so, I did put

> together a talk called curating, about, you know, this course essentially that highlighted this course. And all the different parts of it, saying look, this was made possible by ETTF and I encourage you all to apply. But it was also kind of looking at the pedagogy of this course and how I designed the course and looking at it from a language perspective, a third year university level bridge course, what kinds of source texts that I use all of that, but the technology was certainly one aspect of that presentation. … it was TEACHx that inspired me to even take it one step further and say I'd like all my language teaching colleagues to do a project like this too, because I found it so fulfilling, and it's great for our curriculum.

One participant reflected critically on their experiences and said that they felt that the unit could do more in terms of innovating within language instruction. They added that some of the students discussed the pedagogical approaches within different classes, but the culture within the university did not support innovation in teaching practices.

Participants were generally appreciative of the support and resources made available by the program and the university to support the use of technology-based tools in their teaching. They asserted that the ETTF program was a good start and can potentially be expanded upon to cast a wider net to include more instructors in future instances. Reflecting on additional support that the university can provide, interview participants expressed the need for incentives, recognition, and developing a culture of experimentation in teaching across the university.

Themes

In addition to validating the assumed influences, interviews and document analyses also provided insight into themes that transcended the KMO paradigms. While the interview and document analysis protocols primarily included items focused on validating the assumed

influences, responses from the participants shed light on themes that were not originally assumed. The two themes that resonated across the participant group revolved around the use of technology to reduce the monetary cost of education for students and to engage in self-directed learning to improve their own teaching practices.

Monetary Cost to Students

The increasing cost of higher education participation and the inequity resulting from such high costs, and the benefits derived from participation in tertiary education is well documented (Abel & Deitz, 2014; Clotfelter, 2014; Webber, 2016). Instructional materials, such as textbooks and case packets, represent a substantial share of the cost of higher education, especially in the United States (Hilton et al., 2014). More than half the students opt to not buy textbooks in any given semester, which can cost about $1,200 per year (Open Textbook Alliance, n.d.; Ozdemir & Hendricks, 2017). At Northwestern, students are expected to budget more than $1600 per year for books and supplies (Northwestern University, n.d.-a).

Participants in the study discussed reducing the monetary costs for students as a motivation behind their use of technology-based tools and approaches. Five participants defended the use of technology-based tools as crucial in supporting students by making resources available to them at no cost. While Bobby, Charlie, Drew, and Eli used their tools to supplement readings with the end goal of eliminating the need for students to buy textbooks, Alex had succeeded in making the course textbook free and was proud of having achieved that. Explaining that they "tried very hard to make [their] classes cost no money," Alex made resources available to the students in the form annotated PDF. This further allowed them to curate and update resources every time they taught the class. Charlie explained that they hoped their ETTF project

would result in a "great quality tools for students" and that "they wouldn't have to pay $180 to get a book every quarter."

Open Educational Resources (OER) are free, easily available and distributable instructional materials that instructors can use in lieu of traditional expensive textbooks to help reduce the monetary burden on students. Open source textbooks are "faculty-written, peer reviewed textbooks that are published under an open license" and are increasingly preferred by both faculty and students due to their accessibility, customizability, and high quality (Martin et al., 2017; Open Textbook Alliance, n.d.; Ozdemir & Hendricks, 2017). From an institutional perspective, Northwestern supports the use of OER by its instructors and even provides incentives to instructors in the form of grants under the Affordable Instructional Resources (AIR) program (Northwestern University, n.d.-a). While none of the participants made a direct reference to the AIR grant at Northwestern, scanning interviews with the TLT team suggested an increased focus on OER for future cohorts in partnership with the library.

Self-Directed Learning

Another theme emerged from the interviews and document analyses in the form of participant's practice of engaging in self-directed learning (SDL). A central paradigm in andragogy, SDL is the centered around an individual's ability in exercising "independence in deciding what is worthwhile to learn and how to approach the learning task, regardless of entering competencies and contextual contingencies" (Garrison, 1997, p. 18). In the context of the study, a significant motivation behind instructors' use of technology-based tools and approaches in their teaching was to improve their own teaching practices through SDL.

While the ETTF program does involve regular check-ins with consultants and cohort-wide meetings, participants were expected to engage in a significant amount SDL. While

participants did not use the terms “self-directed learning” or “SDL” in their responses, all participants demonstrated their use of SDL principles in learning new pedagogical approaches and familiarizing themselves with new technologies. Jesse used ETTF as an opportunity to themselves learn about the voice-based assistants, the tool they used in teaching. Describing their motivations behind participating in the ETTF program, Francis reflected,

> I've always, you know, liked to approach, you know, technology with a very open mind. Also, … I'm always looking for different ways to approach online learning, I think that, you know, that there's much that we need to learn much that we need to discover much that we need to, you know, to try out and, and so this was just a logical step for me to approach this.

Glen, who taught online, said,

> I was really interested in learning any sort of new methods or new ways of doing things online that I might not have learned about. And second of all, teaching is my focus as far as like, I get really interested in talking about teaching and learning about teaching and finding new ways to do things. So anytime something presents itself where I can learn more about pedagogy, I'll do it I'll usually apply for it.

As students and instructors engage with more technology-based tools in their learning and teaching experiences, the ability to quickly and independently learn the features of the tool is critical to success. While institutions and service providers can provide technical support, the integration of the tool in the learning environment is primarily up to the instructor.

Conclusion

This chapter presented findings from the interviews and document analysis carried out as part of the study. These findings validated the assumed KMO influences identified in Chapter

Two. In addition to the assumed influences, two themes were identified that emerged from the data and transcended the KMO influences. Table 8 provides an overarching list of the assumed KMO influences and their validation status.

Table 8

Knowledge, Motivational, and Organizational Influences

Influence	Category	Validation
Knowledge of how to select and align technology-based tools with pedagogy and content.	Knowledge – Conceptual	Continuing Need
Ability to integrate technology-based tools in the course.	Knowledge – Procedural	Current Asset
Faculty need to perceive using blended learning tools in their teaching practice as facilitating increased student engagement or their efficiency.	Motivation – Utility Value	Current Asset
Faculty should attribute their level of success in employing at least two new blended learning tools is due to their efforts rather than an inherent technological ability or lack thereof.	Motivation – Attributions	Continuing Need
The university needs to provide adequate time, support, and resources to assist faculty in integrating technology-based tools into teaching practice.	Organizational – Cultural Setting	Continuing Need
The university needs to encourage learning communities within the institution to support the integration of technology-based teaching and learning tools in faculty teaching practice.	Organizational – Cultural Setting	Current Asset

Chapter Five will focus on the recommendations. implementation plans, and evaluation plans to support Northwestern University's mission of excellence in teaching and how technology-based tools can play a part in achieving the mission.

CHAPTER FIVE: DISCUSSION

The purpose of this study was to examine the KMO influences affecting faculty integration of technology-based teaching and learning tools in their teaching practice through the ETTF program at Northwestern University. Chapter One introduced the problem of practice and situated the study with the following research questions:

1. What are the instructors' knowledge, motivation, and organizational influences related to achieving their goal of employing at least two technology-based teaching and learning tools in their teaching practice?
2. What is the interaction between organizational culture and context and stakeholder knowledge and motivation?
3. What are the recommended knowledge, motivation, and organizational solutions?

Chapter Two explored existing literature focused on the topics of technology use for teaching and educational development practices, and identified assumed KMO influences to be studied. Chapter Three detailed the methodology and research plan guiding the study. Chapter Four presented the findings analyzed through interviews and an analysis of documents.

The purpose of this chapter is to recommend practices that Northwestern University can implement to support excellence in teaching, one of the key pillars of its mission. These practices are synthesized from a combination of the findings from the study, and an analysis of promising practices in other similar organizations. The chapter also provides an implementation plan for these practices, followed by an evaluation plan modeled on Kirkpatrick & Kirkpatrick's framework (2006). The chapter concludes with a discussion of how the COVID-19 pandemic has highlighted the use of technological tools for teaching and make suggestions for future research in the domain.

Discussion of Findings

Of the six assumed influences posited by the literature review in the domains of KMO influences, three influences were validated as current assets, and three were validated as continuing needs. Validation of an influence as a continuing need suggests a higher need for intervention as compared to the low need for intervention for influences validated as a current asset. Additionally, two themes were identified from the interviews and document analysis that transcended the KMO influences.

In the knowledge domain, participants' ability to select and align technology-based tools with their content and pedagogy was studied, along with their skills in integrating the tools in their courses. While participants demonstrated thoughtfulness in selecting and using tools in their courses, the alignment with pedagogical theory was ambiguous. With the support of their ETTC consultants, participants were able to enhance their students' learning experiences through practices such as experiential learning and online discussions through effective use of the LMS and associated technology-based tools. While all courses had explicit learning objectives, the connections between these learning objectives and the technology-based tools were implicit at best. Keeping in mind that this study interviewed past participants in the program, who can be considered to be self-selecting and early adopters, support for large-scale adoption of technology-based tools for other faculty at the university will need to be intentional, structured, and systematic.

From a motivational perspective, the study sought to understand how much value technology-based tools added to the participants' teaching practice and the self-efficacy of the participants in using these tools. All but one participant explained that their courses would not be the same without the technology-based tools that they used. The use of these tools made

participants more efficient and increased engagement between the instructor and the students, within the students, and between the students and the content being taught. While all participants demonstrated general proficiency with technology, they explained that interactions with the ETTF consultants were crucial to their success in the program, and some of them would have preferred even more engagement with their consultants than what the program provided. Problem solving with technology involved participants finding solutions on their own through searching the internet, exchanges with the consultants, and through other school, department, and university-provided resources.

From an organizational perspective, all participants demonstrated knowledge of the school, department, and university-provided pedagogical and technological resources, such as the Searle Center for Advancing Learning and Teaching, school-specific information technology teams, and other LCs. While all participants were aware of the existence of these resources, only a few of them engaged proactively with these resources. Participants also highlighted the importance of time required in redesigning courses and incorporating technology in their teaching, and explained that prioritizing learning and using technology-based tools was not trivial.

In addition to the findings aligned with the KMO influences, participants also highlighted how technology-based tools supported reducing the monetary burden on students and the role of technology in improving their own teaching practice through SDL. Several participants explained that sharing freely available resources through the LMS helped students save textbook costs and allowed participants to keep their materials current. Participation in the ETTF program also allowed several participants to engage in SDL as they researched the best technology-based

tools for their courses and studied resources that would help them effectively use these tools in their teaching practice.

Recommended Practices and Implementation Plan

Following the analysis of key findings and further literature review on faculty development programs and technology integration in teaching practice, several recommendations are proposed that can be grouped into three categories. The first category addresses recommendations to strengthen the structure within the ETTF program. Next, recommendations that address structure around the ETTF program are proposed. Finally, recommendations focused on incentives and recognition to increase participation and success in the program are offered. Each recommended practice is accompanied by a potential implementation plan and timeline that the organization can implement. Table 9 provides an overview of the validated KMO influences along with the aligned recommended practice.

Table 9

Knowledge, Motivational, and Organizational Influences with aligned recommended practice

Influence	Category	Validation	Aligned Recommended Practice
Knowledge of how to select and align technology-based tools with pedagogy and content.	Knowledge – Conceptual	Continuing Need	Structure in the program Structure around the program
Ability to integrate technology-based tools in the course.	Knowledge – Procedural	Current Asset	Structure in the program Structure around the program
Faculty need to perceive using blended learning tools in their teaching practice as facilitating increased student engagement or their efficiency.	Motivation – Utility Value	Current Asset	Structure in the program Structure around the program
Faculty should attribute their level of success in employing at least two	Motivation – Attributions	Continuing Need	Structure in the program

new blended learning tools is due to their efforts rather than an inherent technological ability or lack thereof.			Incentives and Recognition
The university needs to provide adequate time, support, and resources to assist faculty in integrating technology-based tools into teaching practice.	Organizational – Cultural Setting	Continuing Need	Structure around the program Incentives and Recognition
The university needs to encourage learning communities within the institution to support the integration of technology-based teaching and learning tools in faculty teaching practice.	Organizational – Cultural Setting	Current Asset	Structure around the program Incentives and Recognition

Structure in the Program

The ETTF program accepts a diverse group of instructors each academic year. The diversity is observed in the teaching experience, technological understanding, pedagogical understanding, and the objectives of the instructors. In order to increase the chances of each project's success, more structure in the program is required to better understand and incorporate the diversity of the individual members in each cohort. This structure can be achieved by revisiting the current practices around the grouping of instructors in the program, standardization of processes in the program while keeping individual consultations personalized, and by increasing scaffolding and accountability through better enforcement of individual project charters.

Grouping

An effective way to improve the chance of success in the program is to divide the cohort into smaller groups based on individual instructors' prior knowledge, technological expertise levels, or even the specific tool they are looking to implement in their projects. Grouping within the program will provide both cohort-based and topic-based benefits (Lee, 2010). Furthermore, such groups can take advantage of peer-learning within the groups and benefit from collegiality

and community, and overcoming "pedagogical solitude" (Ellis & Ortquist-Ahrens, 2010; Shulman, 1986).

The implementation of this recommendation would begin when the applications are received by the ETTF program committee. Once the ETTF applications are evaluated and successful applications are invited to participate in the program, the program committee can divide the applications by a common theme, technology or approach, or the technical expertise of the instructors. Each of these groups can be assigned to a specific consultant who can then plan out the upcoming year in the ETTF journey. This will also allow a standardized approach across groups while allowing for personalized interactions between the consultant and the instructors.

Standardization

The ETTF program can also benefit from increased standardization of processes among the consultants while keeping the personalized interactions between the instructor and the consultants intact. Interviews with the participants revealed several differences across consultants in the frequency of consultations, the context of the meetings, and the engagement between the instructor and the consultant over the program. This standardization could include practices such as regular check-ins at the beginning of the month or communication going out at the beginning of the week. Standardizing process across the group on consultants will provide a consistent experience to the instructors and support the continuity of the program in case of a disruption. Two standard practices that the program can implement in the immediate term are (a) starting the consultation process with pedagogical alignment between the instructors and the consultants and (b) including the Searle Centre for Advancing Teaching and Learning, Northwestern's teaching and learning center, in early consultations. The recommendation of standardizing processes does not suggest adopting a standardized way to engage in the consultation, which should be avoided

as the focus should be on the instructor's needs and expectations and not on that of the consultant's (Stanley et al., 1997).

Project Charters

Project charters are documents that outline the plan, implementation details, and the timeline of the projects in the ETTF program (see Appendices D and E for the last two iterations). While each instructor is required to submit a project charter as part of their application into the program, these charters aren't always revisited as discovered during the document analysis in the study. These charters can be given more importance in future iterations by projecting them as the working contracts between the instructor and the consultant. In addition to increasing accountability, the charters can also serve as an essential tool for scaffolding throughout the program.

From an implementation perspective, the project charter included in the ETTF application can be reviewed by each instructor-consultant pair in the first one-on-one meeting, and this will become the working agreement for the remainder of the project. The consultant should hold the instructor accountable for the charter and the timeline. Instructors and consultants should meet one-on-one at least once a month for consultations and check-ins, with the possibility of increased frequency depending on the respective schedules. The consultant group should also meet as a group once a month to discuss the progress of their instructors and support each other.

Table 10

Implementation plan for creating structure in the program

Recommended Practice	Specific Recommendation	Timeframe (relative within the year of ETTF)	Action Steps
Structure in the program	Grouping of instructors by prior knowledge, technological ability, or theme.	As part of the application evaluations.	Program Committee decides on groups for a given year.
		After acceptance decisions are made and before decisions are communicated.	Consultants are surveyed and assigned to specific groups.
	Standardization of consulting processes	Yearly, prior to the beginning of the cohort.	Program Committee decides on frequency, modality, and group-wide communication standards.
		Soon after the first meeting between instructor and consultant.	Required consultation with the Searle Center for Advancing Learning and Teaching (example standard process)
	Focused implementation of Project Charter	Part of the application process	Applicants submit proposed Project Charter as part of the application
		First individual meeting between the consultant and the instructor.	Accepted instructors and assigned consultant review Project Charter.
		Throughout the program.	Project Charter is used as the working agreement for the year and serves as a scaffolding and accountability instrument.

Structure Around the Program

Educational development within an institution can and should take a variety of forms, including workshops, individual consultations, institutes, classroom observations, and symposia or conferences (Ellis & Ortquist-Ahrens, 2010; Lee, 2010). While instructors at Northwestern have access to several avenues for educational development, as understood from the interviews, these opportunities are scattered across the university. With teaching as a critical part of the mission, educational development at the university must be a strategic endeavor. A strategic plan focused on educational development can bring together different avenues across the university. The ETTF program, a part of the strategic plan, will also need a mission statement to better focus

its activities. The development of such a plan will require forging partnerships across the university focused on educational development. The strategic plan and the partnerships can result in a structured educational development program at Northwestern that incorporates the efforts of the individual schools and departments and places the ETTF program as a mid-tier opportunity for instructors to improve their efficacy of technology use in teaching.

Strategic Planning

Strategic planning is a critical management tool employed by universities for long-term planning. Northwestern University's mission statement emphasizes teaching, and therefore it is imperative that educational development be a vital part of the university's culture. Programs such as ETTF that focus on digital pedagogy and the promotion of technology use in education are critical to educational development programs. The TLT team, the administrative owners of the ETTF program, will also benefit from engaging in a smaller scale strategic planning of how their efforts support the larger university-wide educational development. The ETTF program would benefit from a mission statement and specific targets to be met over the short, medium, and longer terms. To truly develop a holistic plan, the TLT team will also need to reengage their current partners and build new partnerships across the university.

Partnerships Across the University

Educational development programs need to engage with several partners across the university to be successful. These partnerships include centralized administrative units focused on academics, such as the office of the provost and the library, individual schools and departments, and university-wide departments such as marketing, facilities, and technology services. At Northwestern, the TLT team has engaged regularly with the Provost's office and the Searle Center for its programming. While the partnerships with the individual schools and

departments are not focused on programming, the TLT team serves as a centralized avenue for communications between professionals engaged in instructional design and technology across the different schools. A strategic initiative focused on educational development will require a number of these partnerships to be activated and result in holistic programming that will utilize resources across the university.

The ETTF program can benefit from numerous other resources available at Northwestern. This may include partnerships and consultations with the Searle Center for Advancing Learning & Teaching (Searle Center), the office of the provost, and individual schools and units. Structured opportunities for instructors to consult with the Searle Center, as a formal component of the ETTF program, will allow the projects to be more pedagogically grounded and student-centered. Such an enhancement in the ETTF program also brings in the central pedagogical resource of the university as a stakeholder in the project. Additionally, partnerships with the Provost's office or individual school administrations can provide a path for promising projects to be continued beyond the academic year and improved upon with additional incentives such as funding, course reduction, research publications, and potential recognition.

Multi-Tiered Programming

The ETTF program will benefit greatly from a more focused positioning within the broader educational development programming across Northwestern. The program currently accepts applications from all instructors, which results is a broad spectrum of instructor abilities, motivations, and resources. Interviews in the study highlighted a large variance in technological ability and efficacy, pedagogical grounding, and aspirations within instructors engaged in the program. Programming around educational development could be increased both in the number of opportunities available and the level of engagement in the individual programs. One-off

workshops, which are already provided both by the TLT team and individual schools, could be provided as part of larger educational programming at the university. The ETTF program would serve as a mid-tier, year-long opportunity. More involved, multi-year projects could be provided for those interested in a more involved program with a specific focus. As such, the program will benefit from a tighter set of applicants filtered from a larger pool. A multi-tiered program is also better positioned to support instructors across different stages of their careers (Austin, 2010).

From an implementation perspective, programming aimed at a wider audience can take the form of regular workshops delivered centrally by the TLT team or individual schools. The ETTF program can require completion of such programming as a pre-requisite to applying for the program. Existing programming such as the recently instituted Advanced Digital Learning Certificate Series would make for an ideal candidate as a steppingstone to a structured program such as the ETTF (Digital Learning, n.d.). In such workshops or workshop series, which would be open to all instructors regardless of their prior experience or technological ability, instructors can move at their own pace depending on their schedules, motivations, and aspirations. The ETTF program could be positioned as requiring more time and resource commitment for instructors than individual workshops, but less than a higher tiered funded grant that requires or looks favorably upon participation in the ETTF.

One of the ways for instructors to expand on their ETTF projects may be to apply for funding through the Provost's office or their individual schools. The previously active Provost's Digital Learning Fellowship, a funded fellowship opportunity, can be reviewed and resuscitated to advance excellence in digital learning at Northwestern in partnership with the TLT team and individual schools and departments. Funding sources will need to be identified from the TLT

office, the Provost's office, individual schools, or a combination of these. Over the longer term, external funding agencies can also be identified to apply for grants for promising projects.

Table 11

Recommended practices for enhancing structure around the program

Recommended Practice	Specific Recommendation	Timeframe	Action Steps
Structure around the program	Develop a strategic plan focused on educational development	Academic Year 2021-22	TLT develops a mission statement and strategic plan around the ETTF program
			Senior administration develops an educational development strategic plan
	Revisit existing partnerships and create new partnerships	During and after the strategic planning process	TLT team and Searle Center engage with individual school, departments and central units at the organization to collaborate on building educational development programming
	Design a multi-tiered education development program	Academic Year 2021-22	Design and Develop open workshop series for all instructors regardless of prior experience or technological ability
			Redesign ETTF to focus on projects with instructors who have consistently participated on introductory workshop series or those with prior experience
			Revisit the Provost's Digital Learning Fellowship as a potential continuation program to promising projects from the ETTF

Incentives and Recognition

Incentives and recognition are powerful ways to increase participation and the quality of the ETTF projects. While there is not a monetary incentive to participate in the ETTF, non-monetary incentives such as the ability to publish the work in a journal can be promoted within the cohorts. More substantial incentives, such as grants or reduced course loads, can be provided for more involved projects graduating from the ETTF. Formal public recognition of the

participants may also increase the motivation of the participants. Completion of the program can be recognized in the form of a physical or digital certification that will become a part of the instructor's teaching record and can be used as part of evaluations, reappointments, and promotions (Austin, 2010). The year-end TEACHx summit, where several ETTF fellows disseminate their project experiences, provides an opportunity for the participants to be recognized by a senior leader in a purposeful session carved out as part of the program.

Incentives such as the ability to publish a study as part of the ETTF can be advertised in promotional material and information sessions. Further incentives can be identified as part of the strategic plan development around educational development at the university. The ability to include the completion of the program can serve as both incentive and recognition for instructors across different stages of their careers.

Recognition of successful completion of projects can be implemented through the issuance of digital credentials and acknowledging the participants at year-end events, such as the annual TEACHx conference (TEACHx, n.d.). The ETTF committee will need to identify a service provider to issue physical certificates and digital credentials to successfully completed projects. This recognition can become a part of the instructor's record of excellence in teaching and can be a part of the evaluation and promotion dossiers. The same platform can also be used to recognize the participation of faculty in other educational development programs such as the Advanced Digital Learning Certificate (Digital Learning, n.d.). Since the annual TEACHx conference is also organized by the TLT team, it can invite the Provost or another senior academic officer to recognize the successfully completed ETTF projects as part of the TEACHx program. The TEACHx program can also include a session dedicated to the discussion of the

previous year's ETTF projects allowing participants to reflect on their journey and be recognized by the invited academic officer.

Table 12

Recommended practices for incentivizing and recognizing ETTF participation

Recommended Practice	Specific Recommendation	Timeframe	Action Steps
Incentivize and Recognize ETTF participation	Incentives	Throughout the ETTF program and immediately after it	Instructor and consultant design a study to accompany the ETTF program leading to a publication of the work done in the project.
		After the ETTF program	TLT team, Provost's office and individual schools partner to provide additional incentives such as course load reduction and monetary grants to promising ETTF projects
		During instructors' performance evaluation	Instructor adds the ETTF program to their dossier as part of their application for reappointment or promotion
	Recognition	During TEACHx	The Provost or a senior academic officer formally recognizes ETTF participants

Evaluation Plan

Evaluation is a critical process in determining the effectiveness of plans, programs, or interventions. Kirkpatrick & Kirkpatrick (2006) provide a comprehensive framework to evaluate training programs. While initially designed to evaluate corporate training programs, the framework is transferable to many other contexts and will form the primary evaluation framework for the practices recommended in this study. The framework is centered around four dimensions of evaluation—Reaction, Learning, Behavior, and Results—representing a sequential method of evaluating with increasing complexity. Since the ETTF program is relatively new and has not been evaluated in the past, this study can serve as a baseline in future evaluations of the

program. The evaluation plan suggests methods to evaluate each recommended practice across all four levels, followed by an overview of the plan in Table 13.

Level 1: Reaction

The first level of evaluation in Kirkpatrick & Kirkpatrick's framework (2006) measures the immediate reaction of participants in a program, also a measure of customer satisfaction. A positive reaction to a program increases the likelihood of participants' motivation to learn. In the context of the study, a positive reaction to individual consultations is critical to the success of the program. An enhanced structure within the program is expected to provide for a more consistent experience to instructors, thereby contributing to a positive reaction. In creating structure around the program, the different levels of programming will provide an opportunity for workshop leaders to assess the reaction of participants. A positive reaction to the early programs increases the likelihood of instructors to engage with future workshops and potentially future levels of educational development available to them. Finally, reaction to incentives and recognition of participants can be measured during information sessions and TEACHx, respectively.

Level 2: Learning

The second level in Kirkpatrick & Kirkpatrick's framework (2006) measures learning through changes in attitude, knowledge, and skill. Kirkpatrick & Kirkpatrick (2006) define learning as "the extent to which participants change attitudes, improve knowledge, and/or increase skill" (p. 22) as a result of a program or intervention. While the reaction is measured immediately after a program, learning is measured after the participants have had a chance to reflect and apply the outcomes from the program. In the ETTF program, learning can be described as the instructors' increase in knowledge and skills required to use the technological tools they have acquired in their contexts. This may include actions such as building out the rest

of the course independently after a course design consultation or running a class with an engagement tool after practicing the usage with the consultant. Evaluating learning for the structure around the program would result in instructors' ability to understand how the different options available to them support their educational development journey through different levels of programming and by taking advantage of partnerships developed by the TLT team. Learning can also be assessed by a change in instructors' attitudes through incentives and recognition built around the program.

Level 3: Behavior

The third level of evaluation measures the extent to which participants transfer learning to their contexts through sustained behavior. More complex than learning, the behavior should be measured after the participants have had time to consistently demonstrate their learning over time or in multiple contexts. In the context of this study, behavior can be measured by instructors' ability to apply the knowledge and skills gained in the program in different courses and contexts after the completion of the program. A well-structured program will provide the instructors'' with various tools allowing them to bring about a behavioral change in their teaching practice. With a good structure around the ETTF program, instructors' participation in other programs and partnerships continuing their educational development journey will also signify a behavioral change. Successful incentives will result in a behavioral change when they succeed in drawing instructors to the program being incentivized. Instructors' actual usage of digital credentials as part of their evaluation and promotion dossiers and job applications will also demonstrate a behavioral change.

Level 4: Results

The most important dimension of Kirkpatrick and Kirkpatrick's (2006) framework evaluates the impact that the program or intervention has on the participants' work or practice. Results are the most difficult to measure as several different factors, including those outside the context of the program or intervention, may lead to a significant impact on the participants' work. The most significant indication of results from the ETTF program will be an enhancement in students' learning experience as a result of improved teaching practice through technology. Grouping of instructors, standardization in processes, and successful implementation of the project charter should result in instructors' ability to use technology in their teaching practice effectively. The structure around the ETTF program will also contribute to instructors' increased efficacy in using technological tools through sustained participation in increasing levels of education development. Successful use of incentives and recognition will finally result in instructors' motivation to engage with education development with the final goal of impacting students' learning experience.

Table 13

Overview of the Evaluation Plan

Recommended Practice	Level 1: Reaction	Level 2: Learning	Level 3: Behavior	Level 4: Results
Build more structure in the ETTF program through grouping participants, standardizing processes, and enforcing the Project Charter	Verbal reactions at the end of each group meeting and consultation Observation of group discussions	Regular check-in by the consultant Class observation	Survey or interview one year after the completion of the program Future consultations outside the program Class observation	Student evaluations Class Observation

Enhance the structure around the ETTF program by developing a strategic plan for educational development, creating multi-tiered programming, and engaging in university-wide partnerships	Reactions sheets for pre-ETTF workshops	Survey to assess potential participation	Returning participants in different programs Engagement data from partners	Participation across all educational development programs
Providing incentives for participation and recognizing the completion of the program	Reaction sheets at the end of information sessions Session evaluation at the end of TEACHx session	Repeat participation in educational development programs Acceptance and usage of digital credentials	Questions in the pre-program survey focused on incentives Use of digital credentials in evaluation dossier	Career growth Recognition of participants' teaching

COVID-19

During the course of this study, the COVID-19 pandemic had forced most educational institutions to transition to remote teaching due to global school and university closures. Instructors and students all over the world, including those at Northwestern University, were forced to rapidly transition to technology-based tools to continue their education. Due to lack of time and resources, this rapid transition took the shape of replicating face-to-face courses to an online environment, and has resulted in disengagement, fatigue, and lack of satisfaction from both instructors and students (Gardner, 2020; Mcmurtrie, 2020a, 2020b). While several universities, associations, publications, and individuals have quickly provided resources to support instructors and students through these difficult times, the pandemic has put a spotlight on technology use in teaching (ACUE, n.d.; Darby, 2020; Supiano, 2020).

While the COVID-19 pandemic is a crisis, it is also an opportunity for instructors to rethink their pedagogical practices going forward. The use of technology in teaching provides

value by allowing instructors and students to engage in teaching and learning practices that are simply unavailable in the traditional face-to-face classroom. While the use of tools such as the LMS is increasing, this crisis provides an opportunity for instructors to rethinking the blend of technology use in their teaching practice (Bonk & Graham, 2005). Asynchronous teaching practices allow for deeper learning, and technology-based tools allow for an increased focus on asynchronous learning while reserving the precious face-to-face time for shared meaning making (Bruff, 2019; Dennen, 2013; Stanford, 2020). In light of this opportunity, the practices recommended in this study provide one potential pathway for institutions to support their instructors through thoughtful educational development.

Suggestions for Future Research

As the use of technology becomes more ubiquitous in teaching and learning practices, institutions should explore meaningful opportunities for instructors to engage in educational development. While the use of technology is specific domains is well documented, further research could explore ways in how these practices can be scaled to an institutional level effectively. The role of instructional designers and technologists in these contexts should also be studied to provide institutions clear paths for implementation. Longitudinal studies focusing on the development of programs within institutions and comparative studies on the efficacy of structured educational development programs across institutions will support effective programming for institutions.

Conclusion

The purpose of this study was to assess the efficacy of the ETTF program at Northwestern University. The case-study approach explored the KMO influences on instructors' use of technology in their teaching practice. Through interviews and document analyses, the

KMO influences were validated, and practices were recommended to further strengthen the educational development programming at Northwestern.

With an increasing number of students participating in tertiary education, technology is key to make higher education more available and accessible to all those who want to pursue it. It is imperative that instructors understand the importance of technology in this pursuit and are provided with the right training to make effective use of the various affordances of various technological tools. The increasing rise in online education and recent global events such as the COVID-19 pandemic has demonstrated that while technology is ubiquitously available, its effective use requires intentionality and pedagogical training. Through effective educational development and structured support, instructors can engage in intentional, pedagogically driven, and systematic use of technology in their teaching practice.

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Footnotes

[1]Blended Learning (BL) is often used interchangeably with Hybrid Learning (HL). In the context of this study, I use BL to discuss the spectrum of learning environments which combine face-to-face instruction with online tools. HL would be a specific example of a BL where the instruction is delivered primarily online with a co-location requirement in the program.

[2]Learning engineers are a family of professionals with expertise in different facets of pedagogy and technology. Instructional designers, instructional technologists, learning experience designers, learning designers, etc. are terms used interchangably in the industry to refer to these professionals.

Appendix A

University of Southern California
Rossier School of Education
Waite Phillips Hall

Intentional, Pedagogically Driven, and Systematic use of Technology in Teaching Practice

You are invited to participate in a research study. Research studies include only people who voluntarily choose to take part. This document explains information about this study. You should ask questions about anything that is unclear to you.

PURPOSE OF THE STUDY

This research study aims to understand how faculty at Northwestern University who have completed the Education Technology Teaching Fellowship (ETTF) program integrate technology into their teaching practice.

PARTICIPANT INVOLVEMENT

If you agree to take part in this study, you will be asked to participate in an hour-long recorded interview over a video conferencing platform. You do not have to answer any questions you don't want to answer.

PAYMENT/COMPENSATION FOR PARTICIPATION

You will not be compensated for your participation; however, if you are interested, the researcher will share with you the results of the study once completed.

CONFIDENTIALITY

The data will be stored on a password protected computer until after the study has been completed and the researcher has graduated, at which point the data will be destroyed. Additionally, your responses will be aggregated with other participant responses and your name will not be attached to any quotations used in the final report. In general, your responses will be made anonymous through pseudonyms and removing identifiable characteristics.
The members of the research team and the University of Southern California's Human Subjects Protection Program (HSPP) may access the data. The HSPP reviews and monitors research studies to protect the rights and welfare of research subjects.
When the results of the research are published or discussed in conferences, no identifiable information will be used.

INVESTIGATOR CONTACT INFORMATION

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IRB CONTACT INFORMATION

University of Southern California Institutional Review Board, 1640 Marengo Street, Suite 700, Los Angeles, CA 90033-9269. Phone (323) 442-0114 or email irb@usc.edu.

Appendix B

Interview Protocol

- How did you hear about the ETTF program?
    - What motivated you to apply for the program?

- Please discuss some of your reasons for integrating new technology in your teaching practice.
    - (Probe) Please provide me with an example of a time when you felt integrating technology helped to engage students.
    - (Probe) Please provide me with an example of a time when you felt integrating technology made you more efficient.
    - (Probe) How did the ETTF program help you, if at all, in thinking through your original motivations?

- How do you select a technological learning tool to use in your teaching?
    - (Probe) How does your teaching style affect the tool selection, if at all?
    - (Probe) How does the content you are teaching affect the tool selection, if at all?
    - How did the ETTF program and mentor help you, if at all, in the selection of the tool?

- What role do learning objectives play in the selection and integration of blended learning tools in your courses, if any?
- What role do learning outcomes play in the selection and integration of blended learning tools in your courses, if any?

- Walk me through how you integrate technological learning tools in your class.
    - (Probe) How do you introduce the tool to students, if at all?
    - (Probe) How do you discuss these in your syllabus, if at all?
    - How did ETTF program and mentor help you, if at all, in the integration of the tool in your class?

- Redesigning a course to include technology takes a significant time commitment. What are your thoughts on this statement?
    - (Probe) How do you go about prioritizing the redesign of courses to include blended learning tools?
    - How did the ETTF program and mentor help you, if at all, in the time management around the integration of the tool in your class?

- Some faculty members claim they are “technologically challenged.” What are your thoughts on this?

- What kinds of support are provided by Northwestern, both technological and pedagogical, that you are aware of?

    - Which of these have you utilized?
    - (Probe) What did the ETTF mentor primarily support you with?

- What are some avenues where you are able to discuss challenges around integrating technology into teaching in an ongoing manner, if any?
    - In what ways do you participate, if at all, in the community of current and former ETTF awardees?
    - In what ways do you participate, if at all, in a department, school, or university-wide communities to discuss these challenges?

Appendix C

Educational Technology Teaching Fellows Program: Our Working Relationship

Consultant Responsibilities:

- Your consultant will meet with you at least once per month to provide advice, assistance, and feedback.
- Your consultant will help with researching and implementing pedagogical best practices.
- Your consultant will serve as a technical advisor for Canvas and facilitate technical support as needed.
- Your consultant will recommend other educational technologies as applicable.
- Your consultant will connect you with other individuals internally and externally who may be able to provide insight and guidance.
- Your consultant and at least one additional consultant will attend class and/or observe online interactions during the pilot implementation of the project and provide feedback.

Faculty Responsibilities:

- Faculty will build their Canvas sites and implement other educational technologies with consultant guidance.
- Faculty will attend all meetings and will present at the final showcase.
- Faculty will participate in milestone setting and actively work to achieve those milestones.
- Faculty will share their experiences (both successes and challenges) and outcomes with the other Educational Technology Teaching Fellows and the broader Northwestern community.

Going Beyond Educational Technology Teaching Fellows (optional):

- Based on faculty and consultant interest, there may be opportunities to collaborate on research and conference presentations related to projects.
- After participating in the program, fellows will be given priority in piloting new learning technologies and learning apps.
- Educational Technology Teaching Fellows will be provided with access to the alumni listserv to stay connected after the program.
- After completing the program, fellows may be given opportunities to present in future years at Educational Technology Teaching Fellows meetings and events and/or appear in Northwestern Information Technology promotional materials.

Appendix D

Educational Technology Teaching Fellows
Project Charter

Draft v. X

Project Name:	**Project Owner(s):**	**Today's Date:**
Problem / Opportunity:		
Goal:		
Objectives: 1.	**Success Criteria:** 1.	
Deliverables: 1.		
Assumptions, Risks, Obstacles: 1.		

Appendix E

Educational Technology Teaching Fellows
Project Charter & Timeline

Today's Date: ENTER DATE HERE

Project Owner: ENTER YOUR NAME HERE

PROJECT CHARTER:

Project Name: ENTER PROJECT NAME HERE

Project Description, Problem, or Opportunity: DESCRIBE YOUR PROJECT HERE

What does success look like for your project? DESCRIBE WHAT YOU THINK SUCCESS WILL LOOK LIKE HERE

Potential Obstacles: IDENTIFY ANY POTENTIAL OBSTACLES HERE

PROJECT TIMELINE:

Enter the milestones for your project, along with their anticipated dates of completion, in the table below. Add more rows as needed.

Project Milestone	Anticipated Date of Completion
Sample: Complete planning	12/15/2017
Sample: Pilot in winter course	3/5/2018
Sample: Evaluate pilot and update for full launch in spring	4/1/2018