THE INFLUENCE OF EPISTEMOLOGICAL BELIEFS, PEDAGOGICAL APPROACHES, AND COURSE DELIVERY MODES ON FACULTY USE OF LEARNING MANAGEMENT SYSTEMS IN HIGHER EDUCATION

by

Shea Walters

A Dissertation
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The Influence of Epistemological Beliefs, Pedagogical Approaches, and Course Delivery Modes on Faculty Use of Learning Management Systems in Higher Education

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Dedication

This is dedicated to Leilani Funaki, a dear friend whose life was taken way too early. Leilani supported me every step of the way throughout this journey and it was extremely important to me to ensure that I finish this degree for the both of us. She was the driving force behind me sticking to the plan that we laid out together prior to her passing. Leilani had a brilliant mind, provided me with amazing support, was my advocate, and one of the best people I have ever known. She is a huge reason I am where I am today, and I will forever be grateful to her for that. The world lost an amazing soul, and not a day goes by that I do not think about her and try to channel her brilliance.

I would also like to dedicate this dissertation to my amazing husband, Mark Walters. I would not have been able to complete this without his unwavering support. The sacrifices he made so that I could complete this journey were tremendous. He stepped up not only as a husband, father, and my best friend, but also as a cheerleader, stress relief, and motivator.

Finally, this dissertation is dedicated to my son Finn, and to my second child, currently residing comfortably in my stomach. May they always know that I did this, in part, for them so that they can see that any goals and dreams they have can be attained. Reach for the stars, my loves.

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List of Abbreviations

Actual Use....AU
Affordance-Based Design....ABD
Amount of Actual Use....AAU
Attitude Toward Live-Text....AT
Attitude Toward Using....ATT
Behavioral Intention to Use....BI
Concept Knowledge....CK
Content Management System....CMS
Design-Based Research....DBR
Descriptive Discriminant Analysis....DDA
Facilitating Conditions....FC
Familiarity with Live-Text....F
Learning Management System....LMS
Pedagogical Content Knowledge....PCK
Pedagogical Knowledge....PK
Perceived Ease of Use....PEOU
Perceived Efficacy....PSE
Perceived Usefulness....PU
Perception of Organization Support....POS
System Quality....SQ
Task-Technology Fit....TTF
Technological Content Knowledge....TCK
Technological Knowledge....TK
Technological Pedagogical Knowledge....TPK
Technology Acceptance Model....TAM
Technology, Pedagogy, and Content Knowledge....TPACK
Technology-to-Performance Change....TPC

Abstract

THE INFLUENCE OF EPISTEMOLOGICAL BELIEFS, PEDAGOGICAL APPROACHES, AND COURSE DELIVERY MODES ON FACULTY USE OF LEARNING MANAGEMENT SYSTEMS IN HIGHER EDUCATION

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This dissertation describes the impacts that higher education faculty members' epistemological beliefs, pedagogical approaches, and the course delivery mode of what they teach has on their use of learning management systems (LMSs). Specifically, this research reflects on how these constructs impact how often tools within the LMS, Blackboard Learn, are used, how they are being used by faculty members and why faculty members choose to use the tools they use. This study begins with an affordance analysis of Blackboard Learn to determine the pedagogical affordances that the tools within it provide for faculty. Additionally, the author conducted a literature review inclusive of how LMSs were currently being used by instructors, factors that were influencing the use of LMSs, and how epistemological beliefs, pedagogical approaches, and course delivery modes were previously found to impact technology and/or LMS use. This was a mixed methods research study including data collection from a survey,

followed by focus groups. The findings from this study are discussed at length in this paper.

Chapter One: Introduction

Technological innovations have led to the increased use of technology within the field of education, leading to significant changes to the way in which information can be presented and how learning can take place. Because of the technological progress that occurs almost daily, the conditions and environment that today's learners are engaged in continuously influence how they access information (Tauber & Wang-Audia, 2014). As the use of technology in education has increased, so has the development of new tools for learning, linking teacher and students, students and students, and students and learning tools (Kasim & Khalid, 2016)

As an educator Taylor (2014) found the integration of technology into educational contexts was changing the processes of teaching and learning. In the past, "learning was not dynamic, it was not interactive, it was not intuitive, and it was certainly not in any way self-directed" (Taylor, 2014, p. 79). This traditional approach to teaching and learning established a challenge for educators with regards to understanding the capabilities of the technology available to them and how to implement technology while effectively meeting the needs of learners. Furthermore, instructors must be cautious and ensure that when they are using technology for online instruction, they are not transferring what they do in the classroom and delivering it over the web (Dabbagh, 2008).

As the Internet came of age, learning interactions and pedagogical models evolved, which also brought more open and flexible learning spaces and afforded multiple forms of interaction (Dabbagh et al., 2019). With the introduction of the Internet, and particularly the rise of online learning, educators were forced to think about how to represent content on the web and how to connect students with the content and with one another (Peruski & Mishra, 2004). One such tool that became widely available in higher education contexts during this period, with a goal to meet these needs, in the learning management system (LMS) technology. This not only enabled educators to deliver instruction to learners at a distance but also opened the door for learning aligned with pedagogical principles. Technology enabled virtually every teaching model or strategy and became an empowering agent for its users (Dabbagh et al., 2019). However, the way in which technology is used can potentially impact the quality of learning that takes place, and thus it is important to understand the capabilities of these technology tools and systems to ensure learning effectiveness.

For example, Web 2.0 tools enables learning interactions that are more constructivist in nature, however many instructors are not capitalizing on the pedagogical affordances of Web 2.0 tools and are primarily using them to disseminate content rather than to create active, constructive, authentic, or intentional learning (Dabbagh et al, 2019). Pedagogical affordances, in accordance with technology, refer to the unique features and characteristics of technologies that add value to the learning experiences (Burden & Atkinson, 2008). Web 2.0 tools allow learners to partake in “high levels of dialogue, interaction, collaboration, and social negotiation through social networks” and

also provide "learners with the ability to generate and share knowledge through learning networks" (Dabbagh et al., 2019, p. 21). Designers, instructors, and facilitators can use LMSs in this way. When it comes to the successful use of LMSs, studies have been conducted that linked student use of an LMS to an increase of student engagement (Filippidi et al., 2010; Jo Kim & Yoon, 2014). However, DeLone and McLean (2003) posited that simply saying more usage will yield more learning benefits is not enough and suggested that the nature, quality, and appropriateness of LMS use are important outcomes. As this will become more evident in this paper, the research shows LMSs are not being used to their full potential and capabilities (Khoza, 2018; Machajewski et al., 2018; Rhode et al., 2017; Walker et al., 2016; Whitmer et al., 2016; Witte, 2018). Rather, LMSs are being used primarily for content delivery, and for managing assignments, quizzes, and tests, replicating traditional classroom teaching methods (Martin et al., 2019). According to Oliver (2001), a major concern of LMS use is that faculty place emphasis on content dissemination over tools that assist with student learning, even though the latter are more likely to promote student interaction and engagement.

Current Learning Management System (LMS) Use

Most higher education institutions have integrated the use of learning management systems, or LMSs, with other institutional infrastructure systems, encouraged faculty adoption of the LMS, and provided the necessary user training and support (Rhode et al., 2017). According to Brooks (2015), LMSs remain a mainstay of the online education infrastructure, with 85% of faculty confirming their use of the institution's LMS. Legon and Garrett (2017) found that 81% of chief online education

officers report the LMS to be the technology that is most important to the integration of online programs. Furthermore, according to a 2014 report by the Educause Center for Analysis and Research (ECAR), 99% of higher education institutions have an LMS in place, and the LMS is used by 86% of faculty and 83% of students.

An LMS is a web-based software application that is designed to house learning content, manage student interactions, as well as provide assessment tools and reports of learning progress and student activities (Kasim & Khalid, 2016). It is a technology platform that allows educators to create, organize, and manage online courses quickly using web-based templates that allow for course delivery. Content within an LMS can be accessed online and allow learners to see and interact with learning tools using any operating system, computer or laptop, or mobile device. According to Coates et al. (2005), LMSs are also platforms that include content management systems, course management tools, and portals. A content management system is a tool that houses digital content and allows for the creation and modification of this content. In the education field, a content management system, or CMS, would be where educators would house the necessary content for a program of study or course. Course management tools are the features within an LMS that allow the educator to conduct certain activities related to the course. These tools could include, but are not limited to, grade systems, e-mail capabilities, assignment submissions, and attendance trackers and will be further discussed in Chapter 2 of this dissertation. Portals within LMSs provide educators with the option to share links that will connect learners to websites outside of the LMS. An LMS provides many tools within each of these components or systems that can be useful

for teaching and learning. These tools can be customized for specific teaching and learning methods and include items such as discussion threads, online chat, video conferencing, supporting resources, assessment, peer review, learning modules, e-mail, reusable learning objects, and content repositories (Walker et al., 2016). There are many different LMSs available to the market for educators to choose from. These include, but are not limited to, Blackboard Learn, Canvas, Desire2Learn, Moodle, and Sakai.

According to Ofranou et al. (2015), usability studies for LMSs are still in their infancy and more research is needed, however they found that an LMS can be used to improve the design of learning experiences. Before we can depict the ways in which LMSs are being used, and how to improve on these to best meet the needs of the learners, we first need to understand how they are currently being used.

Khoza (2018) stated that educators do not have clear guidelines on which to base their decisions regarding how to use an LMS. Thus, when she conducted a study that looked at how university (Stellenbosch University) faculty were using the LMS, she found that 96% (N=134) used the LMS as a content delivery system and only 17% reported using it for any sort of collaboration. Rhode et al. (2017) also studied faculty use of LMSs and found that the most frequently used tools were announcements, item, grades, folders, files, assignments, web link, plagiarism detection, discussion boards, and tests, in that order. Of this list, only discussion boards really expand beyond the content management realm of use. Furthermore, when usage data of tools by faculty was pulled from 2,562 courses at a university in Chicago, it was found that the most commonly used course element was content items in 97% of the courses, followed by the grade center

(79%), announcements (64%), and assignments (49%) (Machajewski et al., 2018). The same study also found that discussion boards were only utilized 32% of the time and blogs, wikis, and journal at 4% (Machajewski et al., 2018).

Witte (2018) surveyed students at Trine University to understand why they were struggling with Moodle's interface and found that the LMS was very top-down, with learners having little control over the interactions that take place within the platform, thus, supporting the hypothesis that LMSs are mainly being used as a storage space, or repository of information for learners to retrieve. Witte (2018) reported that students also found the way in which this content was organized to be confusing. Fisher (2007) argued that instructor use of LMSs is too narrow and misses opportunities to provide real world/work-world collaboration practices and opportunities for the learners. Walker et al. (2016) posited that "more emphasis needs to be placed on teaching instructors online instruction design principles" (p. 46) to address the limited use of LMSs.

Blackboard Learning is an example of an LMS that is widely used in education. Blackboard Inc. was founded in 1997 by Michael Chasen and Matthew Pittinksy and was originally a consulting firm that worked towards the development of a prototype for online learning and thinking through online learning standardization. Since then, the company has gone through many different phases, mergers and acquisitions, and leaders. Blackboard Learn is an LMS that was originally offered as a product in 1998. According to the Blackboard website, their aim is to allow everyone, regardless of geography, financial situation, stage of life or disability, access to education and to deliver a connected experience, data-driven insights, and flexible solutions (Blackboard, 2019).

Blackboard Learn is a web-based server software that features course management, open architecture, and scalable design that allows for integration with student information systems and authentication protocols.

According to McKenzie (2018), Blackboard Inc., as a company, control 28% of the U.S. higher education LMS market. Edutechnica (2017) reported that in a survey conducted on 2,676 U.S. higher education systems that are using LMSs, 32.3% were using Blackboard Learn. The following use of LMSs was as follows: Canvas, 19.8%; Desire2Learn, 10%; Moodle, 18.9%; and Sakai, 3% (Edutechnica, 2017). As an e-Learning tool and LMS, Blackboard Learn has many pedagogical affordances that would allow for meaningful learning. Walker et al. (2016) argued that the impact of an LMS on teaching and learning depends on how the tool is used by the instructors and the students.

Whitmer et al. (2017) pulled data pertaining to tool use in Blackboard Learn from 18,810 courses, over 927 institutions, with 601,544 unique learners. From this data they identified five course patterns with clear distinctions: supplemental (content heavy, low interaction), complementary (one-way communication through content, announcements, gradebook), social (high peer-to-peer interaction through discussion board), evaluative (heavy use of assessments), and holistic (high LMS activity with balanced use of assessments, content, and discussion) (Whitmer et al., 2017). The data showed that 53% of the courses fell into the supplemental category, 24% complementary, 11% social, 10% evaluative, and only 2% followed the holistic approach (Whitmer et al., 2017). The researchers also pulled data around the proportion of course time by tool used, and found that the most commonly used tool was course content for three of the course patterns; it

was the second most used in the remaining two. The course content tool in Blackboard is the feature that faculty can use to disseminate content to students. This further implicates that LMS use primarily centers around the dissemination of content (Whitmer et al., 2017).

Pedagogical Affordances of LMSs

It has been argued that LMSs are not being used to the fullest of their capabilities and, particularly, in a way that capitalizes on their pedagogical affordances. As can be noted, based on previous LMS studies, that, the current use of LMSs appears to support this argument. Clark and Lyons (1999) argued that as technology progresses so does the ability of instructors to provide instructional capabilities that demand new approaches for the promotion of learning. Technology-based teaching and learning environments, such as those enabled through LMSs, are complex systems comprised of multiple components and processes that influence the development of pedagogies through the lens of the theory of affordances (Miduser, 2015).

According to Gibson (1979), the theory of affordances is an ecological or environmental approach to psychology that emphasizes perception and action rather than memory and retrieval. Gibson proposed that objects or tools like LMSs have certain affordances (possibilities for action) that lead those using it to act based on their perceptions of these affordances. Norman (1988) described an affordance as a design aspect which suggests how the object should be used, coining the term affordance as a term that refers to the perceived and actual properties of something that determines how it could possibly be used. This suggests that affordances provide clues to people as to how

they can interact with objects or systems such as the LMS. There are many factors that could potentially be affecting how faculty are using LMSs. The theory of affordances, which will be discussed in further detail later, theorizes that technologies, such as LMSs, can be used for more than what the current literature is finding. This is the framework that will guide this study in seeking to understand why faculty are not using Blackboard Learn to the fullest of its capabilities.

Why aren't instructors currently taking advantage of the pedagogical affordances within LMSs? Research has shown high usage in content delivery with a lack of use in other tools within LMSs (Khoza 2018; Machajewski et al., 2018; Rhode et al., 2017; Walker et al., 2016; Whitmer et al., 2017; Witte, 2018). Are faculty unaware of the pedagogical affordances available within LMSs or is the user interface not intuitive? What is preventing instructors from using the pedagogical tools in the ways they afford teaching and learning? To determine this, we first need to dig deeper into how the pedagogical tools in LMSs are currently being used and their alignment to the affordances.

Educational technologies, such as learning management systems (LMS) and their features, can add to, detract from, or not affect teaching and learning (Dooley et al., 2005). Cognitive information processing theories posit that our cognitive abilities are limited in capacity and therefore learners need to be able to focus on those that are most pertinent to their learning goals (Clark & Mayer, 2011). As educators, we want to focus on minimizing the features that detract from teaching and learning activities while maximizing the use of the features that add to and positively impact teaching and

learning. There are many pedagogical affordances within the LMS that allow for instructors to implement the use of LMSs in a more holistic way. One way to focus LMS use, is to break down the available tools into categories and determine the pedagogical affordances within those categories.

LMS Categories

According to Kasim and Khalid (2016), LMS features or components can be categorized into three main types: learning skills tools, communication tools, and productivity tools. Learning skills tools can vary but can include creating activities and learning tools for students to include quizzes, online presentation tools, and assignments. Communication tools afford interactions between educators and learners and amongst learners. The most common communication tool is announcements (Kasim & Khalid, 2016), which are used to provide information regarding course activities to the learners. However, another tool that is included as a communication tool is the discussion board, or forum, which allows for interaction amongst learners. Finally, productivity tools in LMS include calendars, surveys, and document management systems, which allow for the upload and retrieval of files. All the tools and components within an LMS will be further explored later.

There are many ways to categorize technologies based on pedagogical affordances. Dabbagh and Bannan-Ritland (2005) classified integrative learning technologies such as LMSs into five pedagogical categories: collaborative and communication tools, content creation and delivery tools, administrative tools, learning tools, and assessment tools. Kitsantas and Dabbagh (2010) later used the same categories

to identify and describe the pedagogical affordances within LMSs. Dabbagh and Bannan-Ritland's (2005) categories of pedagogical tools set a framework that was used and adapted (Dabbagh et al., 2019) for identifying pedagogical tools within technologies. Dabbagh et al. (2019) updated the categorization of technologies to include six categories as follows: collaboration and communication, assessment and analytics, immersive, knowledge representation (mindtools), information search and resource management, and content creation. This framework (Figure 1) also allows for overlap as some technology tools can fall into more than one category.

Figure 1. Technology Categories for Meaningful Online Learning (Dabbagh et al., 2019)

Because this study is centered around LMS use, the focus will be on the categories and pedagogical affordances present within LMSs: content creation and delivery, collaboration and communication, learning tools, assessment tools, and administrative tools.

Content creation tools are used by instructors and relate to the creation and delivery of content (Dabbagh et al., 2019). This category includes tools that provide the ability for instructors to create, deliver, and manage web-based content and learning activities and for students to contribute resources to course websites and resource-sharing areas as well as assignment submission and journals (Dabbagh et al, 2019). These tools also include templates for syllabi and/or modules, content sharing repositories, and portfolio and groupwork tools (Kitsantas & Dabbagh, 2010). It is important that "tools for creating such content provide affordances to support developing instruction" that provides a greater emphasis on content organization, clarity, and completeness (Dabbagh et al., 2019, p.51). Affordances needed in LMSs to support the creation and delivery of online learning are organizational tools, version control, tools for providing feedback to students, and navigation controls (Dabbagh et al., 2019). Walker et al. (2016) studied the perspectives of university instructors on different LMS tools and found that instructors believed the tools that allowed for content creation and course materials were beneficial to teaching. The specific tools within an LMS from this category that instructors identified as beneficial were posting lesson plans and test review slides, providing supplemental content to lectures, and the reduction of paper use (Walker et al., 2016).

Collaboration and communication tools are also an important pedagogical category of tools. These tools can be described as tools that facilitate communication and collaboration in an educational setting and can help reduce isolation amongst students, particularly in an online learning environment (Caladine et al., 2010). These tools can be asynchronous (at any time) and synchronous (real time) communication tools, social

networking tools, and group tools. More specifically, LMS collaborative and communication tools include discussion forums, file exchange features, real-time chat, internal e-mail, group workspaces, and a whiteboard (Kitsantas & Dabbagh, 2010; Dabbagh et al., 2019). According to Dabbagh et al. (2019), for communication and collaborative tools to be effective they need to be leveraged by instructors to promote constructive, cooperative, authentic, intentional, and active learning. There are numerous affordances that are needed in online settings to support collaboration and communication tools. LMSs need to be able to support multiple modes of communication and timing, support formal and informal channels of communication and shared access to collaborative artifacts, have version control for collaborative artifacts and synchronous editing of collaborative artifacts (Dabbagh et al., 2019). Instructors also identified collaboration and communication tools as beneficial in LMSs, specifically referencing online discussion boards, wikis, blogs, e-mail, announcements, and groups (Walker et al., 2016). Examples of how instructors used these tools included the creation of discussion groups among students, notification of grades on assignments to students, and to encourage collaboration among teams of students (Walker et al., 2016).

Learning tools are used by learners to create their own personal learning experiences and environments. For this study, this category of tools is a combination of all three frameworks and includes elements from the knowledge representation and information search and resource tools from Dabbagh et al.'s (2019) framework. According to Kitsantas & Dabbagh (2010) these tools can be categorized into three types: content collection or aggregation tools, exploratory tools, and personalized tools. Content

collection or aggregation tools allow learners to compile course materials and resources and can be implemented in LMSs through the online discussion "compile and download" feature, and a "work offline" feature that allows students to download the content in a format that suits their needs (Kitsantas & Dabbagh, 2010). Exploratory tools enable learners to search course-specific topics, use help tools, and share resources. Specific LMS examples include search tools and help centers (Kitsantas & Dabbagh, 2010). They also allow learners to enhance their learning activities and enable them to find resources they can partner with to solve problems (Dabbagh et al., 2019). One of the key concerns with information search is that it often ends with gathering the data and does not continue to the implementation of that learning in some way. As Dabbagh et al. (2019) stated, "simply asking students to find information on the Web will probably not result in meaningful learning. Unless there is an intentional outcome, research is a meaningless activity" (p. 66-67). Therefore, this category of tools includes both the search tools and those that can help the learner manage and organize their findings to support meaningful learning, including knowledge bases, internet search engine tools, as well as content collection, aggregation and annotation tools (Dabbagh et al, 2019), or personalized learning tools (Kitsantas & Dabbagh, 2010). In other words, the "learner creates content and represents it via the affordances of the tool thus making external the knowledge structure" (Dabbagh et al., 2019, p. 57). These tools have affordances that allow for knowledge representation, support organization and synthesis, work with any discipline, and are ubiquitous (Dabbagh et al., 2019). Examples of personalized learning tools that are found in LMSs are blogs, portfolios, journals, portfolios and weblinks (Dabbagh et

al., 2019; Kitsantas & Dabbagh, 2010). Furthermore, faculty can use LMSs to provide links to search engines and knowledge databases that afford simple and advanced searches and access to multiple resources for students to access.

Next, there are assessment tools that provide a variety of assessment types including traditional-style tests and performance-based authentic assessments. Dabbagh et al. (2019) defined assessments as the "process of collecting data to determine the extent to which a person's performance or a product or program has met its intended objectives" (p 173). Assessments allow for the monitoring of student learning and there are many different types that can be used in an online environment. LMS assessment tools include test tools that include multiple options for question types and the ability to create self-assessments, peer-assessments, and performance-based assessments (Kitsantas & Dabbagh, 2010). According to Dabbagh et al. (2019), some more examples of LMS tools for assessing learning are rubric generation, rubric banks, analytic tools, test and quiz tools, digital portfolio systems, and student response systems. Walker et al. (2016) reported that faculty identified gradebooks and assessment tools in LMSs as beneficial to teaching. The benefits that faculty identified included the ability to provide grade updates to students, collect assignments, run course reports, and administer quizzes and assessments directly in the LMS (Walker et al., 2016).

Lastly, there are administrative tools. These tools afford the management of student information, other users such as teaching assistants, and course content and activities. Examples within LMSs include online calendars, authentication features, tools

used to customize course access, and course-scheduling tool (Kitsantas & Dabbagh, 2010).

Factors Influencing Faculty LMS and Technology Use

A review of the current literature has revealed that numerous studies have already been conducted to determine the factors that influence faculty technology and learning management system (LMS) use. The factors that have been heavily explored are those of the Technology Acceptance Model (TAM) and the Technology, Pedagogy, and Content Knowledge (TPACK) framework. The factors within TAM include perceived ease of use, perceived usefulness, attitude toward using, behavioral intention to use, and actual use (Davis, 1989). The factors explored within the TPACK framework are technology knowledge, pedagogy knowledge, and content knowledge. The framework also looks at the overlap between each of these factors. Additionally, there have been some empirical studies that have explored the impact of epistemological beliefs, pedagogical approaches, and delivery modes on the integration of technology within teaching. The implications of these factors on LMS and technology are described below.

Technology Acceptance Model

The technology acceptance model (TAM) (Figure 2) originated from Fishbein and Ajzen's (1975) Theory of Reasoned Action which suggests that an individual's behavior is influenced by his/her intent to perform the behavior and that the intent is a function of his/her attitude toward the behavior and his/her subjective norms. TAM was originally introduced by Davis (1989) who posited that perceived ease of use (PEOU) and perceived usefulness (PU) are the two fundamental determinants of user acceptance of

technology. Davis (1989) defined PEOU as the "degree to which a person believes that using a particular technology would be free from effort" (Davis, 1989, p. 320) and PU as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320). TAM posits that there is a causal relationship between the two, in that when technology is easy to use it will result in an individual perceiving the technology as useful (Davis, 1989). Furthermore, there are three other constructs or factors that impact technology use: attitude toward using (ATT), behavioral intention to use (BI), and actual use (AU) (Davis, 1989). Attitude toward using is an individual's feelings, positive or negative, about performing a behavior within a system (Fishbein & Ajzen, 1975) and TAM claims that if a user finds a technology to be easy to use and useful, they will have a positive attitude toward that technology. Behavioral intention is the degree to which a person has formulated plans to implement specific behaviors or not (Davis, 1989). For this construct, TAM claims that if a user finds a specific technology to be useful (PU), they will then develop positive intentions for using it. According to TAM, the behavioral intention of a user directly influences their actual use of the technology (AU).

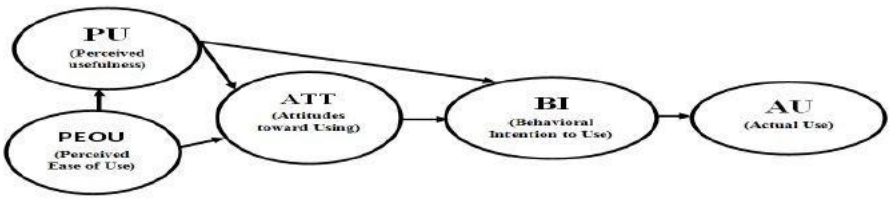

Figure 2. Technology Acceptance Model (TAM) (Davis et al., 1989, p.985)

TAM was developed on the premise that new constructs can be added (Siegel et al., 2017) and has been used and adapted in many empirical studies. It is a popular model for explaining how technology is used by individuals and has been empirically demonstrated to have a high validity in research contexts (Chau, 1996). TAM has also been found to have a greater explanatory power when extensions were added to it (Venkatesh et al., 2003). Fathema et al. (2015) examined faculty use of learning management systems (LMS) in higher education settings and expanded the original TAM to include system quality (SQ) (quality related to functions, speed, features, content, interaction capability of LMS), perceived self-efficacy (PSE) (faculty member's judgment or confidence of his/her capability of using the LMS), and facilitating conditions (FC) (availability of related resources) as external variables. The purpose of this study was to "explore the effects of the proposed external variables on faculty members LMS usage behavior" (Fathema et al., 2015, p. 213). Results from the study indicated that faculty members place emphasis on the quality issues (SQ) of LMS to include functions, content, navigation speed, and interaction capability and that SQ also had a significant positive effect on faculty members' attitude towards LMS (Fathema et al., 2015). Findings also indicated that faculty members with higher self- efficacy (PSE) with technology use, find LMS to be more useful and easier to use, and consequently use LMS more than faculty who are less confident in their use of technology (Fathema et al., 2015). Finally, the study revealed strong relationships amongst PU, PEOU, and ATT and found that PU was significantly determined by the PEOU of LMSs, and the BI of faculty members to use LMSs was significantly determined by the PU of the LMS (Fathema et

al., 2015). In summary, this study found Davis' (1989) claims to be further validated, in that faculty members evaluate ease of use, then the usefulness of an LMS; if they develop positive attitudes towards these factors, they will have a greater positive intent towards using the LMS. Additionally, the three external constructs (SQ, PSE, FC), all "directly or indirectly influenced faculty members' attitude towards LMS, behavioral intention to use LMS and their actual use of LMS" (Fathema et al., 2015, p. 227).

Siegel et al. (2017) conducted a study to analyze higher education faculty use of a new technology by combining TAM with the Commitment and Necessary Effort (CANE) motivation model. The CANE model consists of three constructs: personal agency (self-efficacy and support from organization), affect, and task value. Combining the TAM and CANE model, the motivation acceptance model (MAM) was created by the researchers because the fusion "may provide a better understanding of users' perceptions and their acceptance of the technology" (Seigel et al., 2017, p. 61). The MAM includes actual use (AU), amount of actual use (AAU), attitude toward Live-Text (the new technology) (AT), familiarity with Live-Text (F), perceived usefulness (PU), perceived ease of use (PEOU), and perception of organizational support (POS) (Siegel et al., 2017). This Siegel et al. (2017) study revealed that PEOU was a statistically significant predictor to the faculty liking the new technology and finding it useful, and that users of the technology had higher scores regarding the usefulness of the tool than nonusers. The attitude towards the new technology strongly predicted the use of it based on date, semester, and duration. And finally, perceived organizational support was a significant predictor of attitude

toward the new technology with those using the technology scoring higher in the PU and PEOU than the nonusers to a significant degree (Siegel et al., 2017).

Technology, Pedagogy, and Content Knowledge (TPACK)

Research has indicated that the lack of teachers' content knowledge, content-supported pedagogical knowledge, and knowledge of technology integration results in poor technology integration within education (Polly et al., 2010a; Polly et al, 2010b). Koehler and Mishra (2009) posited that at the heart of good teaching with technology are three core components, content, pedagogy, and technology, as well as the relationships among and between them. Therefore, they created the Technology, Pedagogy, and Content Knowledge (TPACK) framework (Figure 3) to integrate these components. The TPACK framework outlines how what is being taught (content) and how the teacher imparts the content (pedagogy) forms the foundation for effective technology integration (Kurt, 2018). The TPACK framework has been described as situated, complex, multifaceted, integrative, and/or transformative (Angeli & Valanides, 2009; Koehler & Mishra, 2009).

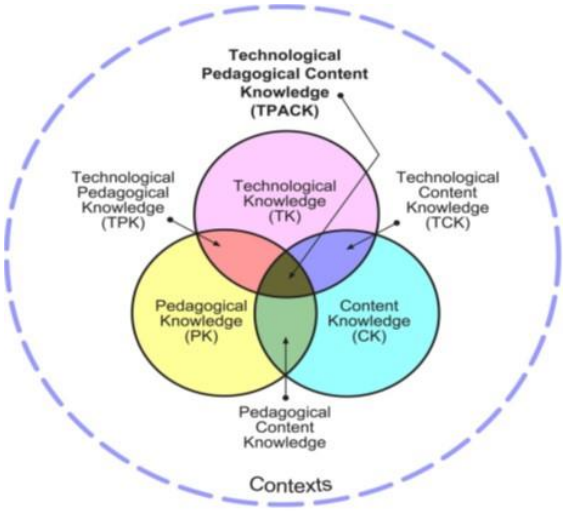

Figure 3. Technology Pedagogy and Content Knowledge (TPACK) Framework

According to Koehler and Mishra (2009), each component of the TPACK model is broken down as follows:

a) Content Knowledge (CK): Describes teachers' own knowledge of the subject matter.

b) Pedagogical Knowledge (PK): Describes teachers' knowledge of the practices, processes, and methods regarding teaching and learning.

c) Technological Knowledge (TK): Describes teachers' knowledge of, and ability to use, various technologies, technological tools, and associated resources.

d) Pedagogical Content Knowledge (PCK): Describes teachers' knowledge regarding foundational areas of teaching and learning, including curricula development, student assessment, and reporting results.

e) Technological Content Knowledge (TCK): Describes teachers' understanding of how technology and content can both influence and push against each other.

f) Technological Pedagogical Knowledge (TPK): Describes teachers' understanding of how particular technologies can change both the teaching and learning experiences by introducing new pedagogical affordances and constraints. Another aspect of TPK concerns understanding how such tools can be deployed alongside pedagogy in ways that are appropriate to the discipline of the lesson at hand.

g) Technological Pedagogical and Content Knowledge (TPACK): Knowledge of using various technologies to teach, represent and facilitate knowledge creation of specific subject content (Chai, et al., 2013, p. 33).

This framework "requires a forward-looking, creative, and open-minded seeking of technology use, not for its own sake but for the sake of advancing student learning and understanding" (Koehler & Mishra, 2009, p. 66).

Lee and Kim (2014a, b; 2017) conducted three different phases of a design-based research (DBR) implementation study to develop an actionable framework with TPACK to improve preservice teachers' TPACK in a multidisciplinary course. The overall goal being to improve the use of technology in teaching and learning through TPACK. Results from the first study indicated that there was a basic understanding of TK, PK, and CK among the participants rather than an integrated knowledge of TCK, TPK, and TPACK (Lee & Kim, 2014a). The participants in the study lacked pedagogy-related knowledge and this could have affected their TPACK learning (Lee & Kim, 2014a). For example, the participants "tended to evaluate technological tools from their external characteristics that were not relevant to pedagogical affordances to the content" (p. 455) thus suggesting

that pedagogy-related knowledge is critical to acquiring TPACK and that there needs to be a progression of learning the isolated pieces of TPACK to the integrated knowledge.

The findings from the second study indicated that preservice teachers' TPACK was enhanced through the active TPACK discussion and designing several technology-integrated lesson plans, but their TPACK was not fully utilized in teaching practice (Lee & Kim, 2014b). Overall, while the model did yield improvement in participants' pedagogical knowledge, revisions were still identified as necessary to improve the model, particularly to increase technology-integrated lessons that were learner-centered and required high order skills. Some of the proposed revisions made by Lee and Kim (2014b) included providing more effective support when evaluating examples and including components that help in the understanding and application of learner-centered strategies.

The final study implemented a third version of the model and found that with instructor support, participants were connecting the TPACK domains to previously experienced teaching examples which helped them to make sense of TPACK (Lee & Kim, 2017). Also, participants were able to evaluate learner-centered, technology-integrated activities and provide constructive suggestions or alternative strategies, and were able to "develop and implement TPACK lessons that incorporated learner-centered strategies or higher-order thinking activities". This indicated that, when applied, the TPACK framework can improve upon student learning and activities when integrating technology (Lee & Kim, 2017, p. 1650). Overall, the combined findings from these three studies indicated that with increased knowledge in all the TPACK domains, preservice

teachers were more successful in creating lesson plans and integrating technology effectively within instructional practices.

Other Factors Influencing LMS and Technology Use

The types of beliefs teachers have about the nature of knowledge and learning, or epistemological beliefs, have been found to influence decisions teachers make about curriculum, pedagogy, and assessments (Schraw & Olafson, 2002). Furthermore, Becker and Riel (1999) posited that there may be a relationship between the pedagogical approaches' teachers employ and the way they implement technology in the classroom. Ertmer (2003) postulated that teachers' epistemological beliefs and pedagogical beliefs were a second-order barrier to the implementation of technology. Jacobson et al. (2010) conducted a study with K-12 teachers in Singapore to determine whether teachers' epistemological beliefs influenced how they integrated technology into the classroom. They found that teachers who believed that knowledge is certain and absolute, mostly used technology as a tool to disseminate knowledge from an expert to the student, and that those who believed more in contextualized and changing knowledge tended to implement technology with a learner-centered approach (Jacobson et al., 2010). However, there were teachers who reported technology use in a way that contradicted their epistemological beliefs, and used pedagogical approaches related to their perceptions of the academic ability of the student. In a survey conducted with over 1,000 K-12 teachers, Martin and Shulman (2006) found that teachers who held learner-centered, constructivist pedagogical beliefs are more likely to use technology in their instructional practices. In another study conducted with 1499 preservice teachers,

epistemological beliefs impacted the participant's capabilities within educational technology integration knowledge and skills, and it was found that constructivist conceptions might contribute to their educational technology integration more positively than traditional epistemological views (Bahcivan et al., 2019).

Another factor that could affect technology use is the delivery mode of a course, or the way in which a course is presented: face-to-face, online, or hybrid. According to Jonassen et al. (1994), the affordances for online and face-to-face environments provide for different learning experiences, which impact the outcomes of instruction and subsequently influence the way in which a teacher would integrate the use of technology. For example, for an online or hybrid course, technology would be required to implement both synchronous and asynchronous learning experiences while for face-to-face settings, technology would not be required and therefore, could be disregarded altogether.

This section revealed that epistemological beliefs, pedagogical approaches, and delivery modes can impact the way in which K-12 and preservice teachers use, and intend to use, technology. However, there is currently a gap in the literature on how epistemological beliefs, pedagogical approaches, and delivery modes impact higher education faculty use of LMSs.

Purpose of Study

Preliminary research conducted on learning management system (LMS) use indicates that instructors are predominately using LMSs for content management and disseminating information. Rhode et al. (2017) found that outside of content management, discussion forums were essentially the only other component of LMSs

being used by instructors. However, through the exploration of the theory of affordances and the pedagogical affordances within the LMS categories, we also learned that LMSs afford faculty the ability to use the system in ways that reach beyond these two tools. As mentioned earlier, research has also shown that variables such as perceived usefulness, perceived ease of use, attitude towards using, perception of organizational support, among other factors, impact or influence LMS use by faculty (Fathema et al., 2015; Siegel et al., 2017). Furthermore, previous studies revealed that the factors within the TPACK framework also influence the use of LMSs and technology by teachers (Lee & Kim, 2017).

The literature also revealed that epistemological beliefs, pedagogical approaches, and delivery modes have an influence on how K-12 and preservice teachers use, and plan to use, technology in their classrooms. However, we do not know how these factors impact higher education faculty's use of LMSs. Therefore, this study seeks to understand if there are other factors, beyond those aligned with the technology acceptance model and the TPACK framework, that determine how faculty are using LMSs. The other factors that this study will focus on are the epistemological beliefs of faculty, the pedagogical approaches to teaching that they implement, and the delivery mode of the courses they teach.

Significance of the Study

As previously mentioned, LMSs are a widely used tool within the education field. They are extremely prevalent in higher education settings. This study would provide integral information relating to how factors such as epistemological beliefs, pedagogical

approaches to teaching, and delivery mode of the courses affect how LMSs are used. This data could then be used by universities to ensure that they not only purchase the LMS that would best meet the needs of their faculty, but also provide information on how they can ensure that LMSs are used in a more holistic way to enable student engagement, learning interactions, and flexible pedagogies. Furthermore, the study could also be used by faculty to determine whether they are using the LMS in conjunction with their epistemological beliefs and delivery methods. With that knowledge, it could lead to faculty considering how they could use the technology in conjunction with the pedagogical affordances most strongly associated with their epistemological beliefs and pedagogical approaches.

Research Questions

The research questions for this study are:

1. Are there significant differences between epistemological beliefs, pedagogical approaches, and course delivery mode and the way faculty use the LMS?
2. Which of the five LMS categories (administrative, assessment, collaboration and communication, content creation and delivery, learning) are contributing to the differences across these variables?
3. How are faculty using the tools within the five LMS categories in their courses?
4. Why are faculty using the tools within the five LMS categories the way they are using them?

Definition of Terms

Terms that are significant to this study have been adapted and contextualized for this study and are defined below.

Epistemological Beliefs – The nature and role of individual representations about knowledge and knowing (Mason & Bromme, 2009).

Pedagogical Approaches – The instructional strategies and learning activities faculty use to support student learning (Cochran-Smith & Zeichner, 2009).

Course Delivery Mode – Defines whether a course is presented face-to-face, fully online, or in a hybrid nature (Burns et al., 2013).

Pedagogical Affordances – Unique features and characteristics of technologies that add value to the learning experience (Burden & Atkinson, 2008).

Constructivism – Philosophy that students are active learners who interact with the environment and people to construct their own knowledge (Cetin-Dindar et al., 2014).

Objectivism – Teaching method that follows the principle that there is one true and correct reality that becomes understood through the objective methods of science, and/or observation of behaviors (Wang and Peyvandi, 2018).

Cognitivism – Using observable behaviors to focus on the mental processing of a learner and to understand how a learner engages in the process (Gage & Berliner, 1988; Nagowah & Nagowah, 2009).

LMS Use – What tools are being used by faculty, and how often, within the Blackboard Learn learning management system.

Chapter Two: Literature Review

The instructor plays an invaluable role in teaching and learning within higher education settings. Over time, increasing technology innovations have allowed for innovations in teaching. While there is an abundance of technologies available to instructors, learning management systems (LMSs) have become one of the most popular technologies and are widely used in universities across the world. With so many institutions using LMSs, it is important to understand how instructors' epistemological beliefs and pedagogical approaches impact their LMS use. Furthermore, how do course delivery modes factor into the equation. This literature review will begin by discussing the theory of affordances in conjunction with technology use. It will then dive into epistemological beliefs, pedagogical approaches, and delivery modes by defining these constructs. The review will then segue into empirical studies that have been conducted on faculty use of LMSs and reveal a gap in the literature, strengthening the argument for the significance of this study.

Theory of Affordances and Technology Use

As described in the introduction, the theory of affordances emphasizes perceptions and action over memory and retrieval and proposes that objects or tools have possibilities for action, or affordances, that are used in conjunction with peoples' perceptions of their intended use (Gibson, 1979). Norman (1988) further described affordances as a design element that suggests how the object should be used. There are many different types of affordances as identified by many researchers. For example,

Hartson (2003) identified five categories of affordances that should be considered when designing for user interaction: cognitive, physical, sensory, functional, and emotional. These affordances are defined as follows (p. 644):

1. Cognitive affordance: design feature that helps, aids, supports, facilitates, or enables thinking and/or knowing about something.
2. Physical affordance: design feature that helps, aids, supports, facilitates, or enables physically doing something.
3. Sensory affordance: design feature that helps, aids, supports, facilitates, or enables the user in seeing, hearing, or feeling something.
4. Functional affordance: helps or aids the user to accomplish work.
5. Emotional affordance: features or design elements that make an emotional connection with the user.

Kirschner et al. (2004) established a classification system for the purposes of analyzing how to best match learning tasks to e-learning technologies. In their framework, they do not just define technological affordances, but also social and educational affordances. Educational affordances are the characteristics of a resource that determine if and how a learning behavior could be enacted and social affordances are the aspects of the online learning environment that provide social-contextual facilitation relevant to the learner's social interaction (Kirschner et al., 2004). For this study, educational affordances are referred to as pedagogical affordances. According to Bower (2008) these educational and social affordances "serve to illuminate the major foci when designing learning experiences using technology" (Bower, 2008, p. 6).

Bower (2008) broke down e-learning technology affordances even further into a classification system that depicts functional affordances of a technology based on the type and degree of interaction it enables. According to Bower (2008), these categories are (p. 6):

1. Media affordances: type of input and output forms, such as text, images, audio, and video.
2. Spatial affordances: ability to resize elements within an interface, move and place elements within an interface.
3. Temporal affordance: access anytime anywhere, ability to be recorded and played back, synchronous versus asynchronous.
4. Navigation affordances: capacity to browse other sections of a resource and move back/forward, capacity to link to other sections within the resource or other resources, ability to search, sort and sequence.
5. Emphasis affordances: capacity to highlight aspects of a resource, explicitly direct attention to components.
6. Synthesis affordances: capacity to combine multiple tools together to create a mixed media learning environment, the extent to which the function of tools and the content of resources can be integrated.
7. Access-control affordances: capacity to allow or deny who can read/edit/upload/download/broadcast/view/administer, capacity to support one-to-one, one-to-many, many-to-many contributions and collaborations.

8. Technical affordances: capacity to be used on various platforms with minimal/ubiquitous underlying technologies, ability to adapt to bandwidth of connection, speed, and efficiency of tool(s).
9. Usability: intuitiveness of a tool, ease with which user can manipulate tool to execute its various functions, relates to efficiency.
10. Aesthetics: appeal of design, appearance of interface, relates to user satisfaction and ability to hold attention.
11. Reliability: robustness of platform, system performs as intended whenever required.

When using LMSs, it is not only important that instructors are aware of the different types of affordances, but they also need to understand what to do with them. "The point being emphasized is the process of consciously identifying the affordances of e-learning tools, so that they can then be considered in light of the affordance requirements of the learning tasks" (Bower, 2008, p. 8).

Dabbagh et al. (2019) adapted the Three Component Model for Online Learning (Dabbagh & Bannan-Ritland, 2005) (Figure 4) to "maximize the potential of the compatible bonding between technology and pedagogy when designing online learning environments" and "emphasize the reciprocal, cyclical, and transformative interaction between learning technologies, learning activities, and instructional strategies" (p. 22). This model shows how technology use can shape our learning activities and interactions, which also shape our instructional strategies and pedagogical practices, leading to the use of learning technologies (Dabbagh et al., 2019). This model allows the person designing a

course to start with any of the three components and then integrate the other two components based on their affordances (Dabbagh et al., 2019). In the case of faculty in higher education using LMSs, this would mean that they would start with the learning technology and "explore the instructional or pedagogical potential" (Dabbagh et al., 2019, p. 23), or pedagogical affordances, of the LMS and then integrate the appropriate instructional strategies.

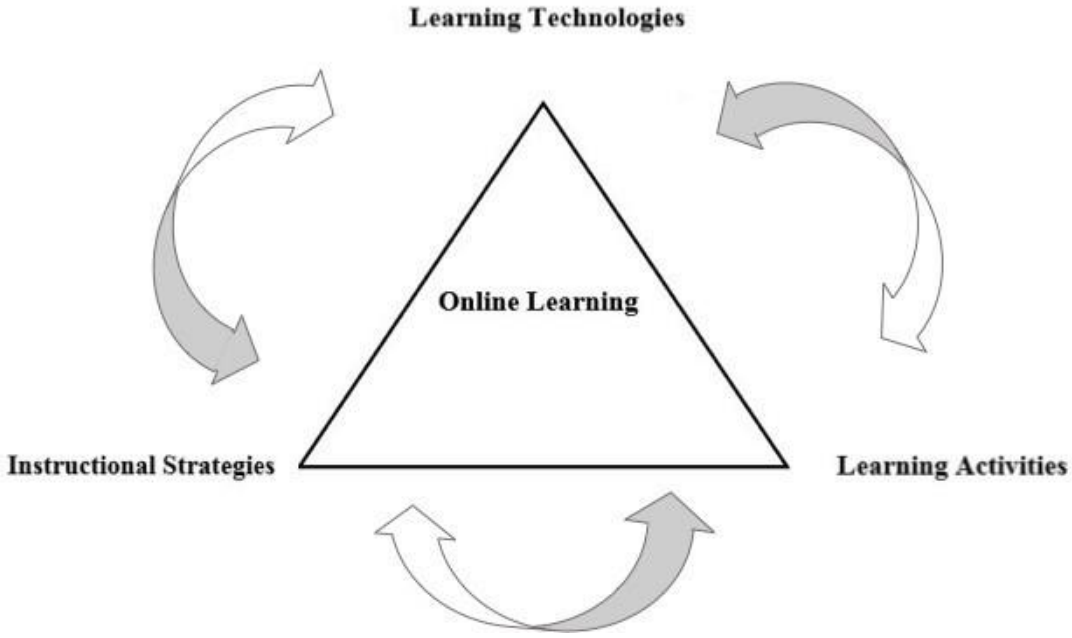

Figure 4. Three Component Model for Online Learning (Dabbagh & Bannan-Ritland, 2005).

Park and Song (2015) identified a gap in research studies pertaining to the development of affordable e-learning technologies and found that this gap can be attributed to a lack of design guidelines. They defined affordable as enhancing the

affordances provided (Park & Song, 2015). They found that many user interfaces have been developed with a focus on a design approach that does not pay attention to affordances and is therefore "limited in that intended affordances are not systematically considered in the design process" (Park & Song, 2015, p. 185). Because users are more likely to actively use a tool when the user interface is more affordable, Park and Song (2015) redesigned the e-learning interface of EDUNT Cyberhome Learning System, which was Korea's largest education portal. The topic they selected to redesign was "What is the Internet and Information Society?"

The researchers used an affordance-based design (ABD) approach developed by Maier and Fadel (2009). ABD focuses on conceptualizing the users as the agents of the behaviors associated with the artifacts being designed as opposed to what the designer wants the artifact to do (Maier, 2011). Following the redesign, sets of students participated in each of the e-learning environments and it was found that those who interacted with the e-learning interface design using ABD scored significantly higher in all three components of usability, effectiveness and efficiency, and satisfaction, than those in the e-learning content group prior to the re-design (Park & Song, 2015). Students also reported that the "redesigned user interface led them to have positive affect because they could easily locate important information and access tools" (Park & Song, 2015, p. 194).

In another study conducted by Osborne et al. (2013), a design-based research approach was adopted to determine how assessments might be adapted to create employability-focused assessments supported by technologies at the University of Exeter.

Because traditional forms of assessment, such as exams and essays, do not tend to be used in professional contexts, they are not well-suited for embedding employability. The goal of the study was to create authentic assessments that employ tasks that are more genuine and real. This study was based on the premise that the theory of affordances suggests ways of addressing the flexibility of technologies to be aligned with pedagogies using affordances (Osborne et al., 2013, p. 3):

1. Any one object/space has multiple affordances, and the affordance that is attended to is based on need. This flexibility allows for alignment with specific pedagogic requirements.
2. An affordance is stable, and it does not change as the need of the observer changes. This stability allows for multiple technologies to be designed into a pedagogic model.
3. Affordances are personal and relational. This allows individuals to select from multiple technologies based on personal needs and experiences.

The researchers began by researching and identifying the key components of authentic assessment and determining how they can take current assessments and create designs that improve on those assessments, followed by an evaluation of those assessments. To implement the appropriate technologies with their assessment designs, they needed to choose a method that would identify the affordances of the technologies in consideration (Osborne et al., 2013). They settled on rating the technology by summarizing what it provides from an affordances perspective. Through this process they narrowed it down to three potential technologies to implement their assessment and

demonstrated the tools with students to show how these tools would be useful in supporting the assessment they were going to take. Academics and employers' feedback were also sought out by the researcher. Finally, the tools were tested by the students and evaluated for their effectiveness in conjunction with the assessment. Based on the results, the authors posited that by using the theory of affordances to highlight the strengths of technologies when considering a specific pedagogic context, they were successful in identifying appropriate technologies to implement their assessment (Osborne et al., 2013). Moreover, the researchers believed that by taking a functional perspective into the affordance concept they were able to use technologies in assessments as more than tools; rather they were specific places. As an example, Blogger, a tool for blogging, "provides not simply a tool to write, but a place capable of providing for self-reflection and peer review" and Evernote, is not simply a note taking tool, but a place for "centralizing and contrasting disparate experiences (Osborne et al., 2013, p. 17)."

These studies show that by designing with affordances at the forefront, learning experiences can be improved for the users (user interface and assessment). Therefore, this study is structured around the theory of affordances and the idea that LMSs afford instructors the opportunity to use the tools in ways that align with their epistemological beliefs, pedagogical approaches to teaching, and can adjust per the needs of the different delivery modes.

Task-Technology Fit and Affordances in LMSs

Task-technology fit (TTF), according to Goodhue and Thompson (1995), is "the degree to which technology assists an individual in performing his or her portfolio of

tasks" (p 216) and is one factor that has been shown to influence both the use of information systems and their performance impacts. The technology-to-performance chain (TPC), illustrated in Figure 5, shows that the task-technology fit directly influences performance and indirectly influences utilization via precursors of utilization, such as expected consequences of use, attitude toward use, social norms, habit, and facilitating conditions (Goodhue & Thompson, 1995). As LMSs are a form of technology, there has been some research conducted to determine how TTF relates to LMS use. When considering instructor use of an LMS, McGill et al. (2011), defined TTF as the "ability of the LMS to support the instructor in the range of teaching and course administration activities they engage in whilst accommodating the range of skills instructors have with information technology" (p 44-45).

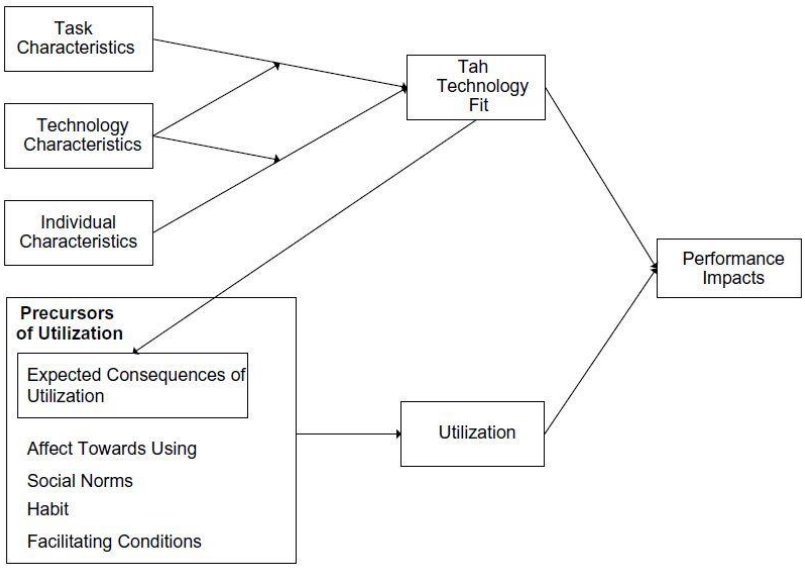

Figure 5. The Technology-to-Performance Chain (TPC) (Goodhue and Thompson, 1995).

McGill and Klobas (2009) were the first to research the relationship between TTF and LMS use. Prior to them, research surrounding TTF focused on software development, managerial decision making, healthcare, and the use of a library cataloguing system (McGill & Klobas, 2009). The researchers first broke the mold by studying how TTF influences the performance impacts of LMSs for students. Because this research is focused on instructor use of LMSs, it will bypass this first study and focus on the study conducted by McGill et al. in 2011.

McGill et al. (2011) sought to understand how TTF affects instructor use of LMSs. Specifically, they focused on its influences on LMS performance impacts and utilization. They also looked at how LMS utilization influences LMS performance impacts, how social norms influence LMS utilization, and how facilitating conditions influence LMS utilization (Figure 6). For this study, utilization was the amount of time spent in the LMS and performance impact refers to the effect of the system on the outcomes of use for the user and could include both effectiveness of teaching and instructor efficiency or productivity.

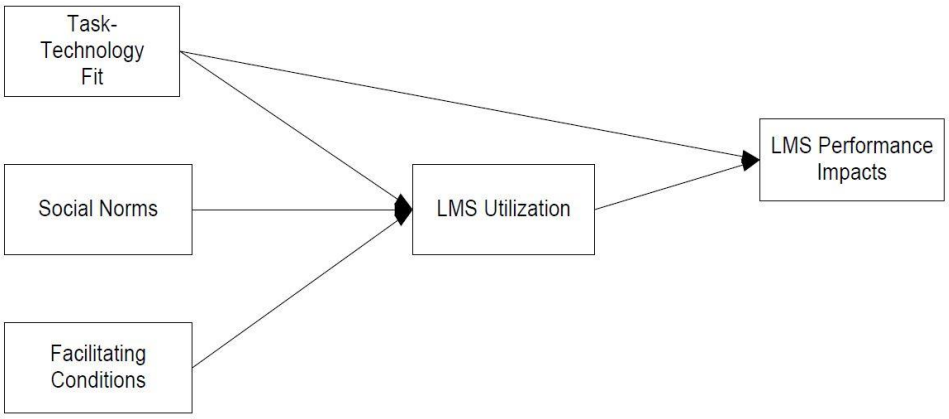

Figure 6. The Test Model (McGill et al., 2011).

McGill et al. (2011) conducted two studies at an Australian University to test the following hypotheses (p. 47-48):

1. TTF will positively influence LMS performance impact for instructors.
2. Utilization will positively influence LMS performance impacts for instructors.
3. TTF will positively influence LMS utilization by instructors.
4. Social norms will positively influence LMS utilization by instructors.
5. Facilitating conditions will positively influence LMS utilization.

The first study was conducted through a web-based questionnaire sent to instructors from a wide range of disciplines who were using the WebCT LMS in their teaching, to which 67 responded. Instructors answered questions related to their training and experience with the LMS, and their perceptions of the LMS and its impact on their teaching performance. The results from the first study showed that TTF played an important role in the success of LMS use for instructors, which should lead to significant improvements in what instructors are able to successfully implement in their teaching

(McGill et al., 2011). Furthermore, the study did not reveal a direct relationship between TTF and LMS utilization, nor was there a direct relationship between LMS utilization and LMS performance impact. Additionally, social norms and facilitating conditions were not found to influence utilization (McGill et al., 2011). These results were unexpected by the researchers and therefore led to the second study.

For the second study, email interviews were conducted using open-ended questions; responses were examined interpretatively to triangulate and validate the findings of the first study, as well as to gain additional insights into the nature of the relationships (McGill et al., 2011). Seven instructors engaged in these email interviews and answered questions about their perceptions of the roles that TTF, social norms, and facilitating conditions play in their LMS utilization and the impacts their LMS use has on their teaching.

Overall, the findings of this study emphasized the importance of TTF. Instructors noted that LMSs afford improvements in communication, coordination, and productivity, but highlighted that poor TTF decreases efficiency and therefore negatively impacts the performance. Furthermore, several participants reported that improved TTF led to increased utilization and poor TTF led to reluctance to use the LMS. In opposition, there were also participants who felt that poor TTF required increased utilization due to issues such as "unannounced downtime, frequent errors, inability to read Office 2007 files, and a thousand other glitches" (McGill et al., 2011, p 55). The findings from this study suggested that the better fit of an LMS to the skills of an instructor and the tasks that the instructor must complete, the more positive its effect on their performance is likely to be

(McGill et al., 2011, p 57). However, according to Renzi (2008), instructors should be able to produce TTF and the ability of instructors to integrate a technology into their teaching is a function of the instructor's pedagogical skills rather than technology and technology skills.

Griffin and Rankine (2010) argued that when considering LMS affordances, much of the research was focused on enhancing student learning and lacked an emphasis on affordances for academics, which, if highlighted, could incentivize faculty use. Therefore, they sought to answer how LMSs could deliver administration affordances for teachers. To answer this question, they conducted a case study of a large enrollment, first-year undergraduate psychology unit at the University of Western Sydney (UWS) where Griffin was the coordinator of the unit and Rankine managed the LMS, which was Blackboard Campus Edition (Version 8). Enrollment included over 700 students across three geographically dispersed campuses and served several degree programs. The delivery of the course was face-to-face and included some tutorials blended with online discussions, resources, and self-directed learning activities and quizzes. The authors arranged the tools within the LMS into functional quadrants, which can be found in Figure 7.

The affordances for academics are represented in the center and were communication and collaboration, content and resources, evaluation and assessment, and site management. Because the focus of this study is on the affordances for academics, the findings are related to instructor interaction with these affordances and tools. Therefore, the authors focused on the affordances with the following lens (Griffin & Rankine, 2010):

a) Communication and collaboration: Afford communications between the instructor and student, ranging from student "personal issues that are interfering with learning or assessment submission, through confusion about content or resources, to explanation of essential concepts" (p. 512), or the instructor proactively informing students about aspects of the unit. Furthermore, with large enrollment courses, there is usually a team of lecturers and tutors, and this also includes communication between the teaching staff.
b) Content and resources: How LMSs afford "practical adjustments in just-in-time uploading of content and the efficiency inherent in content and resources being available for refreshing each semester (p. 516)."
c) Evaluation and assessment: Afford "practical efficiencies that teachers need to manage their workloads and the resource constraints with which they work" (p.518) related to assessing student performance.
d) Site management: Affords the automatic recording of student assessment marks and grades and the tracking of student interactions in the online environment.

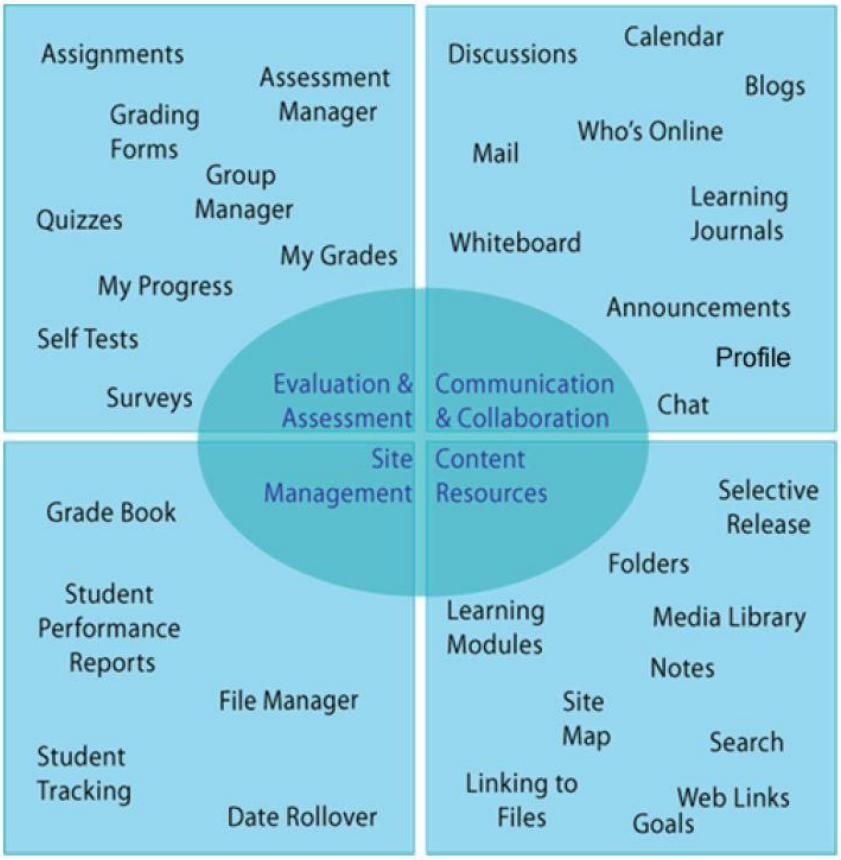

Figure 7. Blackboard Campus Edition (Version 8) Tools

The overall findings of this study yielded that the LMS does afford time-saving efficiencies for instructors in these categories once they have developed competence in the use of the LMS. For example, for communications, the instructor and tutors insisted that all communications were within the LMS and implemented a structure for discussion topics by clustering posts by relevance (Griffin & Rankine, 2010). Furthermore, the teaching team was able to share resources and tips using the LMS, also increasing efficiency. According to the researchers, the most time-saving efficiency afforded by the LMS was the ability to source, reuse, and refresh unit components. Finally, the onerous

and tedious task of managing marks and grades was managed through the site management category of affordances by using the grade book (Griffin & Rankine, 2010).

The results of this study suggested that the tools within LMSs afford faculty to use it in way that would provide effective and efficient academic use. Furthermore, the affordances for academics also promote pedagogical effectiveness. For example, "student learning is facilitated by communications with the staff, and as described, those communications can be more efficiently managed with an effectiveness spin-off" (Griffin & Rankine, 2010, p. 525). While related to the affordances of LMSs, and we are seeing use of the tool for a face-to-face course, we still do not know whether the use would have been different based on the instructor's epistemological beliefs, if pedagogical approaches of the instructor would have had an impact, or if the results would have been different had the delivery mode of the course been hybrid or fully online.

Epistemological Beliefs

Epistemology has been studied extensively over multiple decades. Perry (1968) focused epistemology research on the nature of knowledge. It then evolved in 1990, as an epistemological belief system, coined by Schommer as an umbrella over the nature of knowledge and nature of learning. Schommer posited that the epistemological belief system consisted of the stability of knowledge, source of knowledge, structure of knowledge, the speed of learning, and the ability to learn, and that these beliefs were essentially independent of one another (Schommer, 1990). Schommer (1990) described each of these beliefs as the following:

a) Stability of knowledge: reveals beliefs about certainty or tentativeness about learning.
b) Source of knowledge: knowledge is obtained from the authority such as a teacher or textbook, or personal reasoning is important for the construction of knowledge.
c) Structure of knowledge: views knowledge as composed of isolated pieces to highly integrated concept.
d) Speed of learning: learning occurs quickly or gradually.
e) Ability to learn: innate nature of learning or developmental nature of learning by time.

Speed of learning and ability to learn were highly criticized by researchers because these pertained to learning rather than knowledge/knowing (Bahcivan et al., 2019). Schommer-Aikins (2004) accepted the criticism and changed her epistemological belief model to certainty, simplicity, and source dimensions constructing the set of epistemological beliefs.

Furthermore, epistemological beliefs were classified by researchers on a continuum that ranged from naïve to sophisticated (Pulmones, 2010; Schommer, 1990). "Naïve epistemological beliefs correspond to that knowledge which is certain (certainty), involves unrelated bits (simplicity), comes from authorities (source), and does not need different types of justifications (justification) (Bahcivan et al., 2019, p 580)." On the other hand, sophisticated beliefs adopt that knowledge has a growing structure, is composed of complex networks, comes from the self, and should be justified in different ways (Bachcivan et al, 2019). For the purposes of this study, epistemological beliefs are

the nature and role of individual representations about knowledge and knowing (Mason & Bromme, 2009).

Epistemological beliefs can be divided into three different paradigms of learning: objectivism, cognitivism, and constructivism. Objectivism was originally presented by Rand (1961), who posited that reality exists independently of consciousness and that an individual can obtain objective knowledge from perception through the formation of concepts and the process of inductive logic. The major assumptions of objectivism are (Lakoff, 1987 as cited in Wang & Peyvandi, 2018, p. 30):

1. There is a real world consisting of entities structured according to their properties and relations.
2. The real world is fully and correctly structured so that it can be modeled.
3. Symbols are representations of reality and can only be meaningful to the degree that they correspond to reality.
4. The human mind processes abstract symbols in a computer-like fashion so that it mirrors nature.
5. Human thought is symbol manipulation, and it is independent of the human organism.
6. The meaning of the world exists objectively, independent of the human mind and it is external to the knower.

According to Wang and Peyvandi (2018), an objectivist teaching method "follows the principle that there is one true and correct reality, which can only be understood through the objective methods of science" (p. 31).

Cognitivism focuses on the processes of learning rather than observed behavior. In other words, an outward exhibition of learning is not required but the focus should be on the internal processes and connections that take place during learning. According to Gage and Berliner (1988), cognitive psychologists use observable behaviors as an indication for deducing what is going on in a person's mind and that the emphasis is on the active mental processing on the part of the learner. The consideration of those processes will assist in the understanding of how the learner engages in the process so that this learning process may be improved (Nagowah & Nagowah, 2009). According to Reid (2005), learners' roles in the learning process are active as opposed to passive. Cognitivists also believe that knowledge is absolute and given, but the focus and emphasis is on the internal processes of the learner during the learning process (Nagowah & Nagowah, 2009).

The constructivist learning theory is centered around the idea that learners generate their own rules and mental models through experiencing things and reflecting on those experiences (Bruning et al., 1999). Bates and Poole (2003) postulated that we construct knowledge rather than acquire it through methods such as memorization or the transmission between those who have the knowledge to those who do not. According to Tam (2000), there are four basic characteristics of constructivist learning environments:

1. knowledge will be shared between instructors and students,
2. instructors and students will share authority,
3. the teacher's role is one of a facilitator or guide,

4. learning groups will consist of small numbers of heterogeneous students (as cited by Wang & Peyvandi, 2018, p. 31).

The constructivist method of learning involves learners discovering learning on their own through active involvement with these concepts and principles, as well as the incorporation of cooperative learning, experimentation, open-ended problems, and real-life scenarios (Nagowah & Nagowah, 2009).

Pedagogical Approaches

The term pedagogical approach, sometimes referred to as teaching method, is used to encompass the pedagogy, principles, and management strategies of instructors. Pedagogical approaches can and have been classified in different ways. Arguably the most common classification is the dichotomy of teacher-centered approach vs. learner-centered approach. The teacher-centered approach was modeled after factories, which focused on efficiency through regimented processes (Thompson, 2003). This method is predominately associated with the transmission of knowledge from instructor to the student. In other words, students passively receive knowledge from instructors through lectures and direct instruction. With this approach, student achievement is at the forefront and making relationships with students is anchored in the intellectual explorations of the learning materials (Brown, 2003). Teachers are responsible for determining what and how students will learn.

Learner-centered approaches focus on the learner's needs and characteristics over the knowledge of facts and skills, with an emphasis on engaging the learner in learning for understanding and thinking to build their own interpretations (Brown, 2003). The

primary role of the teacher in a learner-centered approach is to coach and facilitate learning and overall comprehension of the material. Student learning is usually measured through both formal and informal forms of assessment, like group projects, student portfolios, and class participation.

Another breakdown of pedagogical approaches includes content-focused and interactive/participative methods (Teaching Methods, 2020). In the content-focused method category, both the teacher and the learning must fit into that content. In other words, the information and skills to be taught are the most important component and emphasis is centered around the clarity and careful analysis of the content. Neither the teacher nor student can become critical of anything to do with the content. The interactive/participant category borrows from the teacher-centered, learner-centered, and content-focused methods by avoiding emphasizing teacher, learner, or content. Rather, this method is driven by the situational analysis of what is most important given the current situation of those involved in the learning process.

Furthermore, pedagogical approaches could also be classified as high-tech and low-tech. In a high-tech approach to learning, different technology is used to assist students in their classroom learning. In this approach, computers and tablets are utilized in the classroom; others may use the internet to assign coursework. A low-tech approach to learning sticks to a more traditional approach to learning and considers physical presence and interaction between the educator and the student a requirement. For this study, pedagogical approaches are going to be classified as teacher-centered and learner-centered.

There are many different examples of both teacher-centered and learner-centered approaches to teaching. To begin, teacher-centered methods of instruction include direct instruction/lecture, flipped classroom, and the demonstration method. Direct instruction is considered the primary teaching strategy within the teacher-centered strategies and relies on explicit teaching through lectures and teacher-led demonstrations. The roles the teacher might play in this form of instruction are formal authority, expert, and personal model (Teaching Methods, 2020). Formal authority refers to when teachers are the position of power because of their exemplary knowledge and status over the students. The expert role refers to when all the knowledge and expertise lies within the teachers and their primary role is to guide and direct learners through the learning process. Finally, the personal model refers to when teachers lead by example through the demonstration of how to access and comprehend information and student learning is done through observation and replication of the teacher's process.

The flipped classroom approach is considered by some to be a learner-centered approach because of its focus on active learning into a concrete approach that incorporates technology and can include collaborative activities, problem solving, interdisciplinarity, teamwork, critical reflection and dialogue (Gnaur, 2019). However, the flipped classroom approach could also be very teacher-centered when the approach implements pre-recorded lectures and videos where information is passed from one person (an expert) to another. Despite the potential for more learner-centeredness, this approach is still highly focused on the teacher's idea of how learning should happen, what information students need, and how it is shared with them (Teaching Methods,

2020). The teacher has the choice of what is to be communicated online and which digital format is used (Gnaur, 2019). Therefore, students learn from the teacher's crafted knowledge without considering how this knowledge was created or constructing their own approach (Sadaghiani, 2012). For this study, the flipped classroom approach, while very technology-based, will be labeled as teacher-centered for these reasons.

The final teacher-centered approach, for the purposes of this study, is the demonstration method. Weaver and Cenci (1960) argued that the most effective way to teach an occupational skill is to demonstrate it. With the demonstration method, teachers are not lecturing or telling the students about something, rather they are performing the act, or action, they want the student to learn. In other words, demonstration is any planned performance of an occupational skill, scientific principle, or experiment (Makokha & Ongwae, n.d.).

The learner-centered approaches, or teaching methods, in this study include hands-on learning, differentiated instruction, game-based learning, problem-based learning, and experiential/expeditionary learning. Kinesthetic or hands-on learning. This type of learning is based on the idea of multiple intelligences and requires students to do, make, or create (Teaching Methods, 2020). Some examples of these activities would be drawing, role-play, building, sports activities, the use of drama, and other hands-on activities.

The differentiated instruction approach initially gained traction with the 1975 Individuals with Disabilities Education Act (IDEA) that ensured all children had equal access to public education (Teaching Methods, 2020). While the act was initiated to

protect students with special needs, differentiated instruction is used to meet the needs of all types of learners. Chamberlin and Powers (2010) outlined seven core principles that guide differentiated instruction:

1. Teachers communicate what is essential for students to learn about a subject to link curriculum and instruction to assessment. Assessment is ongoing and serves to inform instruction that includes students' understanding of the material, their personal interests, and learning profiles.
2. Teachers respond to the differences amongst their students by accepting students where they are and have expectations that students will understand all that they can.
3. Participation is expected from all students and they are challenged at a level that is attainable to them and promotes individual growth.
4. Teachers and students are collaborators in the learning process.
5. Teachers are flexible with utilizing groups and whole class discussion, and students work in diverse groups based on their readiness, interests, and learner profiles. According to Turner et. al (2017), a learning profile includes a student's learning preferences, family structure, favorite hobbies, interests, state assessment scores, reading scores, and fluency in reading recordings (p. 491).
6. A differentiated approach is proactive rather than reactive with lesson plans that are structured to address the variance in learner preferences.
7. Space, time, and materials are implemented to suit the needs of the various learners (Chamberlin & Powers, 2010).

In a game-based learning environment, students work on quests to accomplish a goal, or learning objective, by choosing actions and experimenting along the way (Teaching Methods, 2020). It is a rule-based and goal-oriented form of play that has the capacity for facilitating teaching and learning (Bagheri et al., 2019). According to a literature review conducted by Qian and Clark (2016), game-based learning seems to facilitate the 21st century skills including critical thinking and exploration. Game-based learning is difficult to implement in higher education for reasons including, but not limited to, the expense of providing classrooms with the proper equipment and the limited knowledge of faculty to find and adapt games to the learning objectives of a course (Kapp, 2012). Despite that, it is still important to highlight how those who implement game-based learning into their teaching potentially use LMSs to support this pedagogical approach or whether there is a difference in how they use the LMS. Games-based learning is different from gamification, however, it often includes gamification elements. Gamification has been defined as a "process of enhancing services with motivational affordances to invoke gameful experiences and further behavioral outcomes" (Hamari et al., 2014, p.3025). In other words, gamification is a teaching method that includes adding game elements to the learning process with the goal of invoking the same psychological experiences as games generally do (Huotari & Hamari, 2012). Game elements could include points, badges, scoreboards, leaderboards, etc. Because gamification is just the addition of these elements, it does not fall into games-based learning and will not be included in this study.

Problem-based learning is defined as a learner-centered pedagogy where learners work through problems with little direction from the teacher and therefore develop intellectual independence (Williamson & Gregory, 2010). Some of the key elements to problem-based learning include group-based problem solving, learning in context, self-directed learning, and an emphasis on metacognitive reasoning (Abrandt-Dahlgren & Dahlgren, 2002). The goal is to engage the learners through collaborative, small group, or team work to construct and apply knowledge while exploring solutions to real-world problems (Vandenhouten et al., 2017). Vandenhouten et al. (2017) posited that the role of the teachers in this approach is to be role models and mentors who focus on helping students uncover and unpack the elements of the problem to produce possible solutions. With this approach, an extraordinarily complex, identified problem which stimulates actual issues and challenges, is the integral component. The emphasis is placed on the problem-solving process itself rather than the solution to the problem (Williamson & Gregory, 2010). It also relies on students drawing on prior learning from many disciplines to generate creative solutions (Vandenhouten et al., 2017). Finally, the problem should "replicate key situations by which professionals are challenged in practice, thus preparing students for the 'messy' problems of the workplace and real life" (Vandenhouten et al., 2017, p. 118).

Experiential learning is based on Knowles (1978) belief that experience is a key part of learning and Dewey's (1938) extensive influence that underscores the importance of experience in education. In experiential learning, a teacher will facilitate firsthand experiences for their students through internship and practicum in curriculums, as well as

the accreditation and recognition of prior learning experiences. The accreditation of one's experiences is recognizing that experience is related to "recognizing experience itself as knowledge even it if took place without formal educational interventions" (Kuk & Holst, 2018). The experience itself is not what constitutes experiential learning. Rather it is the relationship between experience, reflection based on prior knowledge, and learned experiences as a result (Kuk & Holst, 2018). The key component is reflection. Kolb's (1984) learning model portrays two dialectically related modes of grasping an experience, concrete experience, and abstract conceptualization and two dialectally related modes of transforming that experience into learning, reflective observation, and active experimentation. The overall goal is to reach integrative learning, which involves an idealized learning cycle or spiral where a learner engages in experiencing, reflecting, thinking, and acting, in a recursive process that is responsive to the learning situation and what is being learned (Mainemelis et al., 2002). Simply put, experiential learning is an approach to teaching where students learn by doing the task or process that they are studying, and may include role-playing, simulation, consulting with an actual business, or operating an actual business (Daly, 2001).

Researchers generally agree that pedagogical approaches and beliefs are related to the epistemic beliefs of teachers (Pajares, 1992; Chai 2010). Hofer and Pintrich (1997) agreed that "beliefs about learning and teaching are related to how knowledge is acquired, and in terms of psychological reality of the network of individuals' beliefs, beliefs about learning, teaching, and knowledge are probably intertwined" (p. 116). This was further verified by studies that have found that constructivist epistemological beliefs

are related to the use of learner-centered pedagogical approaches (Schraw & Olafson, 2002; Brownlee, 2004). Kang and Wallace (2005) found that teachers who viewed science as a body of fact-driven information, or had an objectivist/behaviorist epistemic belief, implemented more teacher-centered approaches to teaching. Finally, those who possess the cognitivist epistemological belief are likely to implement teacher-centered pedagogical approaches but include an examination of the learner's existing mental structures to determine how to design instruction so that it can be readily assimilated (Ertmer & Newby, 2013).

Delivery Mode

Another factor this study will explore is the relationship between course delivery mode and faculty use of LMSs. The delivery modes for this study mirror those in a study conducted by Burns et al. (2013) and are face-to-face, online, and hybrid. Face-to-face course delivery mode is used to describe the course sections that are taught where students attended a class on the physical campus and the instructor is present (Burns et al., 2013). In this mode, the pedagogical model seems to be based on a traditional model where the instructor provides the content in the face-to-face setting and student use of Information and Communication Technology (ICT) tools is not mandatory, but rather predominately for leisure and communication (Gros et al., 2012). The face-to-face mode relates mainly to the instructor's method of delivering the course and to the activities used within the classroom (Baragash & Al-Samarraie, 2018). The online delivery mode refers to the courses that deliver all course material via the Internet with no required face-to-face meetings between the instructor and students (Burns et al., 2013). Learning

technologies, such as LMSs are used extensively to support online learning by affording the facilitation of instruction, assessment, and course administration, while also providing a different way to communicate with students (Hongjiang et al., 2014). Overall, faculty are fully dependent on technology systems to completely deliver and support their courses. Finally, a hybrid course involves both face-to-face class meetings and online learning. A hybrid course in this study is consistent with the models put forth by Kaleta et al. (2005) in that it reduces the number of in-class meetings but does not eliminate them, rather replaces them with online, interactive learning activities and considers why and how often classes need to meet face-to-face. This is not to be confused with a blended learning environment. A blended learning environment may hold 100% of their classes face-to-face but also have some components of online learning. According to Heinze and Procter (2006), a hybrid course is more than the combination of face-to-face and online instruction, it must include elements of social interaction. In other words, the online component to the hybrid course includes asynchronous or synchronous interactions online between the teacher and learner and the online component is more than just a source for housing additional content.

Epistemological Beliefs, Pedagogical Approaches, and Delivery Modes within LMSs

According to Zhao and Frank (2003), teachers are more likely to integrate technologies if they can identify how they can support their pedagogical beliefs. Steel (2009) posited that many university teachers struggle to use LMSs to create learning designs that are truly engaging for their students and that LMSs as a one-size-fits-all technology solution, may not be appropriate for the expression of all teachers'

pedagogies and intentions. Other researchers found that assessments within LMSs do not support social constructivists practices (Papastergiou, 2006) and that LMSs model structures associated with traditional classroom-based activities (Apedoe, 2005). Apedoe (2005) also posited that LMSs were originally used by faculty in higher education to support their teacher-centered approaches to learning. Despite these findings, there are opportunities within LMSs for a diverse range of pedagogical practices (Holt & Challis, 2007) and teaching approaches, including behaviorist and constructivist approaches (Papastergiou 2006). Furthermore, the findings of an affordance analysis of Blackboard Learn, conducted as a pilot study by the researcher, found that there are affordances within the Blackboard Learn LMS that allow for the implementation of multiple teaching strategies aligned with differing epistemological beliefs (Walters, 2019).

This section provides an encapsulation of an extensive literature review of empirical studies done on LMS use that can be linked to the constructs of this study: epistemological beliefs, pedagogical approaches, and delivery modes. Some of the studies focus on one construct, while others were a blend of more than one. Furthermore, some of these studies were not focused on the constructs, however the researcher inferred that had the constructs been the focus, results may have yielded these constructs to have impacted the outcomes. Overall, this section will reveal gaps and further solidify the need for this study.

In a study conducted by Schraw and Olafson (2003), they found that preservice teachers' epistemological beliefs had great influence on their teaching methods. For example, "teachers who believe that knowledge is certain, and the source of knowledge is

[an] external authority, such as teacher or textbooks, prefer to implement traditional instruction that does not involve students in teaching/learning process, in their classrooms" (Cetin-Dindar et al., 2014, p. 482). Moreover, Cetin-Dindar et al. (2014) found that preservice teachers with a sophisticated view of epistemological beliefs preferred creating constructivist learning environments, giving importance to student-student cooperation and interaction, and fostering a social and friendly environment in classes for students to ask questions.

Steel (2009) conducted a study to better understand how university faculty, who had been identified as successful technology users, viewed LMSs potential to effectively implement its use in conjunction with their beliefs and teaching practices. One faculty member stated that the role of web technologies is to combine their affordances with her own teacher attributes to implement an effective learning environment for her students, and that LMSs offer many opportunities for the implementation of a learner-centered learning environment (Steel, 2009). Another posited that a teacher's pedagogical beliefs and objectives should be the determining factor of whether technologies should have any role in instruction and believes that these technologies can support active learning and active engagement for students. Because this faculty member teaches large and diverse classes, he believes LMSs offer him the affordances to extend learning beyond the lecture classroom to a safe and more interactive learning space. This faculty member also stated that an LMS is not enough on its own, rather that faculty need to select the functionality that is relevant to the learning experiences they wish to implement (Steel, 2009). He believed in an experiential approach to learning because of its ability to help students

gain a better understanding of theories and concepts. Therefore, he used surveys, quizzes, and communication tools to reproduce important research findings that underpin theory and aggregate data. Furthermore, he used online role plays, scenario analysis, and simulation games with student collaboration to provide opportunities for the application of theoretical concepts (Steel, 2009). The final participant of this study held the belief that students needed to feel socially included, comfortable, and motivated during their learning experiences and that learning technologies, such as LMSs, can be designed to cater to a range of diverse learning styles and enable multiple ways of connecting students to learning. She also stated that any web component to the learning experience needs to be coherent and integrated with offline learning and supportive of the desired learning outcomes. Her pedagogical views align with preferences of authentic learning and experiences and therefore she uses the LMS to connect learning and learner choices to students' future professional lives with a deliberate blended learning strategy (Steel, 2009). Overall, the findings of this study suggested that these faculty members used the LMS differently to match their own pedagogical preferences and the teaching and learning issues they were focusing on solving (Steel, 2009). All three faculty also stated the importance of using the technology in alignment with the educational need rather than building the instruction around the technology itself. Therefore, all three used the LMS to support authentic learning approaches and materials; the affordances described by each faculty member could best be defined as pedagogical affordances that match their pedagogical beliefs (Steel, 2009).

An empirical study was conducted using a Master of Arts (MA) course regarding Contemporary Issues in Adult Education at the University of Ghana by Asamoah and Oheneba-Sakyi (2017). The purpose of the study was to demonstrate how faculty could apply constructivist tenets and learner-centered pedagogical approaches using educational technologies, including the Sakai LMS (Asamoah & Oheneba-Sakyi, 2017). A qualitative, descriptive case study was implemented and homed in on a 14-week course that met once a week for four hours, inclusive of 11 MA students who agreed to partake in semi-structured interviews. Moreover, the researchers took on a participant observer role in the class during the entire semester and collected data, through observation and documents, pertaining to the instructor's role in curriculum design and its placement on the Sakai platform, engagement with learner-centered pedagogy, assessment method, constructivist role in the use of the LMS and other technologies; and the role of the technology in the constructivist perspective on teaching and learning.

Data revealed that the instructor provided learning resources to the students using an e-resource tool in the LMS that included a syllabus, educational material links, websites, and lecture notes. The instructor also uploaded the course outline, course material, notes, slides, a website for e-books, e-libraries, articles, and links for YouTube online within the resource's tools. The purpose of the e-library materials and e-books was to facilitate students' learning through problem-solving skill building that can be used in the real world, based on "experts' advice" (p. 204) (Asamoah & Oheneba-Sakyi, 2017). The announcement tool, emails, and the chat room tools on the LMS platform were used to provide information to students and to encourage them to visit the resource tools and to

download relevant information. The instructor always used audio, video files, and pdf files to facilitate student learning (Asamoah & Oheneba-Sakyi, 2017). To ensure the learner-centered pedagogy was implemented, the instructor "provided active learning opportunities and a social interaction platform to facilitate students' knowledge building" (Asamoah & Oheneba-Sakyi, 2017, p. 203). The student interviews supported this statement and their responses reiterated that many of the learning activities were carried out online, and that students "engaged in active, team-based collaborative and problem-solving learning" (p. 205) both online and in the face-to-face settings through debates and chat room conversations (Asamoah & Oheneba-Sakyi, 2017). The instructor also proved to be well-versed in the technological, pedagogical, and content knowledge by creating a participatory learning environment through the careful selection of tools to enable student engagement with interpersonal communication and interactions with the instructor (Asamoah & Oheneba-Sakyi, 2017).

This study demonstrated that instructors can "marry and apply constructivist practice" (p. 207) while using LMSs by:

a) Engaging students and persuading them to make deeper connections with the material under study and generate meanings rather than regurgitate information.
b) Allowing students to interact with the instructor, content, and peers.
c) Implementing team-based collaborative and problem-based learning.
d) Utilizing tools for knowledge construction through such means as simulations, multimedia, and problem-solving approaches (Asamoah & Oheneba-Sakyi, 2017, p. 207).

In Denmark, Ørngreen et al. (2019) looked at the use of Moodle (an LMS) at a university where the faculty used the problem-based approach in their teaching. The study was a piece of a larger project that included a systematic literature review to identify the challenges, potential benefits, and useful pointers for using Moodle in problem-based learning, four interviews with faculty to investigate the design use strategies for Moodle, a survey where students nominated their best Moodle course and finally, an analysis of the nominated Moodle courses.

The literature review yielded that most LMSs, including Moodle, are designed with traditional lecture-based instruction in mind and therefore are not intrinsically conducive to a problem-based approach (Ali et al., 2015). Furthermore, teachers find it difficult to define, design, and structure problem-based, or even project-based activities (Ørngreen et al., 2019). Conversely, Ali et al. (2015) argued that collaborative and communicative tools, which are essential to the problem-based learning environment, are already available and are the best for building learning environments that benefit from the hundreds of freely available plug-ins created by the Moodle community.

Faculty interviews highlighted three barriers to faculty use of Moodle in conjunction with the problem-based approach to teaching:

1. Faculty lacked information about Moodle in terms of its features and what is possible in the version available to them as well as inspiration about how to work with the features pedagogically within problem-based learning.
2. Faculty felt alone in terms of designing their own Moodle room.

3. Faculty were not always aware of the benefits of using Moodle for more than information dissemination, as they meet up with their students on campus on a regular basis (Ørngreen et al., 2019).

The findings from this study, seem to mirror those that have been conducted on learning management use, that were not tied to a particular teaching method, in that they were predominately used for teacher-centered approaches to teaching, to include mostly the dissemination of content. However, this study highlighted the lack of empirical research surrounding LMS use in relation to pedagogical teaching approaches, therefore further solidifying the need for additional engagement with research in this area.

Louhab et al. (2019) created the Smart Adaptive Management for Flipped Learning (SAM-FL) approach to provide teachers with an integrated solution within the Moodle LMS that would allow them to control the learning process for learners using an adaptive flipped classroom pedagogical approach to teaching. This approach also allowed the instructor to provide the learners the opportunity to access course content suited to their level of subject knowledge through the development and addition of a plug-in to the Moodle platform. The plug-in to the Moodle platform automatically graded and provided the information students needed to either advance or review content. The authors posited that the model would enable instructors to do the following (Louhab et al., 2019) while using the LMS:

1. Deliver static content that considers the learning needs of the learners.
2. Offer learners course content adapted to their knowledge level.

3. Treat learners in an individual way and focus on his/her strengths and weaknesses while controlling their learning process.
4. Integrate the flipped classroom to give learners more time and space to express shortcomings and develop a deeper understanding of the course concepts.

The implementation the SAM-FL approach included setting up the course by including several chapters with each divided into several sections and incorporating activities. Sections could be presented as pages, and a page contains a set of paragraphs. The learning process, illustrated in Figure 7, includes the system deciding the chapter in which the learner would begin their course; the instructor would manually set the difficulty level during course creation, and the learner would be obliged to consult that chapter for a definite period and then asked to take an evaluative questionnaire (Louhab et al., 2019). The results of the questionnaire then determine what the learner's next step will be. This process is done within the context of the flipped classroom and allow learners to bring questions about incomprehensible constructs to the face-to-face sessions of the class.

To evaluate this solution, Louhab et al. (2019) implemented an educational scenario that included a positioning test, input test (result obtained at the conclusion of each chapter), learning course concepts, output test (results obtained using the Moodle plug-in), and final exam, with 42 learners in the third year of their bachelor's degree program in Mathematics and Computer Science. Of the 42 learners, 32 followed the learning process until the end. The findings from this study concluded that using a "flipped classroom approach through an LMS, and differentiating the content, yielded

remarkable progression of the learners' results" (Louhab et al., 2019, p. 765). The results of the exam scores were always higher than the positioning test, and the study started with 31.25% of learners placed in the beginning category, 31.25% the intermediate, 34.37% in pre-advanced, and 3.12% in advanced. By the end of the four weeks, there were 0% of beginner learners, 9.37% of intermediate, 81.25% of pre-advanced, and 9.37% of advanced, indicating that implementing this solution helps improve knowledge.

While the researchers did include a plug-in that allowed for automatic grading and placement, they still allowed for test scores to be put in without the plug-in (input test). These findings yielded that, while not as drastic, there was still an improvement in student scores. Implications from this study confirm that the LMS does afford the use of the flipped classroom model, pedagogical approach to teaching, and when used in this context, student performance in learning the content improved.

Gautreau (2011) conducted a study of faculty at California State University Fullerton to identify the motivation factors, along with demographics among faculty, to understand what motivates faculty to adopt an LMS as part of face-to-face teaching, and when deciding to teach online courses. The target population for this study were full-time tenure or tenure track faculty who taught in the College of Communications. The number of faculty who participated represented 87% of the total faculty in the College of Communications during the spring semester of 2008. A needs assessment evaluation methodology was applied and was used to identify specific factors that motivate faculty to adopt an LMS as part of their teaching strategies. A survey instrument was sent to participants to complete.

The findings from this study revealed that the variables of tenure status, as well as level of experience with an LMS and with computers were significant in determining the utilization of the LMS. Additionally, this study revealed that salary, responsibility, and achievement are the prominent factors that faculty consider important when deciding on whether to adopt an LMS into their instructional practices (Gautreau, 2011). In this study, achievement is associated with the ability for faculty to achieve their goals of advancing their knowledge of teaching using an LMS. To advance teaching using an LMS, a faculty member would need to apply their epistemological beliefs along with how they use the tools within an LMS. Furthermore, it was determined that untenured faculty apply available resources to enhance their instruction and meet the needs of students (Gautreau, 2011) which could potentially mean using other resources outside of the LMS which would influence how faculty use an LMS.

Another study sought to determine the impact of instructor's individual characteristics, LMS characteristics, and organization characteristics on instructor satisfaction of LMS in blended learning, and consequently, on their continuous use in blended learning and pure use intention for distance learning (Al-Busaidi & Al-Shihi, 2012). Figure 8 depicts the different characteristics that fell into each of the constructs. The study included 82 instructors from Sultan Qaboos University (SQU) in Oman. The LMS was initially WebCT (now Blackboard), but later was switched to Moodle. A questionnaire was used to gather the data and partial least square, and a variance-based structural equation model (SEM) technique was used to obtain determinate valued of latent variable for predictive purposes.

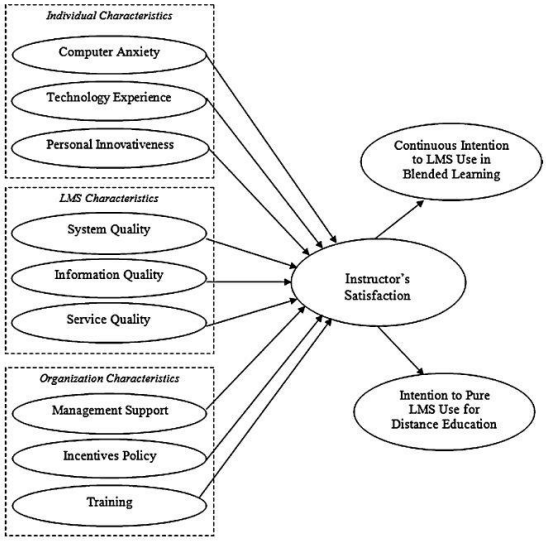

Figure 8. Model of Factors Relating to Instructor's Satisfaction of LMS in Blended Learning and Continue Intent to Use LMS.

According to the results from this study, computer anxiety had negative impacts on instructor satisfaction of the LMS. Data analysis also revealed instructor personal innovativeness, system quality, information quality, management support, incentives policy, and training all have a positive impact on LMS satisfaction. The characteristics that did not yield any significance were technology experience and service quality. Instructor innovativeness was measuring as an "individual's attitude reflecting a tendency to experiment with and to adopt new information technologies independently of the communicated experience of others" (Al-Busaidi & Al-Shihi, 2012, p. 24). These researchers believed that this could be related to pedagogical approaches, in that, the higher the innovativeness of an instructor, the more likely they would be to try different pedagogical approaches within an LMS. However, this is not measured, or stated

explicitly in this study, and therefore coagulates that this is a gap in the research that needs to be explored. Furthermore, the study found that instructor satisfaction of LMSs is a key determinant of their continuous use of LMSs in blended learning (face-to-face delivery mode with some online components) and of their intention to purely use LMSs for distance education, or courses offered fully online. What this study does not reveal about the different delivery modes is whether they impact what tools and how often those tools are used in LMSs.

Willis and Cifuentes (2005) conducted a study using a technology integration graduate level course for preservice K-12 that was offered both online and face-to-face. The purpose was to analyze the technology integration by the instructor and measure outcomes of both modes of delivery and the affordances applied in both modes. The results of this study yielded some key differences between the two delivery modes. The first difference was that, in the face-to-face setting, students were able to ask questions and receive real-time support during skill training and hands-on activities while those in the online course had to rely on asynchronous questions and feedback through e-mail and bulletin board responses (Willis & Cifuentes, 2005). Secondly, the face-to-face classroom implemented more hands-on and collaborative activities to practice technology skills while the online group had to rely mostly on online procedures and tutorials despite the fact that both online and face-to-face mode of delivery afford for learning to be hands-on, model learner-centered instruction (Willis & Cifuentes, 2005). And finally, in the face-to-face setting, observations were used to measure the transfer of acquired skills to application of the skills while the online format used assessments and product

submissions (Willis & Cifuentes, 2005). These findings can be attributed to the perceived affordances of these course delivery modes. For example, real-time access to an instructor may be an affordance for face-to-face delivery, however just-in-time support can be provided through software application supported help programs, online help, and instructor-generated frequently asked questions. Additionally, affordances for online teaching make it harder to model classroom practice with the interaction being mostly asynchronous, however, complimentary integration of multimedia components afford the incorporation of video case studies or the collaborative exchange of learner-centered products (Willis & Cifuentes, 2005). While there are affordances in the online setting that can match those of the face-to-face, one that would be very difficult to replicate is the ability of the online setting to offer teachers in a course to interact with technology integration in an environment that closely resembles their own classroom setting, unless of course, they too, are teaching an online course.

The final study of this literature review looks at the effects of delivery mode on student performance. The study was conducted at a Midwestern land grant university for undergraduate students taking a two-course sequence in information systems, required for all business majors. The purpose of this research was to determine if there was a significant different in student success in the introductory information systems course based on three different modes of delivery: face-to-face, online, and hybrid (Burns et al., 2013). The researchers collected data pertaining to student performance in the course through final grades, and also collected data on the downstream course based on whether they took the course face-to-face or online, from which of the three delivery modes they

took the introductory course, and their learning success in the original course. Data from the face-to-face and online courses were pulled from four consecutive semesters, and the hybrid course was developed after the first year of the study and therefore data was collected for two consecutive semesters. For all the courses, web access to the recorded lectures and exam reviews were available to the students. Furthermore, the exams for each delivery mode were available and recorded in the LMS. During the two-year time frame of this study, data from 382 students was pulled from the introductory course, and 217 from the downstream course.

The results from this study indicated that students who self-selected the face-to-face and online delivery modes had higher GPAs than students self-selecting for the hybrid delivery mode; a student's GPA was found to be a highly significant factor in a student's success in the introductory information systems course and was not affected by the delivery mode (Burns et al., 2013). Even though GPA was the biggest indicator in this study, the study found that students who took the introductory course in the face-to-face version had statistically better learning outcomes than students in the other two delivery formats. That being said, those who had taken the online or hybrid mode delivery did significantly better, as a group, in the second more advanced information systems course than those students who had taken the introductory course in the face-to-face mode (Burns et al., 2013). There are several factors that could have impacted these findings, one being the epistemological beliefs and pedagogical approaches of the instructor, and how these may have affected how they used the LMS to support student learning.

Summary

This chapter provided an extensive review of the literature pertaining to the different constructs associated with the research focus. It began with the theory of affordances and its relation to technology use. It then segued into a review of the constructs of this study: epistemological beliefs, pedagogical approaches, and delivery mode. The chapter then focused on the empirical studies related to factors currently affecting LMS use and how they link to the different constructs that have been identified as the focus of this study.

This literature review revealed that, although LMS are currently being used primarily for the dissemination of content, the tools within them have more pedagogical affordances available to faculty members (Osborne et al., 2013; Park & Song, 2015; Dabbagh et al., 2019). The factors that are or could affect LMS use are plenty. For each of these factors, the literature review defined their constructs before sharing the research that has already been conducted. McGill et al. (2011) found that TTF (degree to which technology assists an individual in performing tasks) significantly impacts the way faculty uses LMS. Epistemological beliefs have been found to have a relationship with the teaching methods of preservice teachers (Schraw & Olafson, 2002) and Steel (2009) found a relationship between epistemological beliefs and how faculty used the LMS. Minimal studies were found pertaining to how teaching methods affect LMS use, outside of a study on how faculty used the LMS in conjunction with a problem-based learning approach. This study yielded that the LMS was being used mostly for content dissemination but did not compare faculty use with other teaching methods (Ørngreen et

al., 2019). Finally, the delivery mode of the course was explored, and the literature review yielded few empirical studies related directly to faculty use of LMS and none directly comparing the different delivery modes. In the studies found, research was predominately focused on student perceptions of how the LMS was used, their learning, and their satisfaction with the course (Hongjiang et al., 2014). Overall, this chapter lays out the gaps in the literature and the need to delve deeper into how epistemological beliefs, pedagogical approaches, and the delivery mode of a course affects faculty use of learning management systems, knowing that the LMS affords faculty to use it in ways that align with their beliefs and the methods from which they would like to implement.

Chapter Three: Methods

This section describes the methods that were used to explore the factors that impact faculty use of Blackboard Learn at a university located in Northern Virginia. The focus of this research was to determine how faculty epistemological beliefs, teaching methods, and course delivery, impact their use within the learning management system (LMS). Use, for the purpose of this study, is the combination of what tools faculty are using and how often they are using these tools. A mixed methods approach was used to answer the following research questions:

1. Are there significant differences between epistemological beliefs, pedagogical approaches, and course delivery mode and the way faculty use the LMS?
2. Which of the five LMS categories (administrative, assessment, communication and collaboration, content creation and delivery, learning) are contributing to the differences across these variables?
3. How are faculty using the tools within the five LMS categories in their courses?
4. Why are faculty using the tools within the five LMS categories in their courses the way they are using them?

This chapter begins with a description of the setting in which the study was conducted, including the participants who were asked to engage. The chapter also includes details about the research design and the measures that were used to gather data to answer the research questions. The following sections depict the study procedures and statistical analysis of the research data.

Setting

This research study was conducted at George Mason University (GMU) where the researcher is a doctoral candidate in the Learning Technologies Design Research (LTDR) specialization of the PhD in Education program. GMU is Virginia's largest public research university with an enrollment of 37,677 students as of 2019. The university offers both undergraduate and graduate programs, within 10 colleges and schools, to include, Antonin Scalia Law School, College of Education and Human Development, College of Health and Human Services, College of Humanities and Social Sciences, College of Science, College of Visual and Performing Art, Schar School of Policy and Government, School for Conflict Analysis and Resolution, School of Business, and the Volgenau School of Engineering. GMU offers over 50 fully and hybrid online programs. The University's main campus is in Fairfax, Virginia. There are other campuses located in Arlington, Virginia, Manassas, Virginia, and Songdo, South Korea. GMU is a research 1 (R1) university, which is a category that the Carnegie Classification of Institutions of Higher Education uses to identify universities in the United States that engage in the highest levels of research activity. The LMS at GMU is Blackboard Learn, and every course that is offered is also assigned a dedicated space within Blackboard Learn.

Participants

The target population for this study was the faculty members at George Mason University. According to statistics provided by the University, as of Fall semester 2018, there were 1,283 full-time instructional faculty and 1,345 part-time faculty. The breakdown of the full-time staff members and their rank are shown in Table 1.

Table 1. *Number of Full-time Faculty by Rank*

Academic Rank	12-month faculty	9-month faculty
All Ranks	143	1,202
Professor	21	310
Associate Professor	43	414
Assistant Professor	31	395
Instructor	18	83
Lecturer	0	0

For full-time instructional faculty there are 669 tenured faculty (M-433; F-236), 228 tenure-tracked (M-130; W-98), and 448 not tenure-tracked (M-191; F-257). Part-time instructional faculty has five tenured faculty, zero on tenure track, and 1,278 not on tenure track. The ethnic breakdown of the full-time instructional staff can be found in Table 2 and the breakdown of part-time instructional staff in Table 3.

Table 2. *Ethnic Breakdown of the Full-Time Instructional Faculty*

Race/ethnicity	Total Men	Total Women	Total (M+W)
Nonresident alien	7	17	34
Hispanic/Latino	24	26	50
American Indian or Alaska Native	1	1	2
Asian	63	43	106
Black or African American	44	62	106
Native Hawaiian or Other Pacific Islander	1	0	1
White	494	426	920
Two or More Races	12	8	20
Race and Ethnicity Unknown	38	16	54
Total	714	599	1,283

Table 3. *Ethnic Breakdown of Part-time Instructional Staff*

Race/ethnicity	Total Men	Total Women	Total (M+W)
Nonresident alien	29	22	51
Hispanic/Latinx	21	23	44
American Indian or Alaska Native	3	0	3
Asian	103	60	163
Black or African American	28	31	59
Native Hawaiian or Other Pacific Islander	0	0	0
White	499	411	910
Two or More Races	12	10	22
Race and Ethnicity Unknown	59	34	93
Total	754	591	1,345

To determine the needed sample size for this study, G*Power was calculated factoring in effect size, alpha level, and power (Cohens, 1988). A priori power analysis was conducted using MANOVA: Global Effects, with an effect size of 0.0625, alpha level of .05, and power of .95. The number of groups was three, for each of the dependent variables, and the response variables was five, for each of the categories of tools. Based on this calculation, 201 was the minimum number of participants needed for this study.

To engage the faculty in this research, the email addresses of all faculty members were gathered from the George Mason website. Over 2,500 faculty members were invited

to partake in the survey. There was a total of 217 survey responses. Of these responses, 12 were not included due to participants not consenting, not having used Blackboard Learn within the last two years, or not completing all the questions in the survey. This left 205 total participants included in the dataset which met the sample size requirements previously identified for this research study.

The demographic information of these participants and their teaching and LMS experience can be found in Chapter 4 of this dissertation. Of the 205 survey responses, 68 responded that they would be willing to partake in the focus group discussions with 46 identifying as aligning with a constructivist epistemological belief, 15 as cognitivist, 3 as objectivist, and 4 as other. Nineteen total participants were able to engage in the focus groups, with 17 identifying as constructivist, one as cognitivist, and one as other.

Research Design

A mixed methods approach was used to answer the questions of this research study. According to Creswell and Plano Clark (2017), a combination of both quantitative and qualitative research provides the most complete analysis of complex problems. Mixed research has the fewest limitations on the sorts of methods and evidence to gain understanding on what you choose to study and to address alternative explanations and interpretations of these (Maxwell & Chmiel, 2012). Maxwell & Chmiel (2012) also posited that a mixed methods approach provides the greatest opportunity for the integration and triangulation of observations and data. Furthermore, Greene (2007) argued that mixed methods research allows for different approaches to develop different understandings of the study and to allow researchers the "ability to deepen and

complexify, rather than simply to triangulate and test, their conclusions" (as cited by Maxwell & Chmiel, 2012, p. 8).

The combination of the quantitative and qualitative research is that of a component design, meaning that the different methods are separate from each other and the results of the methods will later be combined (Maxwell & Loomis, 2003). Because this study focused on the impact of constructs on the use of tools within Blackboard Learn, the quantitative component of this study will provide numerical data highlighting determinism, or cause-and-effect thinking, that mirrors the postpositivist worldview commonly associated with quantitative approaches (Creswell & Plano Clark, 2017). Furthermore, by engaging in focus groups, the knowledge of a phenomena was represented through the participants and their subjective views and assisted further in explaining why faculty use the tools in Blackboard Learn in specific ways.

An explanatory sequential design was used and included collecting quantitative data, analyzing the quantitative data, and using the results to inform the follow-up qualitative data collection (Creswell & Plano Clark, 2017). As mentioned above, quantitative data was collected through survey responses; participants from the study were then selected for the qualitative component based on responses to their survey questions. By using this approach, the qualitative data allowed for further explanation of the quantitative results. This is particularly important for this study because the researcher first wanted to see what tools are being used by faculty and how often. From there, this research dug deeper into why this may be the case through the qualitative component of the research.

Data Sources

In this study, data was collected through a mixed method approach by gathering and analyzing data from survey responses and focus groups. This approach allowed for the triangulation of data and reduced the validity threats through the reduction of systemic biases (Maxwell, 2005). The quantitative component of the study was a survey sent to faculty at GMU, and the qualitative component included data gathered from focus groups from faculty members who were identified through their responses to the survey. The selection process for the focus groups was semi-purposive sampling with selections based on those who volunteered and responded to the constructs of epistemological beliefs, pedagogical approaches, and course delivery mode. The goal was to have representatives from each of the categories within those constructs. Of the 70 participants who responded that they were willing to participate in focus groups on the survey, only 19 were included into the focus group discussions. This section provides context around how the survey was developed, items within the survey, focus groups questions, and how the items in the survey and focus groups overlap to ensure the triangulation of the data.

Survey Development

Survey development began with conducting an affordance analysis of Blackboard Learn. This section describes both the affordance analysis and survey development.

Affordance Analysis of Blackboard Learn. Prior to conducting a survey to determine how faculty are currently using Blackboard Learn in conjunction with its pedagogical tools and affordances, Blackboard Learn first needed to be analyzed to determine if there are more pedagogical tools to identify, and what the available

affordances are within the learning management system (LMS). Therefore, an affordance analysis of Blackboard has been conducted using a combination of both Dabbagh and Bannan-Ritland's (2005) and Kitsantas and Dabbagh's (2010) technology classification frameworks.

Process of Analysis. According to Bower (2008) an affordance analysis should be conducted by 1) identifying educational goals, 2) postulating suitable tasks, 3a) determining the affordance requirements of the identified tasks and 3b) determining the affordances that are available (Bower, 2008, p.8-9). It is through this analysis that a designer, or instructor, would then be able to "synergistically integrate the available and required affordances to form a specific task design (Bower, 2008, p.9)." Bower's (2008) affordance analysis procedure was used for this analysis and the steps are shown in Figure 9 below (p. 8-9):

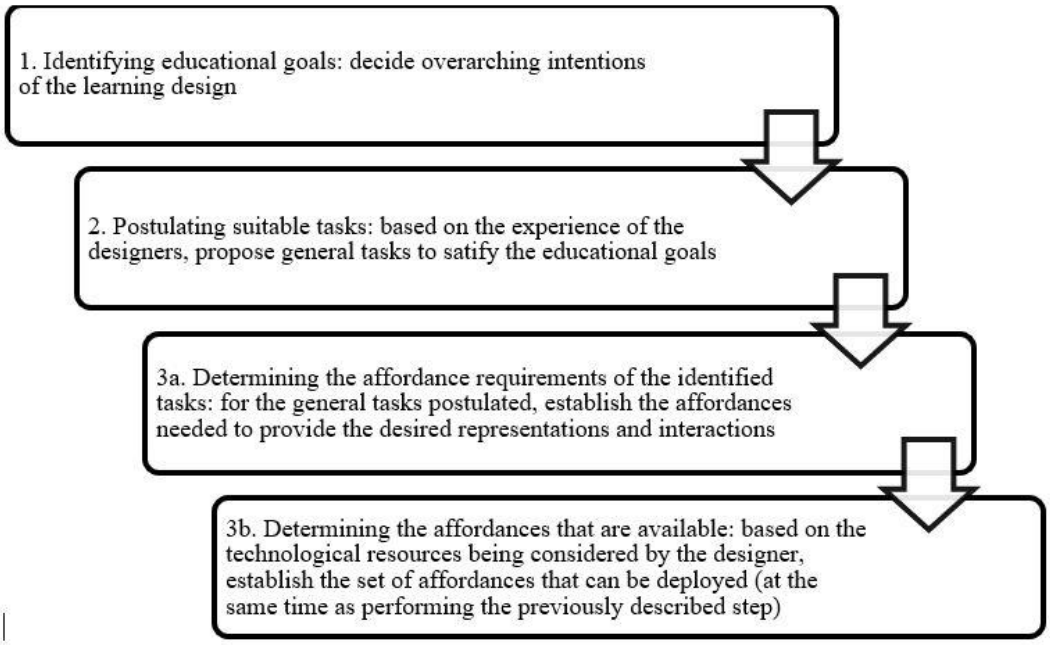

Figure 9. Bower's Affordance Analysis Procedure

For this analysis, the focus was on the pedagogical affordances of the tools of Blackboard Learn version 9.1 In other words, how instructors can use them to assist in their teaching.

To begin the affordance analysis, it was imperative to identify a framework around the pedagogical affordances that would be used. With that as the focus, the framework for this analysis was adopted and adapted from two separate pre-existing frameworks. The first of these frameworks is the one created by Dabbagh and Bannan-Ritland (2005) that identified five categories of pedagogical tools that are embedded in LMSs collaborative and communication tools, content creation and delivery tools, administrative tools, learning tools, and assessment tools. The second framework expanded on the 2005 framework and showed how LMSs, as a subset of integrative

learning technologies, incorporate tools from these five categories of pedagogical tools (Kitsantas & Dabbagh, 2010).

Using these two frameworks as a guide, this affordance analysis focused on five technology categorization themes:

1. Administrative Tools: Tools that are controlled by the instructor and primarily are associated with general maintenance of a course. The pedagogical affordances associated with this tool include, but are not limited to, uploading, saving and deleting content, providing access for learners, accessing help, and tracking attendance.
2. Assessment Tools: Tools that revolve around assessing learners and analyzing course use and assessment. Pedagogical affordances associated with this tool include tracking learner growth and ability to meet learning objectives, creating formal and informal assessments, and tracking user interaction with course content.
3. Collaboration & Communication Tools: These tools are associated with announcements and notifications from instructors, but also looks at the tools within Blackboard that allow learners to interact and work with one another. Pedagogical affordances associated with this category include communication between instructor and learners and between learners, alerting learners of important information, and group work on projects and knowledge construction.
4. Content Creation and Delivery Tools: Again, this tool is associated with both the content created and shared by the instructor and the learners. These tools afford

instructors and learners the ability to provide and organize content for learners and share media relevant to course content.

5. Learning Tools: The definition for these tools is similar to the one described by Dabbagh et al. (2019), and are used to search for resources, either through the internet or specific knowledge repositories, as well as to provide a way of managing these resources (Dabbagh et al., 2019). These tools also allow for learners to interact with technology to advance and construct their learning. Affordances include simple and advanced searches and the creation of collections of resources relevant to the learners' needs.

The next step to the affordance analysis was to explore Blackboard Learn and gain access to a complete list of tools and their pedagogical affordances. Furthermore, University personnel associated with the implementation and analysis of Blackboard Learn use at George Mason University were contacted to see what content they could provide. From this communication, an excel spreadsheet was provided that included every tool name and tool functionality available in the current version of Blackboard Learn used by faculty. The list included 126 tools associated with Blackboard Learn that are available for instructor use. The researcher was also granted instructor access in Blackboard Learn to further explore the functionality of the tools and determine their pedagogical affordances.

Two columns were then added to the excel spreadsheet, technology categorization theme and pedagogical affordances. First, for each of the tools, the technology categorization theme for that tool was identified. Table 4 shows the findings from this

stage of the analysis. It is important to note that some of the tools had more than one technology categorization theme associated with it therefore the total number identified will be greater than 124.

Table 4. *Number of Tools Identified Within Each Technology Categorization Theme*

Technology Categorization Theme	Number Identified
Administrative	62
Assessment	28
Collaboration & Communication	18
Content Creation & Delivery	34
Learning	14
Total	156

After placing each tool into a categorization theme based on the framework used in this affordance analysis, pedagogical affordances for each of the tools were then identified. It was important to determine the pedagogical affordances available to instructors within the LMS, Blackboard Learn, that were available to faculty at GMU and not rely on those previously identified by other researchers. While there was some overlap between those previously identified, they were generalized based on all LMSs and did not pertain to the specific version used by GMU faculty. To determine the pedagogical affordances of the tools, the tool functionality was analyzed with an instructional lens. In other words, the

researcher asked, “how would a faculty member use this tool to assist and enhance the learning of his/her students?” The answer to this question yielded the pedagogical affordances for each of the 126 tools. The researcher also tested the tool in the course she was provided instructor access to, to ensure that the identified affordance could be implemented by faculty members. The entire list of the tools with their accompanying pedagogical affordances can be found in Appendix A, but for each category, the following affordances were categorized as found in Table 5 below.

Table 5. *Pedagogical Affordances Within Each Technology Categorization Theme*

Technology Categorization Theme	Pedagogical Affordances
Administrative	• Delete, save, and upload content • Access learners' information • Copy courses, modules, lessons, content • Provide navigation for learners • Organize course content and learners • Navigate course settings and access
Assessment	• Track learner growth/ability to meet learning objectives • Differentiate instruction based on outcomes • Analyze course use by learners • Allows faculty to provide space for peers to provide feedback to one another
Collaboration & Communication	• Asynchronous and synchronous communication between instructor/learner, learner/instructor • Communicate important dates and tasks • Co-construction of knowledge between learners
Content Creation & Delivery	• Provide and organize content for learners • Creation and delivery of content • Media sharing of content
Learning	*The following affordances below refer to a faculty member providing space for students to:* • Engage in basic and advanced searches • Organize personal collections of information found • Implement personal learning management • Partake in construction of knowledge • Create creative representations of knowledge

The results of the affordance analysis revealed Blackboard Learn provides for many pedagogical affordances that can be used by instructors. Using the pedagogical affordances identified by this analysis, this study will be able to determine why faculty are using learning management systems, particularly Blackboard Learn, the way they are.

Survey Development Process. Upon completion of the affordance analysis, survey development began. Even though the survey for this research did not include underlying constructs, to increase the validity of the survey, some of the development process mirrored that of scale development. The purpose for partially implementing a scale development process within the development of this survey was to ensure that the survey adequately measures the constructs of the study, minimizes respondent error, and attains a certain level of reliability (Gehlback & Brinkworth, 2011). According to Gehlback and Brinkworth (2011, p.381), a general framework for development "should (a) clearly determine the construct in question, (b) consult the literature to ascertain whether a new scale is needed, (c) develop an item pool (that should be overly inclusive), (d) select appropriate response formats for items, and (e) conduct several iterations of pilot testing."

The literature review revealed the need for the development of a new survey that asked respondents to identify their epistemological beliefs, teaching methods, and delivery mode in conjunction with their frequency of tools used. The affordance analysis categorized the tools and identified the pedagogical affordances of each and, thus, guided the construction of items. Demographic questions were included first, followed by LMS experience, epistemological beliefs, teaching methods used, and delivery mode of the

course from which they were focusing their responses. The structure of these questions is provided in Table 6.

Table 6. *Demographic and Experiential Variables*

Variable	Items Included	Level of Measurement
Sex	• Male • Female • Non-binary • Prefer not to say	Categorical nominal
Age	• 20 – 29 years • 30 – 39 years • 40 – 49 years • 50+ years	Continuous interval
Years teaching in higher ed	Open-ended	Continuous nominal
Length of time at GMU as faculty	Open-ended	Continuous nominal
Position at GMU	• Full Professor • Associate Professor • Assistant Professor • Adjunct Faculty • Term Faculty • Other _____	Categorical ordinal
Level teaching at GMU	• Undergraduate • Graduate • Both	Categorical nominal
Associated school/college At GMU	Open-ended	Categorical
Use Blackboard	• Yes • No	Categorical nominal
Course survey responses are focused on	Open-ended	Categorical
Delivery Method	• Face-to-face • Hybrid • Fully online	Categorical nominal
Experience with LMSs	Open-ended	Continuous nominal

Experience with Blackboard	Open-ended	Continuous nominal
Epistemological Belief	• Constructivism • Objectivism • Cognitivism	Categorical nominal
Use of Pedagogical Approaches	• Lecture/Direct Instruction • Flipped Classroom • Kinesthetic Learning • Demonstration • Differentiated Instruction • Game-based learning • Problem-based learning • Experiential/Expeditionary	Likert Scale Categorical nominal

Next, the survey asked that faculty to identify, using a Likert scale ranging from "never" to "always", how often they use Blackboard Learn tools sorted by technology category (administrative, assessment, communication and collaboration, content creation and delivery, learning). Table 7 depicts which Blackboard Learn tools fell into each category and was presented in the survey. For each tool there was a follow-up for when a response is "never". The respondent was asked to select a reason they never use a tool. This is a multiple-choice response question that includes three options: I am aware of it, but do not use it, unaware of this feature, use a similar tool outside of Blackboard.

Table 7. *Blackboard Learn Tools in Survey by Category*

Technology Categorization Theme	Blackboard Learn Tools	
Administrative	Calendar	Tasks
	Contacts	Sandbox
	Lesson	Attendance
	Course Copy	Syllabus
	Teaching Style	
Assessment	Anonymous Grading	Safe Assign
	Rubrics	Assignment
	Goals	Self-Assessment
	Item Analysis	Peer Assessment
	Performance	Kaltura Video Quiz
	Dashboard	
	Survey	
	Test	
Collaboration & Communication	Announcements	Class Conversations
	Course Messages	Groups
	Send Email	Blackboard Collaborate
	Discussion Board	Ultra
	Wiki	
Content Creation & Delivery	Content Area	Media Gallery
	Files	Item
	Folders	Audio
	Glossary	Web Link
	Images	Lesson Plan
	Mashups (Link Videos)	Module
	Assignments	WebLinks
Learning	Blogs	Lynda.com
	Portfolios	VoiceThread
	Journals	

After developing the first iteration of the survey, experts in the field were asked to review and provide feedback. By using experts to gain validation, data was collected that establishes construct relevance of individual items, ensured no key indicators had been omitted, and provided information on item clarity, language complexity, and other item-

level concerns researchers may have (Gehlback & Brinkworth, 2011). For the expert interviews, faculty within the Learning Technologies Design Research department were sent the survey, asked to review it, and then meet with the researcher for 30-45 minutes to review the survey line-by-line while providing feedback and areas for improvement. These interviews provided feedback pertaining to the way in which the questions were worded, the order of the questions, providing clues and definitions within the survey, recommendations about the type of responses, and enhancements on how to use the survey tool, Qualtrics. The survey was then piloted with six faculty members and feedback was provided to further ensure the above criteria were met. The full survey can be found in Appendix B.

Focus Groups

The qualitative component of this study was conducted by holding focus groups with faculty members who volunteered. The focus group questions were semi-structured, meaning questions were identified prior to the meetings, however, based on the conversation and responses of the participants, questions were altered or added. The purpose of the focus groups was to 1) validate the responses to the survey and 2) provide more rich data around the reason's faculty choose to use the tools within the LMS that they do. Furthermore, the focus groups also provided more context around why faculty choose to use similar tools, with similar pedagogical affordances outside of the LMS. The focus group sessions start by asking participants how they think people learn (epistemological beliefs), commonly used pedagogical approaches/teaching methods they implement, and the delivery mode of their courses at GMU. The focus groups

participants were also asked how these factors influence their use of Blackboard Learn. Finally, participants were asked what tools they use outside of Blackboard and why they choose those tools over ones available in Blackboard. This excluded the tools that are outside of Blackboard, but that GMU provides a direct link to within the LMS.

Procedures

The data for this study was collected during the Fall 2020 semester. Upon Institutional Review Board (IRB) approval, an email was sent to all instructional faculty at GMU, requesting their participation in this research, with a link to the survey. Because many faculty members teach more than one course, they were asked to focus their responses to the survey on only one course of their choosing. Responses were collected for a month, and a reminder email was sent after three weeks to engage more faculty. This yielded 217 total responses, 205 of which were included in the data for this study. Within the survey, there was a question asking respondents if they would be willing to engage in a focus group to further discuss the items in the survey. Those of whom responded yes, were asked to provide contact information and were sorted based on their responses to the questions surrounding epistemological beliefs. This was done in an attempt to ensure that there was representation from each of the identifying epistemological beliefs. Upon completion of this step, 19 participants were able to partake in the focus groups, 17 of whom identified as constructivist, one as cognitivist, and one as other. Six focus groups were held, via Zoom, with the faculty mostly working from remote locations due to the impact of the COVID-19 pandemic. Each session was scheduled for one hour each. Table 8 depicts the data collection timeline.

Table 8. *Data Collection Timeline*

Process	Projected Dates
IRB Approval	September 8, 2020
Initial Email to Faculty	September 30, 2020
Follow-up Email to Faculty	October 22, 2020
Schedule Focus Groups	November 1, 2020
Conduct Focus Groups	November 3 – 15, 2020

Data Analysis

Because of the mixed nature of this study, quantitative and qualitative data were analyzed for each of the research questions as both are represented in the survey and focus group questions. Upon retrieval of the survey data, the analysis began with cleaning the data and identifying missing values. Datasets are prone to errors for multiple reasons, including respondents entering values incorrectly, failing to complete responses, or skipping items. The survey for this study was developed in a way that forced responses and did not allow for participants to skip questions. Additionally, with the inclusion of many multiple choice and Likert scale items, there were limited opportunities for values that are not within a range of scores. Furthermore, the dataset was produced by Qualtrics and exported directly into SPSS Statistics Version 27, which assisted with avoiding errors that could have been due to manual entry. Once data was cleaned and tested for

assumptions, descriptive statistics were examined on all variables. Because the LMS tools are categorized, descriptive discriminant analyses (DDAs) were used to analyze the data. This approach was useful to not only understand the differences between groups but also helped to discover which of the groups contributed most to group separation (Sherry, 2006). The DDA technique emphasizes the group differences and deemphasizes the group similarities (Betz, 1987), which allowed for an easier identification of how epistemological beliefs, pedagogical approaches, and delivery modes were impacting the Blackboard Learn tool use based on the five categories.

To test all the different constructs, nine separate DDA's were run using SPSS Statistics Version 27. One DDA was run to determine the influence of epistemological beliefs on faculty use of tools. Seven separate DDA's were run for each of the pedagogical approaches (direct instruction, game-based learning, problem-based learning, experiential learning, flipped classroom, kinesthetic learning, and differentiated instruction). The final DDA was run to determine the influence on the delivery mode of the course on LMS use.

In conjunction with the survey data, the transcribed focus group discussions were analyzed. The researcher approached the data in an emic way, and did not let pre-existing theories, dictate how the data was coded. Carspecken's (1996) approach to analysis was used and began with going through the entire dataset and coding for emergent themes. This requires low-level coding, which according to Carspecken (1996) is coding that "falls close to the primary record and requires little abstraction" (p.146) from a participant's words or actions. For this study, this step included taking participant

statements and placing them numerous categories, to include epistemological beliefs, pedagogical approaches, delivery mode, and the five categories of tools. Upon completion of this process, high-level coding was then be conducted, which required a greater degree of abstraction from the actual words of the participants. It was through this process that the themes from the data emerged. Table 9 is a display of the data source and the researcher's assumptions for each of the research questions.

Table 9. *Data Sources and Assumptions*

Research Question	Data Source	Assumption
1. Are there significant differences between epistemological beliefs, pedagogical approaches, and course delivery mode and the way faculty use the LMS?	Survey	Steel (2009) found that faculty used the LMS based on their epistemological beliefs and pedagogical approaches, therefore this research assumes that: • Faculty with a constructivist view of learning will implement more learner-centered approaches to teaching within the LMS and therefore use tools within the communication & collaboration and learning categories. • Faculty with a behaviorist view of learning will implement more teacher-centered approaches to teaching and use administrative and content & delivery tools most often. • Faculty with a cognitivist view of learning will use mostly teacher-centered approaches to learning but will also want to understand how students are processing their learning and will therefore likely use mostly content creation and delivery tools as well as learning tools. For course delivery mode, the assumption is that face-to-face courses will predominately use the LMS for content creation and delivery tools and for online and hybrid courses, instructors will use more communication and collaboration and learning tools than the face-to-face courses.
2.Which of the five LMS categories (administrative, assessment, collaboration and communication, content creation and delivery, learning) are contributing to the differences across these variables?	Survey	For each of the variables, it is assumed that content creations and delivery tools will be the biggest contributor for each of the variables because previous research has shown that these are the most predominately used tools in LMSs (Khoza 2018; Machajewski et al.; 2018, Rhode et al., 2017; Walker et al., 2016; Whitmer et al., 2017; Witte, 2018).

		The category that will stand out for each of the variables will be: • Constructivist Approach: Communication and Collaboration Tools • Behaviorist Approach: Administrative Tools • Cognitivist: Learning Tools
3. How are faculty using the tools within the five LMS categories in their courses?	Focus Groups	It is assumed that faculty members will be using the tools within the LMS categories, based on their pedagogical affordances. For example, discussion boards will be used by faculty to provide space for learners to share their learning and engage in conversation on course topics.
4. Why are faculty using the tools withing the five LMS categories the way they are using them?	Focus Groups	This research assumes that faculty are using the tools based on their understanding of the tools' pedagogical affordances. If faculty are unaware of the affordances a tool provides, they will likely not use the tools (Walker et al., 2006; Fisher, 2007). Additionally, the epistemological beliefs of the faculty will influence why and how they use the categories and tools within the LMS (Steel, 2009).

Summary

This chapter presented a description of the setting in which the study was conducted followed by a description the population. A calculation of the sampling size was also described. The design of this research and description of the instruments along with the process for developing these instruments were also described. Next, the process for collecting the data for this research study are presented. Finally, this chapter provided

a description of the statistical test and coding techniques used for the quantitative and qualitative components of this research study.

Chapter Four: Findings

This study employed a mixed method design to determine how epistemological beliefs, pedagogical approaches, and course delivery modes influence how faculty use tools within the learning management system (LMS), Blackboard Learn. This chapter presents the findings of this study from both the quantitative and qualitative analyses of the data. The first section provides a review of the statistical procedures performed cleaning the data, assessing missing data, and identifying outliers for the quantitative analysis. Procedures for establishing the validity and reliability of the scores and descriptive analyses are also discussed. Next, findings from the first two research questions are presented by providing the analyses for each of the six complete descriptive discriminant analyses (DDAs), and the three DDAs that did not meet all assumptions and could not be completed. To address research questions three and four, a description of the analysis process for the focus groups is presented followed by coded results from the focus groups. The chapter then closes with a summary of findings.

Quantitative Data Analysis and Results

This section provides the findings from the quantitative component of this research study. The data for this section was collected through a survey that was emailed directly to instructional faculty at George Mason University. The purpose of the survey was to gather demographic information on the participants, determine their epistemological beliefs, pedagogical approaches, and course delivery modes, and the way they are using tools within Blackboard Learn. Multiple descriptive discriminant analyses

(DDAs) were conducted to determine the variables that contribute to group separation (Sherry, 2006). This statistical analysis was used to answer the first two research questions of this study:

1. Are there significant differences between epistemological beliefs, pedagogical approaches, and course delivery mode and the way faculty use the LMS?
2. Which of the five LMS categories (administrative, assessment, collaboration and communication, content creation and delivery, learning) are contributing to the differences across these variables?

There was a total of 217 responses to the survey that needed to be screened prior to analyzing the data.

Data Screening

The survey data were examined through visual means and descriptive statistics for missing data and the identification of outliers. Two hundred seventeen participants attempted to complete the survey in Qualtrics. Of that number, 11 incomplete responses were observed. These were as a result of non-consenting to participate, having not used Blackboard Learn within the last two years, nor completing all the questions/items in the survey. All incomplete responses were removed from the final sample. Additionally, the standard deviations were assessed, and no additional respondents required removal. Following the data screening process, 206 faculty responses were included in further analysis.

Assessment of DDA Assumptions

There are seven assumptions required for conducting descriptive discriminant analyses (Klecka, 1980). These seven assumptions are (Sherry, 2006, p.668):

1. Two or more mutually exclusive groups.
2. A minimum of two subjects per group.
3. Any number of continuous variables as long as the sample size of the smallest group exceeds the number of continuous variables.
4. Continuous variables are measured at the interval level.
5. No continuous variable may be a linear combination of other continuous variables (e.g., two subscales and the full scale from which the subscales were created).
6. Each group must demonstrate multivariate normal distribution on the continuous variables.
7. The covariance matrices for each group must be approximately equal.

Assumptions one, two, and four were met because the research included two more mutually exclusive groups, there was a minimum of two subjects per group, and all variables were measured at the interval level. To ensure the size of the smallest group exceeded the number of continuous variables, the pedagogical approaches responses were merged. Respondents chose the frequency of use of the different approaches on a Likert scale that included *never*, *rarely*, *sometimes, often,* and *always*. Some of the pedagogical approaches had extremely small responses to the variables never and always. Therefore, before conducting the DDA, the categories *never* and *rarely* were combined and labeled *little-to-n*o use and the categories *often* and *always* were combined and labeled *often-always* used. *Sometimes* remained the same. Another assumption assessed was

multivariate normality and outliers. There were no continuous variables that were a combination of other variables, thus meeting assumption five. To ensure that all responses were within a normal distribution and without outliers, Mahalanobis distance was tested in the analysis. The results from this test indicated that only one case was above the threshold, at a .001 level of significance, and therefore it was removed from the dataset (Meyers et al., 2017). This ensured that the data would not yield unusual outcomes when the DDA's were run. Removal of the data from this participant reduced the total number of survey responses analyzed for this research study from 206 to 205. The final assumption was tested for each individual DDA using Box's *M* test of homogeneity of variance/covariance and the results yielded seven of the nine potential DDA's to meet this assumption. These findings are described in further detail later in this chapter within each of the DDA test findings.

Reliability

To ensure the reliability of the survey results, several reliability analyses were run using SPSS Statistics Version 27 on the five categories of Blackboard Learn tools as identified by the researcher: administrative, assessment, communication and collaboration, content creation and delivery, and learning tools. All the 42 separate items within the categories were included in the analyses to test the reliability of the scores. The internal consistency reliability for the sample on the five categories of LMS tools was tested using Cronbach's Alpha at a 95% confidence interval (Sherry, 2006). Table 10 lists the findings for each category that fall into the acceptable range, signifying the internal consistency reliability for the scores within each category.

Table 10. *Internal Consistency Reliability Scores at a 95% Confidence Interval*

Category	Cronbach's Alpha	Lower Bound	Upper Bound
Administrative	.682	.611	.744
Assessment	.778	.731	.821
Comm and Collab	.679	.608	.742
Content	.832	.796	.864
Learning Tools	.631	.542	.707

Demographic and Descriptive Analysis

Of the 205 participants whose responses were included in this research study, 83 (38.2%) identified as male, 117 (53.9%) identified as female and five (2.3%) identified as non-binary. The participants of this study also included individuals aged 20-29 (*N* = 7, 3.4%), 30-39 (*N* = 44, 21.5%), 40-49 (*N* = 62, 30.2%), and older than 50 years was the largest group with *N* = 92, 44.9%. Table 11 depicts the ethnicity breakdown of the participants.

Table 11. *Ethnic Breakdown of Survey Participants*

Ethnicity	Number (*N*)	Percent
Hispanic/Latinx	4	1.8
Asian	10	4.6
Black or African American	4	1.8
White	175	80.6
Two or More Races	9	4.1
Race and Ethnicity Unknown	3	1.4
Total	205	100

The teaching experience within higher education and at George Mason University is depicted in Table 12 and the breakdown of the participants' positions is in Table 13.

Table 12. *Years of Teaching Experience in Higher Education and at George Mason University*

Length	Higher Education		George Mason	
	N	%	*N*	%
Less than 5 years	25	11.5%	71	32.7%
5-10 years	51	23.5%	50	23.0%
11-15 years	44	20.3%	38	17.5%
16-20 years	28	12.9%	21	9.7%
More than 20 years	57	26.3%	25	11.5%
Total	205	100%	205	100%

Table 13. *Position at George Mason University*

Position	Number (*N*)	Percentage (%)
Full Professor	31	14.3%
Associate Professor	71	32.7%
Assistant Professor	45	20.7%
Instructor	12	5.5%
Lecturer	2	0.9%
Adjunct	38	17.5%
Other	6	2.8%
Total	205	100%

Because George Mason University has undergraduate and graduate degrees, the participants also identified the level at which they were teaching with 34.6% ($N = 75$) teaching at an undergraduate level, 18.4% ($N = 40$) teaching at the graduate level, and 41.5% ($N = 90$) teaching both undergraduate- and graduate-level courses. Furthermore, Table 14 provides the findings for the faculty experience with LMSs and Blackboard Learn.

Table 14. *Experience with Learning Management Systems (LMSs) and Blackboard Learn*

Length	LMS		Blackboard Learn	
	N	%	*N*	%
Less than 5 years	44	20.3%	58	26.7%
6-10 years	75	34.6%	71	32.7%
11-15 years	54	24.9%	55	25.3%
16-20 years	24	11.1%	19	8.8%
More than 20 years	8	3.7%	2	0.9%
Total	205	100%	205	100%

Descriptive Findings for Epistemological Beliefs, Pedagogical Approaches, and Course Delivery Mode

Prior to presenting the DDA findings, this section will present the descriptive findings relating faculty identification of each of these constructs. Of the 205 participants surveyed, 58.5% (120) identified as constructivist, 7.8% (16) as objectivist, and 24.4% (50) as cognitivist. The pedagogical approaches that were most used by faculty members were direct instruction, problem-based learning, and experiential learning. The pedagogical approaches that were least used were game-based learning, flipped classroom, and differentiated instruction. These findings are presented in Table 15 below.

Table 15. Frequency of Faculty Use of Pedagogical Approaches

Pedagogical Approach	*Little-to-No*		*Sometimes*		*Often-Always*	
	N	%	*N*	%	*N*	%
Direct Instruction	25	12.2%	42	20.5%	138	67.3%
Game-Based	144	70.2%	53	25.4%	9	4.4%
Problem-based	18	8.8%	67	32.7%	120	58.5%
Experiential	46	22.4%	65	31/7%	94	45.8%
Flipped Classroom	96	46.9%	59	28.8%	50	24.4%
Kinesthetic	91	44.4%	44	21.5%	70	34.2%
Differentiated	96	46.9%	59	28.8%	50	24.4%

Finally, of the 205 participants, 53.7% (110) were referencing face-to-face courses in their survey responses, 13.7% (28) were referencing hybrid, and 32.7% (67) were referring to a course taught fully online.

Descriptive Discriminant Analysis (DDA) Findings

For each DDA, SPSS Statistics Version 27 was used to ensure that the sample means met the assumption of multivariate normality. Additionally, for each of the DDAs, the five buckets of Blackboard Learn tools (administrative, assessment, communication and collaboration, content creation and delivery, and learning) were analyzed to determine if epistemological beliefs, pedagogical approaches, or delivery modes of a course influenced the frequency of use of these tools.

Epistemological Beliefs

To determine whether there are significant differences between the epistemological beliefs of faculty and how often they are using the different tools in Blackboard Learn, one DDA was run. Furthermore, this DDA helped to determine which of the five LMS categories were contributing to the differences amongst the different epistemological beliefs of the faculty. Data were collected on the use of tools within Blackboard Learn, categorized into five buckets: administrative, assessment, content creation and delivery, communication and collaboration, and learning tools. Table 16 lists the means and standard deviations for each group on these variables. It was determined that the homogeneity of variance assumption was met for this analysis as was found by analyzing Box's M, $F(30, 43.124) = 1.316$, $p = .116$, indicating that covariance matrices can be pooled for this analysis.

Table 16. *Means and Standard Deviations on the Five Categories of Blackboard Learn Learning Tools for Epistemological Beliefs*

	Constructivism		*Objectivism*		*Cognitivism*	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Admin	19.4	5.8	21.7	6.9	20.8	6.1
Assess	25.1	7.3	27.4	9.5	24.9	7.9
Comms	21.7	5.4	23.2	7.3	20.4	5.2
Content	27.8	7.1	27.9	8.4	25.9	8.9
Learn	6.4	2.7	6.1	3.3	5.2	2.0

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

When examining the canonical discriminant functions, there was a large canonical correlation (.904) on Function 1 with an effect size of R_c^2 = .0829 (8.29%) and a second large canonical correlation (.986) on Function 2 with an effect size of R_c^2 = .0144 (1.44%). However, only Function 1 was statistically significant (p = .05). Therefore, indicating that on Function 1, epistemological beliefs make up for 8.29% of the variance between the way in which faculty members are using the tools within the LMS. The test of Function 2 was not statistically significant (p = .625) and therefore was excluded from further analysis. Table 17 presents these findings.

Table 17. *Wilk's Lambda and Canonical Correlation for Epistemological Beliefs*

Function	*Wilks's Lambda*	x^2	*df*	*p*	R_c	R_c^2
1	.907	18.26	10	.05	.288	8.29%
2	.981	2.61	4	.675	.120	1.44%

Structure coefficients and standardized discriminant function coefficients were examined to determine the variables contributing to the group differences. Structure coefficients provide data to explain how closely each variable and function are related while the standardized discriminant function coefficients provide information about the relative importance of the variables (Sherry, 2006). Table 18 represents both sets of coefficients for both Functions 1 and 2, however as stated above, only Function 1 was interpreted. By looking at the structure matrix table, we see that learning (.667) has the

strongest correlation with the grouping variables (epistemological beliefs), followed by administrative (-.369), content creation and delivery (.343), and communication and collaboration (.306) tools. This indicates that these four categories of tools were primarily responsible for the differences between the epistemological beliefs of faculty with administrative tools being negatively related to learning, content creation and delivery, and communication and collaboration tools. By squaring these variables, it provides a calculation for the variance accounted for in the composite score for Function 1 (Sherry, 2006). Learning tools accounted for 44.49% of variance between epistemological beliefs, administrative tools 13.61%, content creation and delivery tools 11.76%, and communication and collaboration tools 9.36%. As mentioned above, the standardized discriminant functions explain the relative importance of the variables. Because the LMS categories of administrative (-.809), learning (.661), and content and delivery tools (.450) were relatively high in comparison to the other tools, these tools are considered the contributing variables to the difference between frequency of use. Therefore, these three variables were included in the group centroid analysis.

Table 18. *Standardized Discriminant Function and Structure Coefficients for Epistemological Beliefs*

Scale	*Coefficient*	r_s	r_s^2
Function 1			
Admin	-.809	-.369	9.39%
Assess	-.215	-.005	0.02%
Comms	.344	.306	18.36%
Content	.450	.343	11.76%
Learn	.661	.667	44.49%
Function 2			
Admin	.147	.617	38.07%
Assess	.398	.719	51.69%
Comms	.814	.922	85.01%
Content	-.261	.314	9.86%
Learn	-.154	.297	8.82%

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

Regarding the group centroids (Table 19), according to Function 1, those with cognitivist epistemological beliefs had the highest mean and the negative symbol in front of the mean symbolizes an inverse relationship. This indicates that those with cognitivist beliefs were less likely to use learning and content creation and delivery tools, and more likely to use administrative tools. The same can be said for those with objectivist epistemological beliefs, although the mean score of the group centroid was low. The tool use for those with the epistemological belief of constructivism were inversely related and therefore yielded more use of the learning tools and less use of administrative and content creation and delivery tools.

Table 19. *Group Centroids for Epistemological Beliefs*

Group	*Function 1*
Constructivism	.212
Objectivism	-.128
Cognitivism	-.467

Pedagogical Approaches: Direct Instruction

One DDA was run and analyzed to determine whether there are significant differences between how often faculty members use direct instruction as a pedagogical approach and how often they are using the different tools in Blackboard Learn. This DDA also helped to determine which of the five LMS categories were contributing to the differences amongst how often they were implementing the direct instructional pedagogical approach. Table 20 lists the means and standard deviations for each group on these variables. It was determined that the homogeneity of variance assumption was met for this analysis as noted by Box's M, $F(30, 42.849) = 1.339$, $p = .102$, indicating that covariance matrices can be pooled for this analysis.

Table 20. *Means and Standard Deviations on the Five Categories of Blackboard Learn Learning Tools for the Direct Instruction Pedagogical Approach*

	Little-to-No Use		*Used Sometimes*		*Often-Always Used*	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Admin	17.88	5.12	19.73	5.28	20.80	6.29
Assess	24.76	6.79	26.20	7.13	25.09	8.11
Comms	21.28	5.86	23.00	4.89	21.32	5.76
Content	26.92	7.39	27.90	7.68	27.23	7.91
Learn	7.04	2.94	6.62	2.81	5.57	2.39

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

The examination of the canonical discriminant functions yielded a large canonical correlation (.887) on Function 1 with an effect size of R_c^2 = 10.18% and a second large canonical correlation (.988) on Function 2 with an effect size of R_c^2 = 1.23%. However, only Function 1 was statistically significant (p = .008) and therefore accounts for 10.18% of the variance. The test of Function 2 was not statistically significant (p = .646) and consequently was excluded from further analysis. Table 21 represents these findings.

Table 21. *Wilk's Lambda and Canonical Correlation for Direct Instruction*

Function	*Wilks's Lambda*	x^2	*df*	*p*	R_c	R_c^2
1	.887	23.900	10	.008	.319	10.18%
2	.988	2.491	4	.646	.111	1.23%

Structural coefficients and standardized discriminant function coefficients were examined to determine what variables contributed to the group differences and are represented in Table 22. Because Function 2 yielded no statistical significance, only Function 1 was further analyzed. For Function 1, learning and administrative tools were primarily responsible for the separation between how often a faculty member used direct instruction during a course. There was a negative correlation between the two sets of tools. Learning tools had the strongest correlation with the grouping variables (.676) followed closely by administrative tools (-.466.) Learning tools accounted for 45.69% of grouping variance and 21.71% of the variance was explained by administrative tools. For Function 1, the structure coefficients suggest that learning and administrative tools contributed to the difference between the three levels of use of direct instruction. This was further verified when the analysis of the standardized coefficients was conducted. There was no discrepancy between the two tests and therefore when analyzing the group centroids, these two categories of tools within the LMS were analyzed.

Table 22. *Standardized Discriminant Function and Structure Coefficients for Direct Instruction*

Scale	*Coefficient*	r_s	r_s^2
Function 1			
Admin	-.909	-.466	21.71%
Assess	.253	.062	3.84%
Comms	.237	.189	3.57%
Content	-.091	.027	0.07%
Learn	.767	.676	45.69%
Function 2			
Admin	-.095	.439	19.27%
Assess	.177	.525	27.56%
Comms	1.076	.934	87.23%
Content	-.052	.345	11.90%
Learn	-.380	.100	1.00%

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

The analysis of the group centroids (Table 23), for Function 1, yielded that faculty who use *little-to-no* direct instruction in their pedagogical approach to teaching had the highest mean. For faculty members that used *little-to-no* direct instruction, they were more likely to use Blackboard Learn tools within the learning bucket and less likely to use administrative tools as was determined by the structural coefficient and standardized discriminant function analyses. The next largest centroid was for those faculty who used the direct instruction pedagogical approach *sometimes* and had the same correlation as those in the *little-to-no* direct instruction but do not account for as much of the responsibility due to the lower mean.

Table 23. *Group Centroids for Direct Instruction*

Group	*Function 1*
Little-to-no Use	.582
Sometimes Used	.326
Often-Always Used	-.205

Pedagogical Approaches: Game-Based Learning

To determine whether there are significant differences between how often faculty members use game-based learning as a pedagogical approach and how often they are using the different tools in Blackboard Learn, one DDA was run and analyzed. From this DDA, a determination of which of the five LMS categories were contributing to the differences amongst how often they were implementing the game-based learning pedagogical approach was also made. Table 24 lists the means and standard deviations for each group on these variables. The homogeneity of variance assumption was met for this analysis as noted by Box's M, $F(30, 1567.115) = 1.448$, $p = .056$, indicating that covariance matrices can be pooled for this analysis.

Table 24. *Means and Standard Deviations on the Five Categories of Blackboard Learn Learning Tools for the Game-Based Learning Pedagogical Approach*

	Little-to-No Use		*Used Sometimes*		*Often-Always Used*	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Admin	19.79	5.98	20.76	5.39	24.00	6.01
Assess	24.61	6.98	26.52	8.79	28.89	7.75
Comms	20.93	5.29	23.56	5.57	22.33	5.62
Content	26.55	7.68	23.56	7.88	32.22	6.34
Learn	5.79	2.37	6.00	2.75	8.44	4.09

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

The examination of the canonical discriminant functions yielded a large canonical correlation (.886) on Function 1 with an effect size of R_c^2 = 7.23% and a second large canonical correlation (.955) on Function 2 with an effect size of R_c^2 = 4.29%. However, only Function 1 to 2 was statistically significant (p = .007) and thus accounts for 7.23% of the variance. The test of Function 2 was not statistically significant (p = .056), and no further analysis was completed. Table 25 presents these findings.

Table 25. *Wilk's Lambda and Canonical Correlation for Game-Based Learning*

Function	*Wilks's Lambda*	x^2	*df*	*p*	R_c	R_c^2
1	.886	24.234	10	.007	.269	7.23%
2	.955	9.232	4	.056	.212	4.09%

The researcher examined structural coefficients and standardized discriminant function coefficients to determine what variables contributed to the group differences (frequency of use of game-based learning) and are shown in Table 26. The data for Function 2 is also represented, but only Function 1 was further analyzed. Learning, administrative, and content creation and delivery tools were found to be primarily responsible for the separation between how often a faculty member used game-based learning during a course. Learning tools had the strongest correlation with the grouping variables (.651) at 42.38%, followed by administrative (.361) at 13.03% and then content creation and delivery tools (.301) at 9.06%. From this, it can be inferred that learning tools contributed the most to separation between how often tools were used when comparing to how often the game-based learning approach was used, followed by administrative tools, and content creation and delivery tools. For Function 1, the structure coefficients suggested that learning, administrative, and communication and collaboration tools contributed to the difference between the three groups of how often game-based learning was used by participants. This was further verified when the analysis of the standardized coefficients was conducted. Both the structure and standardized coefficient yielded the same tools contributing to the variance and therefore those three sets of tools' group centroids were analyzed.

Table 26. *Standardized Discriminant Function and Structure Coefficients for Game-Based Learning*

Scale	*Coefficient*	r_s	r_s^2
Function 1			
Admin	.599	.361	13.03%
Assess	-.071	.195	3.80%
Comms	-.910	-.184	3.39%
Content	.171	.301	9.06%
Learn	.889	.651	42.38%
Function 2			
Admin	-.044	.533	28.41%
Assess	.055	.632	39.94%
Comms	.731	.928	86.19%
Content	.397	.742	55.06%
Learn	.031	.499	24.90%

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

The analysis of the group centroids (Table 27), for Function 1, yielded that faculty who implemented game-based learning in their teaching *often-always* had the highest mean. The faculty members who used game-based learning *often-always* were more likely to use Blackboard Learn tools that were categorized in learning tools and administrative tools and less likely to use communication and collaboration tools. Neither of the remaining group centroids were large enough to include in this analysis.

Table 27. *Group Centroids for Game-Based Learning*

Group	*Function 1*
Little-to-no Use	.007
Sometimes Used	-.228
Often-Always Used	1.202

Pedagogical Approaches: Problem-Based Learning

One DDA was run and analyzed to determine whether there are significant differences between how often faculty members use the pedagogical approach of problem-based learning and how often they are using the different tools in Blackboard Learn. This DDA also helped to determine which of the five LMS categories were contributing to the differences amongst how often they were implementing the problem-based learning pedagogical approach. Table 28 lists the means and standard deviations for each of these variables. It was determined that the homogeneity of variance assumption was met for this analysis as noted by Box's M, $F(30, 8039.775) = 1.298$, $p = .128$, indicating that covariance matrices can be pooled for this analysis.

Table 28. *Means and Standard Deviations on the Five Categories of Blackboard Learn Learning Tools for Problem-Based Learning*

	Little-to-No Use		*Used Sometimes*		*Often-Always Used*	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Admin	18.61	6.05	18.49	4.83	21.44	6.34
Assess	23.83	8.55	22.83	6.04	26.86	8.13
Comms	20.44	5.65	20.07	4.96	22.72	5.76
Content	23.33	9.93	25.79	6.92	28.79	7.55
Learn	4.94	1.59	5.43	2.37	6.42	2.76

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

The examination of the canonical discriminant functions yielded a large canonical correlation (.888) on Function 1 with an effect size of R_c^2 = 9.49% and a second large canonical correlation (.981) on Function 2 with an effect size of R_c^2 = 1.88%. However, only Function 1 was statistically significant (p = .008) and makes up for 9.49% of the variance. The test of Function 2 was not statistically significant (p = .437) and therefore was excluded from further analysis. Table 29 presents these findings.

Table 29. *Wilk's Lambda and Canonical Correlation for Problem-Based Learning*

Function	*Wilks's Lambda*	x^2	*df*	*p*	R_c	R_c^2
1	.888	23.756	10	.008	.308	9.49%
2	.976	3.779	4	.437	.137	1.88%

According to the structure coefficients, all the tools within Blackboard have a strong correlation with the how often participants used problem-based learning as their pedagogical approach. Administrative tools had the strongest correlation with the grouping variables (.758) at 57.46%, followed by assessment tools (.757) 57.30%, then content creation and delivery tools (.732) at 53.58%, and then communication and collaboration tools (.707) at 49.98%, and finally learning tools (.662) at 43.82%. From this, it can be inferred that all the tools contributed to group separation, or problem-based learning use. The standardized discriminant function coefficients were then analyzed and can be found in Table 30. For Function 1, the structure coefficients suggested that administrative tools contributed to the difference between the three groups (pedagogical approach use) the most (.385) and content creation and delivery tools, next (.290). The remaining variables do not appear to contribute to the correlation between the variables and therefore will not be considered when analyzing the group centroid.

Table 30. *Standardized Discriminant Function and Structure Coefficients for Problem-Based Learning*

Scale	*Coefficient*	r_s	r_s^2
Function 1			
Admin	.385	.758	57.46%
Assess	.197	.757	57.30%
Comms	.158	.707	49.98%
Content	.278	.732	53.58%
Learn	.368	.662	43.82%
Function 2			
Admin	-.011	-.206	4.24%
Assess	-.829	-.437	19.09%
Comms	-.408	-.285	8.12%
Content	.958	.463	21.47%
Learn	.337	.222	4.93%

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

An analysis of the group centroids (Table 31), for Function 1, yielded that faculty with *little-to-no* implementation of problem-based learning had the highest mean when compared with *sometimes* and *often-always*. Because the centroid revealed a negative correlation, faculty members who identified as using problem-based learning *little-to*-no amount were less likely to use the Blackboard Learn tools that were categorized in the content creation and delivery and administrative tools. The next closest group was the faculty who *sometimes* implemented problem-based learning and were also found to use content creation and delivery tools less often.

Table 31. *Group Centroids for Problem-Based Learning*

Group	*Function 1*
Little-to-no Use	-.471
Sometimes Used	-.356
Often-Always Used	.270

Pedagogical Approaches: Experiential Learning

To determine whether there are significant differences between how often faculty members use pedagogical approach experiential learning and how often they are using the different tools in Blackboard Learn, one DDA was run and analyzed. This DDA also helped to determine which of the five LMS categories were contributing to the differences amongst how often they were implementing the direct instructional pedagogical approach. Table 32 lists the means and standard deviations for each group on these variables. It was determined that the homogeneity of variance assumption was met for this analysis as found by Box's M, $F(30, 74570.88) = 1.428$, $p = .061$, indicating that covariance matrices can be pooled for this analysis.

Table 32. *Means and Standard Deviations on the Five Categories of Blackboard Learn Learning Tools for Experiential Learning*

	Little-to-No Use		*Used Sometimes*		*Often-Always Used*	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Admin	20.00	5.69	20.41	6.34	20.21	6.07
Assess	24.79	7.38	24.49	6.83	26.06	8.49
Comms	20.52	4.81	21.55	5.21	22.29	6.20
Content	26.15	8.37	26.37	7.54	28.57	7.52
Learn	5.28	1.96	5.92	2.70	6.33	2.76

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

The examination of the canonical discriminant functions yielded a large canonical correlation (.947) on Function 1 with an effect size of R_c^2 = 4.08% and a second large canonical correlation (.987) on Function 2 with an effect size of R_c^2 = 1.28%. However, neither Function 1 nor Function 2 were statistically significant (p = .366, p = .625) therefore no further descriptive discriminant analysis was completed. Consequently, it cannot be stated whether the implementation of experiential learning has an influence on how often faculty are using the tools within Blackboard Learn. It also cannot be determined if there is a difference between how often faculty are using any of the tools within the LMS categories. Table 33 represents these findings.

Table 33. *Wilk's Lambda and Canonical Correlation for Experiential Learning*

Function	*Wilks's Lambda*	x^2	*df*	*p*	R_c	R_c^2
1-2	.947	10.89	10	.366	.202	4.08%
2	.987	2.56	4	.635	.113	1.28%

Pedagogical Approaches: Flipped Classroom

One DDA was run and analyzed to determine whether there are significant differences between how often faculty members use the flipped classroom pedagogical approach and how often they are using the different tools in Blackboard Learn. This DDA also helped to determine which of the five LMS categories were contributing to the differences amongst how often they were implementing the flipped classroom pedagogical approach. Table 34 lists the means and standard deviations for each group on these variables. For this analysis, the homogeneity of variance assumption was met, found by the analysis of Box's M, $F(30, 81945.975) = 2.092$, $p = .000$, indicating that covariance matrices can be pooled for this analysis.

Table 34. *Means and Standard Deviations on the Five Categories of Blackboard Learn Learning Tools for the Flipped Classroom Pedagogical Approach*

	Little-to-No Use		*Used Sometimes*		*Often-Always Used*	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Admin	20.93	6.83	19.15	4.75	20.16	5.57
Assess	24.63	7.78	25.39	7.68	26.29	7.79
Comms	20.83	5.37	21.91	5.86	22.94	5.73
Content	26.00	8.08	28.02	6.80	29.08	7.94
Learn	5.44	1.91	5.88	2.48	7.08	3.48

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

The examination of the canonical discriminant functions yielded a large canonical correlation (.865) on Function 1 with an effect size of R_c^2 = 11.29% and a second large canonical correlation (.976) on Function 2 with an effect size of R_c^2 = 1.72%. However, only Function 1 was statistically significant (p = .001) and accounts for 11.29% of the variance. The test of Function 2 was not statistically significant (p = .294) and therefore was excluded from further analysis. Table 35 represents these findings.

Table 35. *Wilk's Lambda and Canonical Correlation for Flipped Classroom*

Function	*Wilks's Lambda*	x^2	*df*	*p*	R_c	R_c^2
1	.865	28.948	10	.001	.336	11.29%
2	.976	4.935	4	.294	.131	1.72%

According to the structure coefficients for flipped classroom, learning tools (.656), content creation and delivery tools (.479), and communication and collaboration tools (.426) had the strongest correlation with the group variables. The percentages of variance for each were as follows: learning at 43.04%, content creation and delivery at 22.94%, and communication and collaboration tools at 18.15%. The separation between the frequency of implementing the flipped classroom approach in pedagogical approaches teaching was mostly attributed of the frequency with which these three types of tools were used. The results from analyzing the standardized discriminant function coefficients within Function 1 suggest that administrative tools were the highest contributor to the difference between the three groups (-.913) and were inversely related. Learning tools were next (.500), content creation and delivery tools thereafter (.477), and lastly, communication and collaboration tools (.405). Although administrative tools were not found to be a high contributor from the structure analysis, the standardized discriminant function coefficient was high and therefore when the group centroids were analyzed, these tools were included in the analysis. Table 36 presents the results from both the structure coefficients and standardized discriminant coefficients analyses.

Table 36. *Standardized Discriminant Function and Structure Coefficients Flipped Classroom*

Scale	*Coefficient*	r_s	r_s^2
Function 1			
Admin	-.913	-.255	6.50%
Assess	.156	.246	6.05%
Comms	.405	.426	18.15%
Content	.477	.479	22.94%
Learn	.500	.656	43.04%
Function 2			
Admin	.830	.550	30.25%
Assess	-.294	.165	2.72%
Comms	-.294	.191	3.65%
Content	-.363	.051	0.26%
Learn	.889	.750	56.25%

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

An analysis of the group centroids (Table 37), for Function 1, yielded that faculty who implemented the flipped classroom pedagogical approach *often-always* had the highest mean. Because the centroid revealed a positive correlation, faculty who implemented the flipped classroom approach *often-always* were more likely to use learning, content creation and delivery, and communication and collaboration tools and less likely to use administrative tools. The next closest group was the faculty who implemented the flipped classroom approach *little-to-no* and this had an inverse relationship. Thus, results indicated that they used administrative tools more, and the learning, content creation and delivery, and communication and collaboration tools less.

Table 37. *Group Centroids for Flipped Classroom*

Group	*Function 1*
Little-to-no Use	-.366
Sometimes Used	.210
Often-Always Used	.454

Pedagogical Approaches: Kinesthetic Learning

To determine whether there are significant differences between how often faculty members use the kinesthetic learning pedagogical approach and how often they are using the different tools in Blackboard Learn, one DDA was run and analyzed. This DDA also helped to determine which of the five LMS categories were contributing to the differences amongst how often they were implementing the kinesthetic learning pedagogical approach. Table 36 lists the means and standard deviations for each group on these variables. It was determined that the homogeneity of variance assumption was met for this analysis as noted by Box's M, $F(30, 69633.727) = 1.608$, $p = .019$, indicating that covariance matrices can be pooled for this analysis.

Table 38. *Means and Standard Deviations on the Five Categories of Blackboard Learn Learning Tools for Kinesthetic Learning*

	Little-to-No Use		*Used Sometimes*		*Often-Always Used*	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Admin	19.21	6.20	19.79	5.49	20.91	6.11
Assess	25.16	6.64	24.29	7.07	26.06	9.36
Comms	20.85	5.69	21.66	4.27	22.71	6.16
Content	26.02	8.13	27.02	6.87	29.23	7.55
Learn	5.60	2.43	5.98	2.29	6.43	2.95

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

The examination of the canonical discriminant functions yielded a large canonical correlation (.943) on Function 1 with an effect size of R_c^2 = 5.11% and a second large canonical correlation (.994) on Function 2 with an effect size of R_c^2 = 0.61%. However, neither Function 1 nor Function 2 were statistically significant (p = .305, p = .875) therefore no further descriptive discriminant analysis was completed. As a result, it cannot be stated whether the implementation of kinesthetic learning has an influence on how often faculty are using the tools within Blackboard Learn. It also cannot be determined if there is a difference between how often faculty are using any of the tools within the LMS categories. Table 39 presents these findings.

Table 39. *Wilk's Lambda and Canonical Correlation for Kinesthetic Learning*

Function	*Wilks's Lambda*	x^2	*df*	*p*	R_c	R_c^2
1	.943	11.710	10	.305	.226	5.11%
2	.994	1.219	4	.875	.078	0.61%

Pedagogical Approaches: Differentiated Instruction

One DDA was run and analyzed to determine whether there are significant differences between how often faculty members use the pedagogical approach of differentiated instruction and how often they are using the different tools in Blackboard Learn. This DDA also helped to determine which of the five LMS categories were contributing to the differences amongst how often they were implementing the differentiated instruction pedagogical approach. Table 40 lists the means and standard deviations for each group on these variables. The homogeneity of variance assumption was met for this analysis as noted by Box's M, $F(30, 81945.975) = 2.275$, $p = .000$, indicating that covariance matrices can be pooled for this analysis.

Table 40. *Means and Standard Deviations on the Five Categories of Blackboard Learn Learning Tools for the Differentiated Instruction Pedagogical Approach*

	Little-to-No Use		*Used Sometimes*		*Often-Always Used*	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Admin	19.64	5.98	20.07	5.63	21.54	6.42
Assess	23.99	7.36	25.69	8.03	27.26	7.82
Comms	20.02	5.53	22.71	5.12	23.56	5.57
Content	25.23	8.03	28.17	6.62	30.38	7.44
Learn	5.12	1.71	5.95	2.81	7.60	3.02

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

The examination of the canonical discriminant functions yielded a large canonical correlation (.806) on Function 1 with an effect size of R_c^2 = 17.22% and a second large canonical correlation (.973) on Function 2 with an effect size of R_c^2 = 2.66%. However, only Function 1 was statistically significant (p = .000) and accounts for 17.22% of the variance. Because Function 2 was not statistically significant (p = .249), no further descriptive discriminant analysis was completed for this function. Table 41 represents these findings.

Table 41. *Wilk's Lambda and Canonical Correlation for Differentiated Instruction*

Function	*Wilks's Lambda*	x^2	*df*	*p*	R_c	R_c^2
1	.806	43.203	10	.000	.415	17.22%
2	.973	5.298	4	.249	.163	2.66%

According to the structure coefficients for differentiated instruction, learning tools (.895), content creation and delivery tools (.622), and communication and collaboration tools (.607) had the strongest correlation with the group variables. The percentages of variance for each were as follows: learning at 80.10%, content creation and delivery at 38.69%, and communication and collaboration tools at 36.84%. The separation between these and the frequency of implementation of using a flipped classroom approach to teaching groups was mostly attributed of the frequency of use within these three buckets of tools. The results from analyzing the standardized discriminant function coefficients within Function 1 suggested that learning tools (.732) and content creation and delivery tools (.406) were the two highest contributors to the difference between the three groups. The standardized discriminant function coefficient analysis did not yield any of the other tools as strong contributors, therefore only learning tools and content creation and delivery tools' group centroids were analyzed. Table 42 presents the results from both the structure coefficients and standardized discriminant coefficients analyses.

Table 42. *Standardized Discriminant Function and Structure Coefficients Differentiated Instruction*

Scale	*Coefficient*	r_s	r_s^2
Function 1			
Admin	-.110	.272	7.39%
Assess	-.149	.383	14.67%
Comms	.296	.607	36.84%
Content	.406	.622	38.69%
Learn	.732	.895	80.10%
Function 2			
Admin	.721	.204	4.16%
Assess	-.040	-.072	0.52%
Comms	-1.014	-.538	28.94%
Content	-.296	-.211	4.45%
Learn	.691	.351	12.32%

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

An analysis of the group centroids (Table 43), for Function 1, yielded that faculty who implemented the differentiated instruction pedagogical approach *often-always* had the highest mean. Therefore, yielding that those who used differentiated instruction *often-always* were more likely to use learning and content creation and delivery tools. The next closest group was the faculty who implemented the differentiated instruction approach *little-to-no* and this had an inverse relationship. Thus, indicating that they used learning and content creation and delivery tools less.

Table 43. *Group Centroids for Differentiated Instruction*

Group	*Function 1*
Little-to-no Use	-.421
Sometimes Used	.093
Often-Always Used	.700

Delivery Mode of the Course

One DDA was run and analyzed to determine whether there are significant differences between the delivery mode of a course and how faculty are using the different tools in Blackboard Learn. This DDA also helped to determine which of the five LMS categories were contributing to the differences amongst the different course delivery modes. Table 44 lists the means and standard deviations for each group on the delivery modes. It was determined that the homogeneity of variance assumption was met for this analysis as noted by Box's M, $F(30, 37.240) = 1.177$, $p = .231$, indicating that covariance matrices can be pooled for this analysis.

Table 44. *Means and Standard Deviations on the Five Categories of Blackboard Learn Learning Tools for Delivery Mode of the Course*

	Face-to-Face		*Hybrid*		*Online*	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Admin	19.88	5.62	21.14	6.66	20.42	6.01
Assess	23.66	7.44	28.07	8.01	25.28	7.75
Comms	20.44	5.28	23.18	5.37	21.66	5.62
Content	26.04	7.43	29.64	6.66	28.49	8.42
Learn	5.38	2.22	6.07	2.84	6.88	2.85

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

When examining the canonical discriminant functions, there was a large canonical correlation (.878) on Function 1 with an effect size of R_c^2 = 10.43% and a second large canonical correlation (.980) on Function 2 with an effect size of R_c^2 = 1.99%. However, only Function 1 was statistically significant (p = .004) and attributes to 10.43% of the variance. The test of Function 2 was not statistically significant (p = .405) and therefore was excluded from further analysis. Table 45 depicts these findings.

Table 45. *Wilk's Lambda and Canonical Correlation for Delivery Mode of the Course*

Function	*Wilks's Lambda*	x^2	*df*	*p*	R_c	R_c^2
1	.878	26.04	10	.004	.328	10.43%
2	.974	4.01	4	.405	.141	1.99%

Structural coefficients and standardized discriminant function coefficients were examined to determine which of the Blackboard Learn tools most contributed to the differences across the delivery modes. Table 46 represents both sets of coefficients for each of the functions, however, because of statistical significance, only Function 1 was further analyzed. For Function 1, learning, communication and collaboration, assessment, and content creation and delivery tools were primarily responsible for the separation between the delivery mode of a course and all had a positive correlation as found from the structural coefficient analysis. Learning tools accounted for 57.30% of grouping variance between the delivery mode of a course, communication and collaboration tools 48.44%, assessment tools 43.96% and content creation and delivery tools 27.25%. For Function 1, the structural coefficients suggested that learning, communication and collaboration, assessment, and content creation and delivery tools contributed to the differences across the three groups (delivery modes). When analyzing the standardized discriminant function, the same four were found to be contributing variables and therefore all four were included in the group centroid analysis.

Table 46. *Standardized Discriminant Function and Structure Coefficients for Delivery Mode of the Course*

Scale	*Coefficient*	r_s	r_s^2
Function 1			
Admin	-.529	.173	2.99%
Assess	.527	.663	43.96%
Comms	.448	.696	48.44%
Content	.123	.522	27.25%
Learn	.484	.757	57.30%
Function 2			
Admin	-.100	.302	9.12%
Assess	.572	.518	26.83%
Comms	.151	.214	4.58%
Content	.446	.522	27.25%
Learn	-.925	-.545	23.72%

Note: Admin = Administrative; Assess=Assessment; Content=Content Creation and Delivery; Comms=Communication and Collaboration; Learn=Learning

The analysis of the group centroids (Table 47), for Function 1, yielded that those teaching fully online had the highest mean. For courses that were delivered online, they were more likely to use Blackboard Learn tools within the learning, assessment, communication and collaboration, and administrative tools. The next largest centroid was face-to-face. This was negatively correlated and therefore indicates that those teaching a course face-to-face were less likely to use the tools within the learning, assessment, communication and collaboration, and administrative categories.

Table 47. *Group Centroids for Delivery Mode*

Group	*Function 1*
Face-to-Face	-.314
Hybrid	.295
Online	.392

Qualitative Data Analysis and Results

Focus group discussions were used to fulfill the qualitative component of this mixed-methods research study and addressed the third and fourth research questions pertaining to how and why faculty use the tools they use in the LMS. Participants were identified through the survey by volunteering to partake in the focus group portion of this research study. The findings from this analysis include the experiences and implementation of Blackboard Learn for 19 George Mason University instructional faculty members taken from six different focus group sessions. The attendance from each focus group varied. The first focus group had two participants, the second had three, the third had seven, the fourth had one, the fifth had four and the sixth had two. Each participant was labeled as Participant 1 – Participant 19 and will be referenced as so throughout the analysis.

The focus groups were held online and conducted through Zoom and recorded using the meeting record functionality within the Zoom tool. The recordings were transcribed and reviewed by the researcher to ensure that the transcriptions were accurate. An emic approach was used when coding the data. Therefore, pre-existing theories did

not dictate how the data was coded. The first round of coding was completed by going through the entire dataset and coding for emergent themes (Carspecken, 1996). According to Carspecken (1996), the first round of coding is low-level, and the codes remain close to the "primary record and requires little abstraction" (p. 146) from the actual words of the participants. Participant quotes were pulled directly into the following categories, delivery mode of the course, epistemological beliefs, pedagogical approaches, tools outside of Blackboard, and other. Once data was categorized, those categories were broken further down. Blackboard tools were divided into the five categories of tools: administrative, assessment, communication and collaboration, content creation and delivery, and learning tools. The tools outside of Blackboard were broken down into specific tools, such as Google tools, knowledge resources, publishing and editing, Zoom, and other. The other category was also broken into subcategories, such as Blackboard weakness, lack of experience, lack of knowledge, streamlining course content, etc. Finally, the last round of coding required a greater degree of distraction from the actual words of the participants. Here is where the major themes of the findings were identified: how and why faculty members are using the tools within Blackboard Learn, and why they are choosing to use tools outside of Blackboard. From this process, three sets of themes emerged. First, it was found that many of the participants were using the tools in conjunction to their affordances as identified in the affordance analysis, described in Chapter 3 of this dissertation. Secondly, themes for 'why faculty use the tools within the LMS' were identified and those were that they made tasks easier for the instructor, improved the students' user experience, provided students the information they needed

for a course, provided multiple options for how to use the tools, increased student interaction, and provided a space for students to construct their knowledge and learn from one another. Finally, there were four themes that emerged pertaining to the nonuse of tools within the LMS. These were a lack of experience or knowledge on how to use the tools, the unfavored structure of Blackboard Learn and weakness of tools, the availability of similar tools outside of the LMS, and that the LMS did not afford faculty the ability to implement their epistemological beliefs.

To ensure the reliability of the focus group analysis, the analysis write-up was sent to all of the focus group participants for review and assurance of accuracy. The purpose of this analysis was to answer the second two research questions:

3. How are faculty using the tools within the five LMS categories in their courses?
4. Why are faculty using the tools within the five LMS categories the way they are using them?

The findings and themes identified above and for the referenced questions are presented, in subsequent sections, by the LMS categories as they were presented in the survey.

Frequency of Tool Use by LMS Category

Before conducting the focus groups, frequency of the tools used in Blackboard Learn was pulled from the survey data to guide the questions asked during the focus groups. Additionally, if participants responded to never using a tool, they were asked to identify the reason for their nonuse. Tables 46 and 47 represent these findings.

Table 48. *Frequency of Tool Use by LMS Category*

Tool	*Never*		*Rarely*		*Sometimes*		*Often*		*Always*	
Admin	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Calendar	133	64.9	20	9.8	14	6.8	21	10.2	17	8.3
Contacts	96	46.8	33	16.1	25	12.2	24	11.7	27	13.2
Course Copy	23	11.2	12	5.9	40	19.5	53	25.9	77	37.6
Teaching Style	87	42.4	24	11.7	32	15.6	29	14.1	22	16.1
Tasks	117	57.1	29	14.1	20	9.8	21	10.2	18	8.8
Sandbox	116	56.6	39	19.0	32	15.6	11	5.4	7	3.4
Attendance	136	66.3	22	10.7	19	9.3	11	5.4	17	8.3
Syllabus	21	10.2	4	2.0	14	6.8	26	12.7	140	68.3
Assess	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Anon Grading	148	72.2	19	9.3	19	9.3	9	4.4	10	4.9
Rubrics	55	26.8	19	9.3	39	19.0	48	23.4	44	21.5
Goal Perf.	166	81.0	21	10.2	8	3.9	6	2.9	4	2.0
Item Analysis	117	57.1	13	6.3	35	17.1	22	10.7	18	8.8
Perf. Dash	136	66.3	25	12.2	22	10.7	12	5.9	10	4.9
Survey	90	43.9	39	19.0	54	26.3	19	9.3	3	1.5
Test	51	24.9	16	7.8	35	17.1	46	22.4	57	27.8
Safe Assign	90	43.9	13	6.3	28	13.7	42	20.5	32	15.6
Assignment	13	6.3	1	0.5	21	10.2	49	23.9	121	59.0
S & P Asses	121	59.0	32	15.6	27	13.2	12	5.9	13	6.3
Kaltura	154	75.1	19	9.3	14	6.8	9	4.4	9	4.4

Comms	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Announcement	14	6.8	9	4.4	14	6.8	55	26.8	113	55.1
Course Msgs	90	43.9	12	5.9	22	10.7	36	17.6	45	22.0
Send Email	21	10.2	17	8.3	31	15.1	57	27.8	79	38.5
Discussion	27	13.2	20	9.8	27	13.2	50	24.4	81	39.5
Wiki	137	66.8	30	14.6	25	12.2	8	3.9	5	2.4
Groups	62	30.2	26	12.7	40	19.5	41	20.0	36	17.6
Collaborate	48	23.4	34	16.6	48	23.4	34	16.6	41	20.0
Content	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Content Area	21	10.2	12	5.9	13	6.3	22	16.1	126	61.5
Files	17	8.3	11	5.4	15	7.3	42	20.5	120	58.5
Folders	19	9.3	8	3.9	21	10.2	41	20.0	116	56.6
Glossary	175	85.4	17	8.3	9	4.4	1	0.5	3	1.5
Images	84	41.0	26	12.7	33	16.1	23	11.2	39	19.0
Mashups	72	35.1	7	3.4	34	16.6	36	17.6	56	27.3
Media Gallery	91	44.4	18	8.8	32	15.6	27	13.2	37	18.0
Item	43	21.0	14	6.8	18	8.8	39	19.0	91	44.4
Audio	109	53.2	30	14.6	32	15.6	13	6.3	21	10.2
WebLink	27	13.2	9	4.4	28	13.7	59	28.8	82	40.4
Lesson Plan	150	73.2	23	11.2	14	6.8	9	4.4	9	4.4
Module	64	31.2	19	9.3	36	17.6	30	14.6	56	27.2
Learning	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Blogs	137	66.8	30	14.6	21	10.2	7	3.4	10	4.9
Portfolios	164	80.0	28	13.7	10	4.9	2	1.0	1	0.5
Journals	130	63.4	28	13.7	19	9.3	15	7.3	13	6.3
VoiceThread	172	83.9	20	9.8	10	4.9	3	1.5	0	0.0
WebLinks	91	44.4	21	10.2	29	14.1	27	13.2	37	18.0

Table 49. *Reasons for Never Using Tools Within Blackboard Learn*

Tool	*Aware of it, But Don't Use It*		*Unaware of Tool*		*Use Tool Outside of Blackboard Learn*		*Total of Full Participant Pool*	
Admin	*N*	%	*N*	%	*N*	%	*N*	%
Calendar	77	37.6	35	17.1	20	9.8	132	64.4
Contacts	42	20.5	43	21.0	11	5.5	96	46.8
Course Copy	8	3.9	13	6.3	2	1.0	23	11.2
Teaching Style	13	6.3	69	33.7	4	2.0	86	42.0
Tasks	55	26.8	52	25.4	10	4.9	117	57.1
Sandbox	34	16.6	79	38.5	3	1.5	116	56.6
Attendance	91	44.4	32	15.6	13	6.3	136	66.3
Syllabus	9	4.4	7	3.4	5	2.4	21	10.2
Assess	*N*	%	*N*	%	*N*	%	*N*	%
Anon Grading	107	50.7	42	20.5	2	1.0	148	72.2
Rubrics	35	17.1	12	5.9	8	3.9	55	26.8
Goal Perf.	48	23.4	115	56.1	2	1.0	165	80.5
Item Analysis	35	17.1	79	38.5	3	1.5	117	57.1
Perf. Dashboard	46	22.4	89	43.4	1	.5	136	66.3
Survey	52	25.4	30	14.6	8	3.9	90	43.9
Test	40	19.5	2	1.0	9	4.4	51	24.9
Safe Assign	54	26.3	34	16.6	2	1.0	90	43.9
Assignment	8	3.9	2	1.0	8	1.5	13	6.3
Self & Peer Asses	65	31.7	50	24.4	6	2.9	121	59.0
Kaltura	82	40	67	32.7	5	2.4	154	75.1
Comms	*N*	%	*N*	%	*N*	%	*N*	%
Announcements	12	5.9	0	0	2	1.0	14	6.8
Course Messages	25	12.2	59	28.8	4	2.0	88	57.1
Send Email	12	5.9	3	1.5	6	2.9	21	10.2
Discussion Board	21	10.2	3	1.5	3	1.5	27	13.2
Wiki	91	44.4	37	18.0	8	3.9	136	33.7
Groups	49	23.9	11	5.4	2	1.0	63	30.2
Collaborate	32	15.6	7	3.4	9	4.4	48	23.4

Content	*N*	%	*N*	%	*N*	%	*N*	%
Content Area	27	13.2	14	6.8	3	1.5	44	21.5
Files	9	4.4	5	2.4	1	0.5	15	7.3
Folders	12	5.9	5	2.4	2	1.0	19	9.3
Glossary	65	31.7	104	50.7	4	2.0	173	84.4
Images	38	18.5	40	19.5	6	2.9	84	41.0
Mashups	31	15.1	36	17.6	5	2.4	72	35.1
Media Gallery	33	16.1	54	26.3	4	2.0	91	44.4
Item	17	8.3	22	10.7	3	1.5	42	20.5
Audio	53	25.9	52	25.4	4	2.0	109	53.2
Web Link	11	5.4	12	5.9	3	1.5	26	12.7
Lesson Plan	55	26.8	91	44.4	4	2.0	150	73.2
Module	35	17.1	27	13.2	2	1.0	64	31.2
Learning	*N*	%	*N*	%	*N*	%	*N*	%
Blogs	94	45.9	28	18.5	5	2.4	137	66.8
Portfolios	82	40.0	77	37.6	5	2.4	164	80.0
Journals	68	33.2	56	27.3	6	2.9	130	63.4
VoiceThread	57	27.8	111	54.1	3	1.5	171	83.4

Focus Group Analysis by LMS Category

This section provides the overall findings of how and why the participants within the focus groups are using the tools within Blackboard Learn. The findings from the qualitative analysis of the transcribed focus group discussions are presented by the five categories of tools: administrative, assessment, communication and collaboration, content creation and delivery, and learning. Each section begins with some overall findings of the tool use based on survey results and then dives into the details of how and why tools within each category are used by the faculty who participated in the focus groups. Each section also provides a summary of findings for that category of tools.

Administrative Tools

According to the survey results, the most used administrative tools were syllabus and course copy, with 81% of respondents using the syllabus often or always, and 63.5% using course copy often or always. The tools that were used rarely or never, calendar (74.7%), contacts (62.9%), teaching style (54.1%), tasks (71.2%), sandbox (75.6%), and attendance (77%).

Syllabus. The high use of the syllabus tool can likely be attributed to, as Participant 2 pointed out, "when someone's using Blackboard Learn as their class place for files, you're gonna put your syllabus up there…you gotta put your syllabus up there 'cause it saves you from all of the students emailing that they can't find where they saved it, or if it was a hard copy they've lost it." Furthermore, course syllabi are required by the university, therefore if using Blackboard Learn it is likely they will also be posting it for students to reference. Several of the participants also alluded to Blackboard Learn being a "repository" for them and uploading a syllabus would be inclusive of that repository of course information.

Course Copy. The high frequency of use of course copy was explained by Participant 2 when they stated that they "live(s) by course copy" and that it is something they have used "from the beginning." They went on to explain that course copy allows them to revise course content each semester more efficiently by working from existing courses. Some of the items that were reported being copied over were exams and quizzes and having them available was reported as a "life saver to tweak." Participant 15 explained that while it is a basic tool of Blackboard Learn, they use it often, to copy entire courses or to copy specific modules, rather than a course in its entirety. By copying

specific modules, this enabled them to have different sections of the same course "shared laterally and in relatively real time." Participant 16 agreed and stated using it for both "copy of our whole course and to move over particular modules."

Calendar. According to the survey results, calendar was a tool that was not reported as being widely used by the participants as 74.6% reported using it *rarely* to *never*. However, Participant 1 stated that the interactive calendar in Blackboard Learn has been extremely helpful for students because it allows them to quickly access due dates for assignments and assessments. This participant said it was probably what his students "use the most" and while they keep a PDF version of the calendar for their own reference, they will continue to use the interactive calendar in Blackboard Learn to afford students the transparency of due dates.

Attendance. One last tool within the administrative category that was discussed amongst the focus groups was the attendance feature. The frequency of use of the attendance features primarily matched the survey results (77% reported *rarely* or *never* using the tool) in that most of the focus group members also did not use it. The reasons around nonuse included smaller class sizes and keeping records offline. That being said, Participant 1 shared that they enjoyed the attendance feature because "it's so nice to not have to open up an Excel spreadsheet" to track attendance, however, they did state that Blackboard Learn uses different commands within the attendance feature than other parts of Blackboard Learn; once they got used to those commands, it was "very easy to move through classes" and report not only whether a student was in attendance but also whether they contributed during class. Participant 16 also agreed that having the attendance

feature in Blackboard Learn was a valuable resource because it reduces the extra step of having to open a spreadsheet elsewhere.

Summary of Findings for Administrative Tools. The overall findings from the focus groups, pertaining to the frequency of administrative tool use, mirror those of the survey responses in that syllabus and course copy were identified as heavily used by both. Furthermore, the use of the administrative tools, as described by the participants in the focus groups, yielded that these tools are being used in the same way in which they were identified in the affordance analysis. The attendance feature is being used to track learner attendance, the calendar to track course milestones and communicate important dates, course copy to copy over a course or parts of a course, and syllabus to create and share course syllabus. As for why participants chose to use the tools described above, the overall theme that emerged was that these tools made things easier for them as the instructor to complete administrative tasks, such as attendance and sharing of course information. Another theme was that the use of the tools provided students with what they needed, such as due dates and course information.

Assessment Tools

According to the survey, the most frequently used tools in the assessment category were assignments (82.9% reported using it *often* or *always*), tests (50.2% reported using it *often-always*), and rubrics (44.9% reported using it *often* or *always*). All three of these items were also brought up and discussed as being used by the focus group participants. The tools that were reported in the survey as being used *rarely* or *never* were anonymous grading (81.5%), goal performance (91.2%), item analysis (63.4%),

performance dashboard (78.5%), survey (62.9%), self and peer assessment (74.6%), and Kaltura (84.4%)

Assignments. Both Participants 1 and 2 said they use the assignments tool "all the time." Reasons why participants use assignments included the convenience it provides for students, reduced risk of losing any assignments or students forgetting to include a page when turning in an assignment, the ability to link a due date and include a cut-off time, and the ability to link them to rubrics. Several participants (1, 2, 17 and 18) highlighted the ability to provide a "cut-off time" that also provides line of sight into when assignments are not done in a "timely manner" and when submissions are "late." This enables the instructor to accurately implement the "grade difference" that was set in the syllabus.

Tests. Tests were also referenced often in the focus groups as tools that were used by the participants. The reasons for using tests in Blackboard Learn varied amongst the participants. Some chose to use the test feature in Blackboard Learn because of the modality of the course as noted by Participant 2 who stated, "if the class is online, the exams are gonna be online." Participant 17 attributed class size as the reason for using the Blackboard Learn test feature. Grading can be done automatically in Blackboard Learn thus reducing the time an instructor would have to spend grading each test individually. To that end, Participant 17 also attributed the "instant feedback" as a reason for choosing to use the tests feature in Blackboard Learn. How instructors implemented the tool into their class design differed as well. Participants 2, 4, and 12 shared using the test feature to incorporate shorter quizzes at a more regular cadence as opposed to large exams.

Participant 12 chooses to use weekly quizzes because of student feedback that there was too much content in the large exams for the students to retain. Participant 4 chooses to use data analysis exercises with check-in quizzes to divide the content into "manageable tasks." It also provided the instructor the ability to see where students may be struggling and thus be able to provide "coaching" and additional help. Another theme that emerged from the use of the tests feature was that some participants (2, 4, 12, and 13) keep tests and quizzes as "low stakes" assignments. In other words, they did not weigh them heavily in the overall grade for the students. Participant 13 shared that they allowed students to continue to retake the tests/quizzes until they reached mastery. Participant 2 shared that they use the online test/quiz feature to allow students the choice of when they want to take it and the ability to take it over multiple days. They also shared that online exams allow "students to feel comfortable using a translator if they really needed to," since there were international students in their classes. As a result of speaking about tests, the Respondus Lockdown feature in Blackboard Learn was also discussed by a couple of the focus group participants (Participants 17 & 18). The main reason for using this tool was to ensure that students were not going to other sources to find answers, in line with the "high-stake" nature of the exams as described by Participant 18.

Rubrics. Rubrics is another assessment tool that participants reported using during the focus group discussions. Many participants chose to use the rubrics to provide students transparency on how they will be graded on assignments, inclusive of discussion boards and blogs. Participant 1 stated that they use rubrics "quite a bit" and Participant 2 shared using them for about "half of [their] assignments," depending on the "nature of the

assignment." Despite sharing that they used rubrics quite a bit, Participant 1 added that it took about "three or four semesters to get used to all the different features and functions of rubrics" before feeling comfortable to use them exclusively, as they do now. The way in which rubrics were presented to the students varied, as well, with instructors providing the rubrics as PDFs or by sharing the rubric feature in Blackboard Learn directly with students.

Kaltura and Item Analysis. Two other assessment tools that were discussed during the focus groups were Kaltura and item analysis. While Participant 3 alluded to using the Kaltura feature to provide announcements to students by embedding it in an email, most of the faculty members used it as an assignment tool with assessment questions included. Participant 8's description of what this looked like in their classroom was:

> *We can't really do the interaction part during the asynchronous pieces but during the asynchronous lecture videos, one thing that I have been doing is embedding… the question in the video so that every few minutes they have to pause the video, do something on their own, and answer the question so that the idea is that they're not just passively watching but they're still supposed be to engaged throughout.*

Another use of Kaltura videos, as described by Participant 7, was for the students to present every other week on their "developing concept and conceptual framework" providing the instructor the ability to see how the student is progressing through all course content. Another use was described by Participant 18, where Kaltura was used for "chapter walkthroughs" as an assignment so ensure that students are able to have access to all of the "content that they have to be responsible for."

Item analysis was used by faculty members in the focus groups to provide an "index of difficulty and discrimination," to "gauge which questions were hard" or "potentially missed by a majority of students", as described by Participants 1, 2, 4, and 12. This allows for faculty members to determine which questions were "badly worded" or cases where the content was not taught well enough. They can then make decisions on whether to dismiss the question as well as whether they should "roll that (content) into the next module and make sure that it gets revisited." It also provided the opportunity to check for bias in questioning. Participant 1 also shared that they also use item analysis to check for spelling and grammar errors because that "can impact students' understanding of the meaning of the question or the response."

Survey. Finally, Participant 17 spoke of incorporating the survey tool into their course. However, the incorporation of this tool was not to assess student learning, rather to give students an opportunity to assess how the course was going and gauge "what is working for them and what is not." This participant used this as their midterm evaluation because the university did not have one and they wanted to know what they needed to improve on for the next semester since they would be teaching the same course with the same content.

Summary of Findings for Assessment Tools. The survey results and focus group discussions both yielded that assignments, tests/quizzes, and rubrics were used at a higher frequency than the other assessment tools. The focus group discussions also revealed that a handful of the participants included the use of Kaltura and item analysis. Most of the assessment tools were being used in conjunction with the affordances

identified in the affordance analysis. Rubrics were being used to ensure fair assessment of learner growth and knowledge of course content, item analysis to analyze learners' performances and analyze assessment question/tools for ability to measure against the learning objectives, tests to track learning growth/ability to meet learning objects. Kaltura was originally identified in the affordance analysis to create videos relevant to the course. While participants were using it in accordance with that, they were also using it as an assessment feature by checking in on student understanding throughout the delivery of the content. The overall themes as to why participants were using the assessment tools described were that they made things easier for the instructor, were convenient for students, accommodated students' needs, improved student experience, and provided students with necessary information.

Communication and Collaboration Tools

According to the survey results, the most commonly used communication and collaboration tools were announcements with 81.9% of faculty reporting they use it *often* or *always*, send e-mail with 66.8% using it often or always, and discussion boards with 63.8% using it *often* or *always*. The only tool that was heavily reported in the survey as being used *rarely* or *never* was wiki (81.4%). Announcements was also discussed often and while the send e-mail feature was identified in the survey separately, it was mostly mentioned in the focus groups in reference to sending announcements directly to students' e-mail addresses. The other two Blackboard Learn tools that were mentioned and discussed during the focus group conversations were Blackboard Collaborate and groups.

Discussion Boards. As previously mentioned, discussion boards were found to be used often by faculty in both the survey and within the focus groups discussions. This is supported by the statement, "as far as a discussion tool, I think Blackboard Learn is the best available to use," shared by Participant 13 during one of the focus groups. Discussion boards were used by faculty members for a multitude of reasons, including providing a space for student to answer prompts, engage with group work, provide peer reviews, and build a community.

Participant 15 spoke to why they do not use discussion boards often and stated that there is "no comparison between an in-class discussion versus an online discussion." Participant 15 also highlighted another reason for not using the discussion board feature because after an instructor poses a question, "somebody responds, somebody else responds…the question's kind of answered, and then everybody else just kind of makes up answers that sound somewhat different, just so they have something else to say." Participant 14 agreed with this observation by stating that they, too, used to have the same issue but then changed the way in which they implemented discussion boards in their courses.

One of the most common uses of the discussion board tool in Blackboard Learn is to provide prompts and have students respond to them. This was described by Participant 1 as "students have their initial posts after responding to some thought prompter that's in the course materials" and that they include "multi-part discussions that will stand." One common theme that emerged, and to solve for the issue highlighted above, was that the prompts needed to be thought-provoking rather than factual. Examples amongst the focus

groups of thought-provoking prompts included questions that prompt students to describe their understanding of different financial statements (Participant 9), solve problem sets with a focus on the process (Participants 9 &12), connect intelligence theories with how they work in the students' lives and the lives of others (Participant 12), respond to case studies they have written or a video on a classmate's case study (Participant 3), and to stimulate responses that will serve both as a "background check or a baseline check of student understanding" (Participant 2). Participants 2 and 7 indicated using discussion post prompts as preparation for the synchronous portion of the class. Participant 7 described what this looks like in their courses. They "post discussion questions so that they are prepared in advance… and then I read through their answers, and then I let them know right at the beginning of class who I'm gonna expect to speak during the open discussion session. So, it's not exactly open discussion but it's a way to try to simulate asking questions and getting answers in class." Furthermore, Participants 13 and 14 discussed using discussion board prompts to allow students to choose a topic in which they are more interested. The implementation looked similar for both participants in their classes. They would post multiple discussion prompts and allow the student to choose from which prompt they would like to provide a response.

Another common use for discussion boards was to assist with group projects or work. This looked slightly different for the participants. Participant 13 described using it as a jigsaw approach within group projects where "everyone in the group kind of is doing something different, and then they come together and try to fit it all together and make sense of it." Participant 9 puts them into small groups and each group works on "similar

but not identical set of documents." Participant 2 had a completely different approach and only leveraged it for group work when they needed to cancel a class. In these instances, they would "come up with some sort of group engagement activity, which has multiple steps that they need to go through to work with their groups, post something, and respond to each other." Another approach that starts with the discussion board threads, but essentially leads to outside the discussion board was described by Participant 1, where there "might be a subgroup meeting [in Zoom] to talk about what they observed in the discussion board."

Discussion boards were also used informally to create a sense of community amongst the students in the class. Participant 7 created a discussion board section where the students could "just vent" and provided the opportunity for students to share how they were feeling. Participant 4 shared another example of community building through discussion boards; this participant created a thread "where students can feel free to raise questions or talk about topics they may not want to be on a blog where it would be part of their grade." This participant also encouraged students to share when "there is a special event happening, a guest lecturer, a movie night" and other events that other classmates may be interested in attending. Additionally, Participant 10 wanted to provide a space within the discussion board tool that would build a "community of professionals." Here they would share ideas of how they worked with clients, describe how to approach different age groups in their practice, or modifying procedures. Participant 5 shared that sometimes this community of professionals happens seamlessly in her class and individuals become invested in each other's research topics and engage one another

regularly throughout discussion threads to get updates or ask questions about each other's research.

One final use of discussion boards that Participants 13 and 14 noted using it for was peer reviews. With peer reviews, they would have to look over classmates work to get feedback prior to turning it in for a grade. This oftentimes was implemented with group work, where members within a group would review each other's work. The purpose was not only to ensure the work was done well enough to turn in, but a way to provide "a different perspective" and "share something fresh" as described in greater detail by Participant 13.

Announcements. As mentioned above, the announcement feature in Blackboard Learn was another commonly used communication and collaboration tool. The use of this tool primarily fit into a theme of instructor communication with students. While the send e-mail feature was highlighted separately within the survey, the focus group participants all used it within the announcement feature. Therefore, references to announcement use in this section is also inclusive of an email, with that announcement, being sent directly to students.

While all the focus group participants agreed to the use of the announcement feature, their implementation varied. Participant 14 blankly stated that all "communication to students" is done through announcements and Participant 13 shared that they make announcements their home page so that students are taken directly to them upon logging into Blackboard Learn. The reasons that faculty chose to include announcements in their Blackboard Learn courses were the ability to send a message to

the whole class, the ability to "pre-deploy" the messages so that they can be developed in the beginning of the semester and then "personalize[d]" while progressing through the semester (Participant 4), and its ease of use and availability of sending it to student e-mails with one click (Participants 12 & 14).

The implementation of announcements between faculty members in the focus groups varied slightly. Participants 3, 5, 12, 13, 14, and 16 used it to provide information and updates on the course. These types of announcements included details about when the course has been opened in the beginning of the semester, reminders to check the syllabus, the content and expectations for the week, and any reasons for delays on grading by the instructor. While some stated they only used the feature for announcements, others stated they used the announcement feature to remind students of impending deadlines. Participant 5 said they use the announcement feature to apply "document design details" that provide "lists or bullet points that help students work" on assignments, thus decreasing the amount of feedback the instructor needs to provide to each individual student.

While most participants shared using the announcement feature as a written form of communication, Participant 12 also referenced creating announcement videos. The reason for this was two-fold: (a) if the message was too long to type, it allowed for a quicker way to share the necessary information and (b) the video could be uploaded onto YouTube to add captions for American Disability Act (ADA) compliance.

Groups. Groups was a tool that was not identified as being used widely amongst survey participants (37.6% reported using it *often-always*), however it was discussed as a

tool used by some focus group participants and is, therefore, included in this analysis. The main purpose for using groups was for instructors to provide a space for students to work on group projects. Due to privacy regulations, this was the only space that they built for this purpose for students since "legally…[instructors] can't [share] (student) emails" as pointed out by Participant 15. Participants 13 and 18, who also were using discussion boards for group work, would post discussion threads in the group section so that those students who were working on a project together, or were studying similar things, could interact with people who shared the same focus as them. Participant 8 used the group feature as a space for lab partners/groups to work together. While most instructors used groups as a space for the students to interact and share knowledge, one shared that they also post slides and content in the group space for students to review.

Blackboard Collaborate. Only 36.6% of survey participants reported using the Collaborate tool within Blackboard Learn *often-always* and the Blackboard Collaborate feature received mixed reviews amongst the focus group participants. While the overall use was not exceedingly high, and this will be discussed further when the tools used outside of Blackboard Learn is discussed, there were still some focus group participants who were using Blackboard Collaborate. For those who did use Blackboard Collaborate, they reported using it for the synchronous, or live sessions, with their students. Participants 8 and 14 noted that their preference to streamline the student experience and keep everything within Blackboard Learn impacted their decision to use Blackboard Collaborate. Participants 15 and 18 highlighted the ease with which recorded sessions could be stored within Blackboard Learn, without any additional work on their end, as a

reason for using Blackboard Collaborate; Participant 13 agreed with that being a favorable feature, despite the fact that they opt to use another tool. While nearly all of the focus group participants who were using Blackboard Collaborate were using it to replace and/or simulate what would occur in a face-to-face setting, Participant 7 shared a different implementation of the tool. For one of their courses, this participant set up Blackboard Collaborate rooms where small group discussion would occur prior to the whole class meeting. This participant felt it provided "richer discussion" because students would also watch the small group discussion recordings as well as having that hour-long discussion in small groups prior to the class meeting. Participant 18 used the Blackboard Collaborate tool to engage students in simulations of visits with patients. Because of the automatic recording feature in Blackboard Collaborate, the instructor would watch the simulation, provide constructive feedback, and students would then watch the recording and think about changes they would make in future interactions with patients. They incorporated this activity with Blackboard Collaborate throughout the semester and it was even used for the students' "final check-outs."

Summary of Findings for Communication and Collaboration Tools. As with the previous tools discussed, the focus group findings for frequency of use by faculty of the tools were aligned with the findings from the survey. Announcements and discussion boards were reported in both the survey and focus groups as the tools most frequently used by participants. Furthermore, groups and Blackboard Collaborate were used heavily by about one-third of both the survey and focus group respondents. As far as the way in which the tools were being used, they predominately corresponded with the affordances

identified by the affordance analysis of Blackboard Learn. Announcements were used to communicate to learners, discussion boards were used for communication and distribution of learning amongst learners and for the construction of knowledge, groups were used to allow for collaboration on projects and to share/build knowledge together, and Blackboard Collaborate was used for synchronous conversations. The major themes to emerge around why participants chose to use these tools in Blackboard Learn were to (a) improve student experience, (b) increase student interaction, and (c) to provide students with the necessary information for the course. A major theme that emerged specifically for discussion boards was the versatility of the tool. The final theme that emerged was specific to Blackboard Collaborate in that it was convenient for the students, which aligns with the overall theme of improving student experience.

Content Creation and Delivery Tools

Content creation and delivery tools were the mostly highly reported as used tools in Blackboard Learn according to the survey results. Within this category, survey responses yielded the following tools as the most commonly used: files (79% *often-always* used), content area (77.6% *often-always* used), folders (76.6% *often-always* used), WebLinks (69.2% *often-always* used) and item (63.4% *often-always* used). Even with these tools being the most heavily used, there was not as much discussion in the focus groups about why and how these tools are used, because the participants essentially used them in the same ways: as a repository. Participant 1 shared, "I tend to use Blackboard Learn as more of a repository or for learning materials" and Participant 13 stated, "Blackboard Learn is a repository…we can upload our files there and keep them there."

The content creation and delivery tools that were reported as being used *rarely* or *never* were glossary (93.7%), audio (67.8%), and lesson plan (84.4%).

Files. Three specific tools that were discussed in the focus groups were files, modules, and folders. Participants used the file areas to upload PDFs, and Participant 1 noted that the user experience of how files opened in a separate window, as opposed to the need for downloading the file, heightened their reason for using this tool. Participant 6 shared that they think "students are learning much better through multimedia" and therefore likes the fact that they can "easily use video and audio files." Participant 17 shared a similar use:

> *"What I do is I set up my Blackboard Learn with videos they can watch prior to coming to class, so once they've watched the videos, those videos I use, I upload using SCORM on form packages on Blackboard Learn so that that can be graded with the SCORM completion, they get graded on it, so that's a portion of their grade. And that gives some incentive too."*

Modules and Folders. When it comes to the use of modules and folders, this differed amongst participants. Participants 1 and 12 pointed out that they disliked the way modules presented in Blackboard Learn for students, and so they opted not to use them at all. Participant 12 shared that they create folders based on the weekly content as well as having a separate folder for assignments. Participant 1 followed a similar set-up and would share things using the item feature and "stack them" in the way they "want them to be reviewed." Several other participants shared that they like the module feature and use it regularly. The goal for all participants was essentially the same: they wanted content to be grouped into categories. As Participant 17 shared, "I think it's easier to group their information into categories, it's more of building information on each other" and another

stated that modules allow them to "chunk things really easily." However, important to note that both Participants 17 and 18, who reported using modules, also shared that they do not use it for all their courses, pointing out that the content very much drives this decision. This distinction usually aligned with the level of the course. Beginning level courses usually did not build off of each other in the way that senior level courses did, therefore in the beginner courses, the participants opted to group content by weekly assignments, as described above, over content-specific modules.

Summary of Findings for Content Creation and Delivery Tools. The focus group findings matched with those of the survey in that most of the participants were using the content creation and delivery tools *often-always* in their Blackboard Learn courses. These tools were being used in the same way that they were identified for use in the affordance analysis. Files, all types (audio, image, and video), were being used to provide students with access to course content and folders, and modules were being used to provide content in an organized way to learners. The major themes around why participants chose to use these tools were to improve student experience and provide students the necessary information for the course, specifically in the order in which they thought students would best absorb the content.

Learning Tools

Learning tools were the most underutilized tools reported by survey responses as 66.8% reported *never* using blogs, 80% reported *never* using portfolios, 63.4% reported *never* using journals, and 83.9% reported *never* using VoiceThread. Although the survey results yielded that most faculty were not using these learning tools, there was some use

of these tools reported in the focus group discussions, inclusive of journals, blogs, and VoiceThread.

Journals. Despite journals only being reported as used *sometimes-always* by 22.9% of survey participants, several focus group participants shared how they implement the use of journals in their courses. One of the overarching themes for journal use included the affordability of students to have a space to record and report on how their learning builds upon itself throughout the course of a semester. Participant 2 described using it in their online class to "have students be working on their research proposal over time and getting feedback from me" because it is "less intimidating than as [sic] an assignment format." Although this participant indicated only using this for her online class, they did say that "it's working really well, so it might be something I carry into my face-to-face classes." Participant 7 shared that they use it in their theory course because they want students to build "on their main concept through the semester, and how the new research that they've been reading contributed to a better understanding of the concept analysis and how that fit into their theoretical framework."

Participant 13, whose students are actively practicing teachers, uses the journal feature to provide a space for the students to report on how they are implementing what they are learning within their own teaching throughout the semester. This participant noted that they used to use Google Docs to accomplish the same task but found that by doing it within Blackboard Learn, it is all in one place and easier for them, as the instructor, to see when a journal entry has been submitted and to, subsequently, grade it.

Blogs. As noted earlier in the discussion board section, discussion boards do not always yield substantive interaction amongst students. Therefore, Participant 4 opted to transition from using discussion board conversations to having students post blogs. From this participants perspective, discussion boards made it "harder for students who maybe had a different perspective to get their classmates to engaged with them," and that blogs "give students a bit more ownership over the topics they choose to dive deep on" without their classmates shifting the topic in a "completely different direction." Furthermore, students are required to read and comment on other students' blog post, thus everyone gets feedback. Another participant agreed with the focus on ensuring that interaction be substantive and also used blogs for this reason. Another use of the blog feature within Blackboard Learn, reported by Participant 14, included having students attend professional development opportunities and then "write up their summaries" so that everyone can see, allowing students' to learn from each other's conference experiences.

As noted above in the journals section, Participant 9 uses the blog feature to have students "scaffold their final paper…building it over ten weeks." Participant 9 also started using blogs in a six-week course hoping there would be "cross-pollination" as students read each other's blogs; if they "were really stuck on the assignment they could get a feel for what that was" from other students' blog post. However, they found that this did not work as hoped and that the 25 entries a week were "all written very differently, they all chose different points of view, so clearly they were looking at what other people had done."

VoiceThread. The incorporation of VoiceThread into the focus group participants' courses was limited. Some participants have used it and continue to use it, some participants are hoping to incorporate it in the future, and some have used it and do not plan on using it again. Participant 13 noted that they find VoiceThread to be "teacher-centered." According to this participant, the version available to George Mason instructional faculty has a reply feature, but only the instructor can have it, therefore limiting student interaction. Therefore, this participant used it to share "slides and videos" but described it as the instructor "standing in front of the class" and narrating them. One use of this tool that invites student interaction would be incorporation of slides that had a question icon that would allow students to respond to something, but it lacked the "back and forth" interaction.

"One of the asynchronous classes I teach used VoiceThread and I did not like it at all," stated Participant 10. They went on to describe why: "every time I went in to check to see if a student had done something, it was starting all over again. I couldn't mark off [if] somebody had already done it." This participant went on to explain that it was very disorganized on the grading end; they, therefore, found the discussion post feature to be much more favorable.

Participant 5, who hopes to use it in the future, stated, "I'm finally getting into the tool a little bit more…I would love to begin having students talk to each other via audio because they seem to like it." Furthermore, this participant noted that students are "walking as they take the class, they are doing other things" so incorporating something like VoiceThread would "give them a bit more flexibility."

Summary of Findings for Learning Tools. Although learning tools were the least frequently used tool, as reported by the survey, there were a handful of participants in the focus groups who were implementing the use of blogs, journals, and VoiceThread. Most of the tools were being used to match the affordances identified in the affordance analysis. Journals and blogs were used as an area for learners to share their knowledge, ask questions, and communicate. Journals were used to share with only the instructor, while blogs were used in a way that students can see each other's work. However, VoiceThread was identified in the affordance analysis as a learning tool for students to share their learning and to interact with one another, and one of the participants countered this use and used it as a tool for the instructor to disseminate content to the learners. The main themes to emerge as to why participants chose to use these tools within Blackboard Learn were that it made things easier for the instructor, improved the student experience, and provided a space for students to construct their knowledge.

Nonuse of Tools Within Blackboard Learn

The survey results yielded minimal use of some of the tools within Blackboard Learn (mostly learning tools). Although the survey allowed for participants to share their reason for never using these tools, the responses were limited to three choices and therefore a question was incorporated into the focus groups to gain a better understanding for this nonuse. There were four major themes that emerged from this question: (a) lack of knowledge/experience with the tools, (b) the unfavorable structure and user experience of these tools within Blackboard Learn, (c) the option for a similar tool outside of

Blackboard Learn that the participants preferred to use, and (d) that Blackboard Learn does not allow for epistemological beliefs to be implemented.

Lack of Knowledge or Experience. "Honestly, the first and foremost thing is, I don't know what they are" stated Participant 12 when asked why they do not incorporate tools like blogs, portfolios, journals, and VoiceThread into their Blackboard Learn use. Many participants had similar responses and would state that they "don't know the course tools very well" (Participant 2) or would "guarantee" not using a tool because "I don't know what they are" (Participant 3). Participant 3 expanded on their lack of knowledge and stated that as they were going through the survey, they would find themselves thinking "maybe I should look up what that is because I should know this, but I don't" when coming across some of the tools they were unfamiliar with. Participant 12 explained in further detail how lack of understanding of some tools has impacted their nonuse:

> *"When I think about the journals, I think about, 'Oh, can they just write a discussion or do an assignment paper that is a journal?' And again, that's me going…I don't know what it is. And so all I have to go on is what it sounds like, and for that example, I'm like, 'Well, why do that when it's just right there and it's easy to just use this?' But yea, that's the biggest reason for me is I don't know what they are, and there isn't really a way that I can see other than doing a lot time, effortful commitment and going on YouTube and reading about it to get 80-ish percent understanding of what it looks like on the student end."*

As stated in the above quote, to learn how to use the tool, it would take individual ownership of the instructors to seek resources to learn how to use these tools. This was supported by Participant 7 who stated that "all of the Blackboard trainings I've gone to over the year[s], some of these things I've just never seen really demonstrated, and I

haven't had time to go and learn them on my own." Furthermore, Participant 18 mirrored this by saying that "there is no time for me to set things up and do it." Finally, Participant 3 shared that their lack of experience with teaching in an online setting altogether has limited their ability to use the different tools within Blackboard when they stated, "I relied on teaching in-person, having those discussions, and having student[s] have ongoing conversations in class", thus incorporating those same things within Blackboard Learn has been a challenge.

Blackboard Learn Structure and Weaknesses. There were many weaknesses of Blackboard Learn identified by the focus group participants as reasons for limited or nonuse of the tools within it. To begin, several participants referred to the subpar way in which Blackboard Learn was designed. Some of the adjectives used by participants included it being hierarchical, clunky, awkward, and not very intuitive. Participant 16 expanded on why this lack of intuitiveness creates such a problem when it comes to incorporating the use of Blackboard Learn with their courses:

> *You have a finite amount of time to interact with your students…the things that are non-intuitive suck up that time extremely quickly. And from my perspective, there's never been a moment that Blackboard has been intuitive. It doesn't use the same sorts of commands as Microsoft, Google, Apple, Windows, any of those. It doesn't incorporate conventions that we're already familiar with, so we have to relearn a convention. And because it's amalgamated so many different tools together from different locations, that whole interface changes when you go into each little tool that you're working with, so you have to really learn things.*

Participant 13 added to this description by stating that Blackboard Learn is analogous to the Winchester House, in that the owner of the house kept on adding onto the house so that it had "stairways that go nowhere and window that go to the floor" and

"that's kinda how Blackboard feels to me. It just feels like they've kept adding features" and never thought to tear down and rebuild it in a way that improves user experience.

Another big complaint about how Blackboard Learn is structured is the inability for the teacher to see what the student experience looks like. As an example, Participant 7 described their attempt at incorporating the journal feature in the past "which was a nightmare" because "the students couldn't figure out where to post and I can't see what they see, so I've actually had to ask students" to open up Blackboard Learn to show the instructor what they are seeing. Participant 12 shared this experience when trying to implement the use of new tools in Blackboard Learn and feels that if they can't help the students use it, they "are putting a lot of risk" in using a new tool "because what if it's not at all what I thought and students reach out to me" and I can't help them because "the instructor side…looks nothing like it does on the student side."

Weaknesses within specific tools were also highlighted throughout the focus group discussions. Participant 13 stated that they find it extremely difficult to provide feedback in Blackboard Learn and spoke about struggles they have had with the grading feature in that there is no form of notification that indicates if students are checking their grades. Therefore, instructors do not know if students are aware of their grades. Participant 10 shared this frustration when trying to provide comments in blogs stating that "the comments from last week were in there so I just had to add a line and add a comment, and then I had to physically go to the grade and change it by hand." Participant 6 noted the difficulties they have had transferring the gradebook to PatriotWeb which is

the required place for all faculty to upload final grades. Finally, Participant 4 described multiple obstacles they have faced when using Blackboard Learn:

> *And I could affirm that Blackboard is super clunky on lots of things. It's very frustrating making quizzes where I just wanna be able to drag things together and have the whole thing be random order, and everything involves clicking 40 different places. Video editing is just impossible. I sometimes will make podcasts for my classes where I'll record audio and then lay a music soundtrack in the background and upload an audio file, obviously using different software. If I need to edit videos, I don't bother within Blackboard, I use elsewhere, edit elsewhere. There are a lot of things, it's really, really clunky and dysfunctional, but the basic stuff of being able to share files, do quizzes, upload assignments work fine. So I'm grateful for that being straightforward for students too.*

Similar Tools Used Outside of Blackboard Learn. The third major theme to come out as to why faculty are not using some of the tools within Blackboard Learn can be attributed to there being similar tools outside of the platform that they prefer to use. The two external tools that were identified as used most often were Zoom and Google Suite tools (Google Docs, Google Slides, etc.).

Many of the participants opt to use Zoom as opposed to Blackboard Collaborate. One of the reasons for this is because of the student experience with Blackboard Collaborate. Participants 10 and 13 stated that when they would go to share something on their screen using Blackboard Collaborate, it would be difficult for students to see what is being shared because the viewing window was so small. Participant 7 attributed their switch to Zoom because of Blackboard Collaborate being unstable and students having issues getting in and out of the session. Another common reason for using Zoom over Blackboard Collaborate was because of the ability to easily move students into breakout

rooms and sessions. Furthermore, Participant 15 shared that they have several sections within a course, and it is not as easy to have all the students in those separate sections come together into one session when using Blackboard Collaborate. Overall, many of the participants highlighted the overall user experience of Zoom as the reason for opting to use it as opposed to the Blackboard Collaborate tool within Blackboard Learn as Participant 13 explained, "it just seems better, to be honest, I don't think there's any one feature that really sets it apart, but I think in all if the features, it's just a little bit easier and more intuitive to use."

The tools within Google Suite were also identified by many participants as something they used as opposed to using tools within Blackboard Learn. One of the most used Google Suite tool by the focus group participants was Google Docs. There were a number of reasons identified for this decision including it being what students are used to and comfortable with, easy to see threaded feedback and input provided by learners, and the fact that it affords its users seamless, real-time collaboration. Instructors sometimes ask that students post a link to a Google Doc so that other students can provide feedback and comments. Participant 5 noted that they are "getting better discussion from students" because they are using Google Docs to keep a repository of notes and therefore are engaging in break-out discussions more often. Furthermore, the same participant explained that allowing students to post thoughts and comments within Google gives the introverts in the class more of an opportunity to get engaged with the class discussion. Participant 11 uses Google Docs as a place for students to provide their input on instructor prompts. For example, the participant shared, "I will put on an NPR

[broadcast]…we'll talk about what were the main ideas, and I'll have everybody throw it up on a Google Doc" and then later post it on Blackboard Learn as a reference for students. Other uses of Google Suite products include allowing students to use Google Slides for group work and using Google Sheets and/or Docs to have students sign up for things.

Participant 3 shared that they also use tools outside of Blackboard Learn to assist with recording and editing videos and audio files, such as Camtasia and Audacity. Participant 1also reported using Microsoft Publisher resources to create question banks for tests and quizzes rather than using what is available in Blackboard Learn. Some other tools that were identified were Perusall, which allows for students to annotate and comment on readings (Participant 14), LaunchPad, which is an interactive online tool that walks students through real cases (Participant 12), and FlipGrid or Padlet, where text and video can be combined easily (Participant 13).

Findings on Epistemological Beliefs, Pedagogical Approaches, and Delivery Mode

In this section, findings from the focus groups around how epistemological beliefs, pedagogical approaches, and the delivery mode of the course influence the use of tools in Blackboard Learn are shared. These findings were used to provide triangulation of the survey findings; there is additional triangulation between the quantitative and qualitative components of this research study presented in Chapter 5 of this research study.

Epistemological Beliefs

There were 19 total focus group participants, 17 who self-identified as constructivists, one as cognitivist, and one as other. When the participants were asked to describe how they think people learn, their descriptions matched that with which they identified within the survey. For example, Participant 1 described engaging their students in learning activities and interactions and then having them reflect on those experiences. Participant 2 added that they connect course content to what the students already know and focuses on helping learners build their own understanding of the world, and Participant 3 mirrored this approach and stated that they focus on a learner-centered approach where the learners create their own knowledge as opposed to "a teacher coming in and [implementing a] top-down directive, filling students with knowledge that they didn't have." Participant 12 self-identified as a cognitivist on the survey and described implementing course content by the theories of intelligence, or other concepts within the course. This aligns with a cognitivist approach in that it focuses on how the participant's mind processes the content. This participant also highlighted incorporating a way in which the learner can apply their knowledge.

Of the 17 participants who self-identified as having a constructivist epistemological belief, approximately 40% of them also shared that they use tools within the learning tools category. The tools that they described using most often were journals (Participants 2, 7, 13, & 14) and blogs (Participants 4 & 9). Furthermore, the individuals who identified as constructivists also shared that they use discussion boards. Additional information about how and why these tools were used by the participants are presented later in this chapter.

Pedagogical Approaches

Participants were asked which pedagogical approaches they implemented most often in their courses. Participant 2 shared that they mostly use problem-based, experiential, and direct instruction, which were also the top three identified in the survey (Table 15). However, as referenced above, the DDA findings did not yield significant findings pertaining to experiential learning and its impact on faculty use of the LMS tools. Participants 1and 3 agreed with Participant 2, but Participant 1 said they try to keep direct instruction to a minimum. Participant 1 described what experiential learning looks like in their course when they stated that they have the learners walk through "a typical career as a video editor or videographer" as examples. Participant 8 shared that they often spend a "significant chunk of class" having the learners work on problems and speaking with one another. Participant 7 described a similar approach where they present an issue to the learners and have them research the ethics around that issue to determine what tools and data they would need to solve the problem. Finally, Participant 12 shared that they always have a "lecture component and required reading component, at a minimum."

As for some of the other pedagogical approaches to teaching, game-based learning was not spoken of at all by the focus groups. This aligns with the findings from the survey in that 70.2% of the participants reported that they use this pedagogical approach in their courses *little-to-no* amount as show in Table 15. Kinesthetic learning was also not discussed often in the focus groups, with the exception of Participant 3 who shared that "kinesthetic learning and learning through doing is really important." The limited discussion of kinesthetic learning in the focus groups does not fully align with the

findings from the survey in that this pedagogical approach was reported as being used *often-always* by 34.2% of the survey participants, *sometimes* by 21.5%, and *little-to-no* by 44.4%. The flipped classroom pedagogical approach was implemented by Participant 12 of the focus groups often. This was alluded to in the excerpt shared above, when it was reported that they often have a required reading component. This reading component, according to Participant 12, was often sent to the learners prior to the class time for them to engage in the content prior to class discussions. Other participants referenced using pre-recorded lectures and sharing resources with learners, which is a characteristic of the flipped classroom approach, and is described later in this chapter. The discussion of flipped classroom appears to align with the findings from the survey in that *little-to-no* use was reported by survey respondents 46.9%, *sometimes* 28.8%, and *often-always* 24.4%.

Course Delivery Mode

The focus group discussions yielded some impacts that course delivery mode has on how faculty members use the tools within Blackboard Learn. First, Participants 1 and 2 stated that when teaching a course face-to-face, Blackboard Learn is essentially a repository for course resources. Participant 2 described this in greater detail when they said that "it's a cloud server for my class when I'm teaching face-to-face." Participant 4 shared a similar experience when they stated, "if I'm teaching on-campus, I traditionally have used Blackboard relatively minimally, mostly as a place to put the syllabus, and put lecture notes, and collect assignments." This participant did share that now that they have been teaching online because of the COVID-19 pandemic this may change. Participant 5

also shared that when they are teaching fully online, they only use Blackboard Learn to "hold readings and the syllabus." Finally, Participant 15 stated "when you're in the classroom then I don't really need Blackboard, right?" and that they hand out all of their readings, role plays, or experiential stuff in the classroom, thus indicating that they do not use it in a face-to-face setting.

When speaking to how they use Blackboard Learn in an online setting, it was found that the participants tend to use the tools more often. This was supported by the DDA findings which revealed that for courses taught online, the LMS tools were used more often. For example, Participant 15 said, "when it's online, then yea, I'll have to post stuff to Blackboard for them." Participant 6 shared that when they are teaching online, they are using Blackboard Learn more to post videos, announcements and other things because teaching online forces them to "put a lot more stuff on there." Participant 19 shared that they are "much more thorough and intentional about pre-reads" when teaching online because they feel "an obligation to populate the site with lots of really great material."

There was no explicit discussion around the hybrid modality. This is likely due to the fact that of the 205 survey responses, only 13.7% identify using a hybrid course as the focus for their responses to the survey questions.

Summary of Findings

The quantitative analysis revealed that epistemological beliefs, delivery mode, and some pedagogical approaches have an influence over how frequently administrative, assessment, communication and collaboration, content creation and delivery, and learning

tools are used by faculty in Blackboard Learn. The DDA for epistemological beliefs revealed that those with a cognitivist belief were less likely to use learning and content creation and delivery tools, and more likely to use administrative tools. Contrary to that, those with a constructivist belief were more likely to use learning tools, while using administrative and content creation and delivery tools less often. For the delivery mode of the course, courses that were taught fully online were more likely to use learning, assessment, communication and collaboration, and administrative tools; courses taught face-to-face used these tools less often. The pedagogical approaches of direct instruction, game-based learning, problem-based learning, flipped classroom, and differentiated instruction were all statistically significant and the DDA's were able to be analyzed. Conversely, experiential learning and kinesthetic learning were not found to be statistically significant and therefore the DDA's were not analyzed. For direct instruction, faculty who implemented this pedagogical approach *little-to-no* use were more likely to use learning tools and less likely to use administrative. Faculty who implemented game-based learning *often-always* were more likely to use learning and administrative tools and less likely to use communication and collaboration tools. *Little-to-no* implementation of problem-based learning yielded less use of content creation and delivery tools and administrative tools. Finally, those who implemented a flipped classroom approach *often-always* were more likely to use administrative tools and less likely to use learning, communication and collaboration, and content creation and delivery tools. In opposition, those who reported implementing the flipped classroom approach *little-to-no* used

learning, communication and collaboration, and content creation and delivery tools more often.

The qualitative analysis of the focus groups revealed that most of the tools within Blackboard Learn were being used by the faculty in accordance with how they were identified for use in the affordance analysis. Differences were apparent in cases when assessments were graded or considered high-stakes versus low-stakes and the desired outcome of the students. In particular, this was to the case with discussion boards, where they were used for prompts, group work, to provide student choice, peer reviews, and to build a sense of community. The major themes for why tools were used were that they made tasks easier for the instructor, improved the students' user experience, provided students the necessary information they needed for a course, provided multiple options for how to use the tools, increased student interaction, and offered a space for students to construct their knowledge and/or learn from one another. Finally, there were four major themes that emerged for why instructors chose to opt out of using tools within Blackboard Learn. These themes were their own personal lack of knowledge and/or experience with the tools, the unfavored structure of Blackboard Learn and the general weaknesses of the tools, the availability of similar tools they preferred to use outside of Blackboard Learn, and that the Blackboard Learn LMS made it difficult for faculty to implement their epistemological beliefs.

Chapter Five: Implications, Recommendations, and Conclusions

This research study was conducted to determine what factors are influencing the way in which learning management systems (LMSs) are being used by faculty in higher education contexts. Particularly how epistemological beliefs, pedagogical approaches, and course delivery mode impact LMS use. Previous research studies revealed that LMSs are not being used to their full potential and capabilities to support effective instruction (Khoza 2018; Machajewski et al., 2018; Rhode et al., 2017; Walker et al., 2016; Whitmer et al., 2017; Witte, 2018). Rather, LMSs are primarily being used for content delivery, managing assignments, quizzes, and tests, and for the replication of traditional classroom instruction (Martin et al., 2019). Studies conducted on the theory of affordances, pedagogical affordances, and the Technology Pedagogy and Content Knowledge (TPACK) framework have shown that LMSs afford faculty the ability to use the system in ways beyond their current use (Dabbagh et al., 2019; Kitsantas & Dabbagh, 2010; Lee & Kim, 2017; Walker et al., 2016). Research has also identified that studies conducted on how LMSs are being used are still in their infancy and more research is needed (Ofranou et al., 2015). This study yielded data results about the significant differences between these constructs and their impact on the frequency of use of tools within the Blackboard Learn LMS, and the categories of LMS tools (administrative, assessment, communication and collaboration, content creation and delivery, and learning) that are contributing to the differences across those variables. Moreover, the study examined how faculty members are using the LMS tools within their courses and why they are using them in that way.

The research questions that guided this study are:

1. Are there significant differences between epistemological beliefs, pedagogical approaches, and course delivery mode and the way faculty use the LMS?
2. Which of the five LMS categories (administrative, assessment, collaboration and communication, content creation and delivery, learning) are contributing to the differences across these variables?
3. How are faculty using the tools within the five LMS categories in their courses?
4. Why are faculty using the tools within the five LMS categories the way they are using them?

Data from 205 survey responses and 5 focus groups, consisting of 19 total participants, were collected and deemed eligible for the quantitative and qualitative components of this study, respectively. The data from the survey responses was used to guide the focus group questions, and both were used to encompass a holistic analysis of the research questions. This chapter shares the research conclusions, implications, and recommendations inferred from the findings of this study.

Findings for Research Questions One and Two

The findings for questions one and two are presented together because the results of the analyses were interconnected. These questions were answered by conducting descriptive discriminant analyses (DDA) with a group of three epistemological beliefs with the five categories of LMS tools, followed by seven pedagogical approaches with the five categories of LMS tools, and finally the three delivery modes of the courses with the five categories. The subsequent sections describe how each of these constructs

influenced the frequency of tool use by faculty, and which of the categories of tools were the most impacted.

Epistemological Beliefs Influence on LMS Use

The results of this study revealed that the epistemological beliefs of faculty members do have an influence on the frequency of use of the LMS tools. Specifically, identifying as cognitivists or constructivists was found to have an impact on how often tools within the learning, administrative, and content creation and delivery categories were used. Faculty members who identified as constructivists were more likely to use learning tools and less likely to use administrative and content creation and delivery tools.

The affordance analysis of Blackboard Learn revealed that the tools within the learning category of LMSs support learner-centered instruction (Walters, 2019). Jacobson et al. (2010) postulated that teachers who believed in contextualized and flexible knowledge used technologies with a learner-centered approach. Constructivists believe in flexible knowledge and tend to implement learner-centered approaches (Bruning et al., 1999; Nagowah & Nagowah, 2009). Therefore, it fits that those participants who identified as having constructivist epistemological beliefs are more likely to use learning tools and less likely to use administrative and content creation and delivery tools since the latter categories of tools support more teacher-centered approaches. For example, content creation and delivery tools are used to disseminate knowledge, which emulates a teacher-centered approach (Teaching Methods, 2020), and administrative tools generally afford teacher-focused tasks including the management of student information, course

content, and activities (Kitsantas & Dabbagh, 2010). In contrast, learning tools are used to help learners generate their knowledge through experiences and reflecting on those experiences (Bruning et al., 1999; Kitsantas & Dabbagh, 2010; Dabbagh et al., 2019). Therefore, instructors with constructivist epistemological beliefs would be less likely to use the content creation and delivery tools.

The data also revealed that faculty members who identified as cognitivists were more likely to use content creation and delivery tools. Cognitivists focus on and emphasize the internal processes of the learner during the learning process; by focusing on these internal processes, it is believed that a greater understanding of how the learning process can be improved will be achieved (Nagowah & Nagowah, 2009). Content creation and delivery tools, particularly how the content is presented, aligns with this in that those with a cognitivist belief would place a lot of emphasis on how content was shared. This supports findings from this study that cognitivists are more likely to use content creation and delivery tools. This was further triangulated in the focus group findings when participants described presenting content in the way they think the learner would best process the information.

There were no significant results in this study on how the objectivist epistemological belief impacts faculty use of the LMS. This is likely due to the small representation of faculty with an objectivist epistemological belief that partook in this study.

Pedagogical Approaches Influence on LMS Use

The findings from this study revealed that five of the seven pedagogical approaches tested have an impact on faculty use of the LMS. Direct instruction, flipped classroom, game-based learning, problem-based learning, and differentiated instruction were all found to have a significant impact on faculty use of the LMS. The impact of these pedagogical approaches on the categories of LMS tools varied and cannot be categorized as teacher-centered vs. learner-centered approaches having specific relational impacts. This is due to the different pedagogies within these two categories not all impacting the use of the LMS in the same way. The impact of each pedagogical approach is described in further detail in the following subsections.

Direct Instruction. When direct instruction was implemented *little-to-no* amount by the instructors, the learning tools were more likely to be used and administrative tools less likely. When implementing a direct instruction pedagogical approach, the teacher plays the role of the expert and information is passed from expert to learner (Teaching Methods, 2020). In other words, this approach is teacher-centered. Therefore, it is fitting that, when direct instruction is not used, tools that are centered around the learner, such as learning tools, are more likely to be used. Additionally, as previously mentioned, administrative tools are used heavily for student management (Kitsantas & Dabbagh, 2010). The direct instruction pedagogical approach explains why, when the direct instruction pedagogical approach is not being implemented, there would be a decrease in the use of administrative tools.

Flipped Classroom. The findings from this study revealed that when the flipped classroom approach was implemented *often-always,* faculty were using learning,

communication and collaboration tools, and content creation and delivery tools more and administrative tools less. According to Gnaur (2019), when using a flipped classroom approach, the teacher has the choice of what is communicated online and which digital format is used. Furthermore, a flipped classroom approach is centered around the teacher's idea of how learning should happen (teacher-centered approach), what information learners need, and how it is shared (Teaching Methods, 2020). This aligns with the fact that content creation and delivery tools were one of the categories of tools used more often. Furthermore, it explains why communication and collaboration tools were used more often. The flipped classroom pedagogical approach relies on communication tools to inform students what their assignments were prior to attending the designated class time. A flipped classroom approach could also be considered learner-centered because of its focus on active learning (Gnaur, 2019). The need for active learning explains why learning tools were found to be used more often with the implementation the flipped classroom pedagogical approach. Lastly, because a flipped classroom approach usually incorporates a synchronous meeting between the teacher and students, this would explain why administrative tools would be used less often. If teachers are meeting with students in a live setting, they likely would not need to use an LMS for administrative items, such as taking attendance.

Game-Based Learning. Findings from this study revealed that learning and administrative tools were more likely to be used by faculty who implemented game-based learning *often-always* and that communication and collaboration tools are less likely to be used. According to Brown (2003), learner-centered approaches focus on the learner's

needs and characteristics and place an emphasis on engaging the learner to build their own interpretations and understanding of content. Because game-based learning was categorized in the second chapter of this dissertation as a learner-centered approach, this supports the higher use of learning tools. Furthermore, game-based learning facilitates the use of 21st century skills, including critical thinking and exploration, which further explains the increased use of learning tools. Game-based learning incorporates rules and usually includes game elements, such as points, badges, scoreboards, and leaderboards (Huotari & Hamari, 2012; Hamari et al., 2014) and would naturally lead to the need for faculty members to use administrative tools. The minimal use of communication and collaboration tools could be due to the fact that learners are engaging in the game-based experience independently. However, this cannot be supported by this study, nor does other research support that inference since game-based learning can incorporate cross-functional teams (Gee, 2007).

Problem Based Learning. The findings of this study revealed that when problem-based learning was implemented *little-to-no* and *sometimes*, administrative and content creation and delivery tools were less likely to be used by faculty. According to Williamson & Gregory (2010), with problem-based learning, learners work through problems with little direction from the teacher, which would explain why administrative tools were used less when implementing this pedagogical approach. Furthermore, because learners are interacting with content with little direction from the teacher, it would be less likely that teachers would need to use content creation and delivery tools.

Differentiated Instruction. Faculty who implemented differentiated instruction *often-always* were more likely to use learning and content creation and delivery tools. According to Chamberlin and Powers (2010), teachers communicate what is essential for students in their learning. This supports the higher frequency of use of content creation and delivery tools. Furthermore, a differentiated instruction approach is proactive rather than reactive and is therefore structured to address a variety of learner preferences and levels (Chamberlin & Powers, 2010). This further emphasizes the need to share more content with learners to ensure that all the learning needs of the learners are met. This could be inclusive of a multitude of media types and differentiated levels of content based on learners' background knowledge and understanding of the content. Additionally, according to Turner et al. (2017), when incorporating differentiated instruction, a learning profile of the learner must be considered, which includes the learner's learning preferences, family structure, favorite hobbies, interests, state assessment scores, reading scores, and fluency in reading recordings. Because differentiated instruction relies so heavily on understanding who a learner is, and its relation to their academic level, this could explain the higher use of learning tools. Learning tools allow the learner to share more about themselves and their preferences through blogs, journals, and VoiceThread, while also allowing an instructor to gather data around learners' understanding of the content.

Kinesthetic and Experiential Learning. Neither the kinesthetic nor experiential pedagogical approaches yielded significant results. There was a low representation of faculty who implemented a kinesthetic pedagogical approach, and this is likely why

statistically significant results were not found. Additionally, Zhao and Frank (2003) posited that teachers are more likely to integrate technologies if they can identify how they support their pedagogical beliefs. Because kinesthetic learning incorporates a hands-on approach where students are required to do, make, or create (Teaching Methods, 2020), faculty may have a hard determining how to utilize the LMS; thus, a differentiation between the utilization of the categories could not be determined. Experiential learning is when a teacher facilitates firsthand experiences for their students through internship and practicum in curriculums (Kuk & Holst, 2018). Unless this firsthand experience incorporates the use of LMSs, there would be minimal use of the LMS. This contributes to the lack of statistically significant findings distinguishing the frequency with which faculty were using the tools within the LMS categories.

Course Delivery Mode Influence on LMS Use

The findings from this study revealed that both courses taught fully online and those taught face-to-face had a statistically significant influence on faculty use of the LMS. For the courses delivered fully online, faculty were more likely to use learning, communication and collaboration, assessment, and content creation and delivery tools. Courses that were taught face-to-face had a negative correlation to online courses, indicating that the face-to-face delivery mode led to less frequent use of learning, communication and collaboration, assessment, and content creation and delivery tools by those faculty members. The heavier use of learner tools in an online setting is likely because the students are not engaging in learning activities in any other setting. This is supported by Willis and Cifuentes's (2005) finding that, in a face-to-face setting, hands-

on and collaborative activities are implemented to practice skills, while in the online setting, students have to rely mostly on conducting these types of activities in the LMS. This also explains why communication and collaboration tools were used more often in the online setting and less often in the face-to-face setting. Students are unable to communicate and collaborate in the classroom setting, so faculty needs to find ways for them to engage with one another online. Furthermore, in an online setting, students may not be given the opportunity to engage in synchronous sessions with an instructor, therefore, they would need to rely on asking questions through e-mail and discussion questions (Willis & Cifuentes, 2005). Assessment tools were also used more in the online setting and less often in the face-to-face setting. This is likely due to the fact that, in a face-to-face setting, observations can be used to measure the transfer of acquired knowledge, while in an online setting an instructor would more often need to rely on assessments (Willis & Cifuentes, 2005). Finally, the higher use of content creation and delivery tools can be attributed to instructors needing to distribute content through the LMS since they are not meeting with the students in a face-to-face setting.

The survey analyses did not indicate significant differences for the way hybrid courses impacted faculty LMS use. The lack of findings on hybrid courses from this study are likely due to the fact that only 13.7% (28/205) of the participants were teaching hybrid courses.

Summary of Findings for Research Questions One and Two

The overall findings revealed that when faculty identified as constructivist or cognitivist there was a statistically significant impact on LMS use. Specifically, faculty

who held constructivist epistemological beliefs were using tools within the learning more often and using the tools within the administrative and content creation and delivery categories less often. This was likely due to the fact that learning tools provide opportunities for faculty to implement teaching methods that align with their epistemological beliefs. Conversely, those with a cognitivist belief were using content creation and delivery tools more; this was likely due to the need to present content in a way that it would be best absorbed by students.

The findings for how pedagogical approaches impacted faculty use of the LMS yielded that the pedagogical approaches of direct instruction, flipped classroom, game-based learning, problem-based learning, and differentiated instruction all had a statistically significant impact on faculty LMS use, while kinesthetic and experiential learning did not. The findings also revealed that there was a variation of impact on faculty LMS use in accordance with their pedagogical approaches. This can be attributed to the fact that other studies have found digital technology practices are not always consistent with teachers espoused pedagogical beliefs and approaches (Bate, 2010). Furthermore, Phillips (2010) found that these inconsistencies can be affected by many other factors, such as teacher self-efficacy, skills, knowledge and professional development opportunities, and the extent to which a teacher believes technology can enhance pedagogical practices. Another reason for the varied findings surrounding frequency of tool use based on pedagogical approaches could be due to the perceived affordances of the user. According to Osborne et al. (2013), any object has multiple affordances that allow for alignment with specific pedagogic requirements; furthermore,

affordances are personal and relational, allowing for individuals to select from multiple technologies. Therefore, faculty could be interpreting the tools differently and not aligning it with their pedagogical needs.

Finally, it was found that both the online and face-to-face course delivery mode had a statistically significant impact on faculty LMS use. When faculty were teaching courses in a fully online setting, they were more likely to use learning, communication and collaboration, assessment, and content creation and delivery tools. Conversely, for courses that were taught in a face-to-face setting, faculty were less likely to use LMS tools in the learning, communication and collaboration, assessment, and content creation and delivery categories. The differences between the frequency of tool use between these two course delivery modes can be attributed to the fact that technology is not required for teaching and learning in a face-to-face setting and, therefore, could be ignored or used only for leisure (Jonassen et al., 1994; Gros et al., 2012).

Research Findings for Research Question Three

This section describes the findings for the third research question of this study which focused on determining how faculty were using LMS tools. Prior to this study, an affordance analysis was conducted to determine what the tools within the Blackboard Learn LMS afforded to the users (Walters, 2019). This research question sought to determine how instructors were using the tools within Blackboard Learn and if these uses matched with those found in the affordance analysis. The overall findings from this study yielded that the tools were being used in conjunction with their affordances. This section

describes the specific ways in which some of these tools are used in concurrence with their identified affordances.

Administrative Tools

Administrative tools fluctuated the least in how they were implemented, and all matched the affordances identified in the affordance analysis conducted by Walters (2019). The syllabus feature was used to share the syllabus with learners, course copy was used to duplicate a course, or part of a course, and bring it to another course to make edits and tweaks as needed, calendar was uploaded to provide learners with important dates, and the attendance feature to track which learners were attending class.

Assessment Tools

The assessment tools that yielded findings from the data analysis included assignments, tests, rubrics, Kaltura, and item analysis. Assignments and tests were both used to monitor student learning and included multiple options for question types and assessments (Kitsantas & Dabbagh, 2010). For example, participants shared that they used tests to incorporate shorter quizzes at a more regular cadence and therefore allow for more check-ins and data points on how well learners are understanding and retaining course content. This matches the findings of Willis and Cifuentes (2005) that online assessments and submitted products are used to measure the transfer of acquired skills. These tests and quizzes were also implemented by participants as “low stakes” assignments, further implying that they use this tool to measure how well the learners are developing the knowledge presented throughout the course. Moreover, participants shared using assessment tools when integrating a differentiated instruction pedagogical

approach. This approach was implemented to provide additional help or intervention services when they noticed a learner did not score well on a quiz or test.

Assignments were predominately used by faculty to assign tasks to learners, track learner growth and their ability to meet learning objectives, and provide space for learners to upload assignments, as identified by the learning objectives, aligning with the affordances that were identified by the affordance analysis (Walters, 2019). An additional affordance of the assignments feature, as identified by the findings of this study, was the ability to link a due date to assignments to ensure that learners submit the assignment on time. This provides the instructors the ability to easily see when assignments are late and, thus, adjust the grade when applicable. This aligns with Walker et al.'s (2016) finding that faculty liked the benefit of collecting assignments directly in the LMS. Kaltura was a tool used by some participants to present assignments to learners. The most common way this tool was used was to embed questions about the content within Kaltura to check for learner understanding. Rubrics were identified to ensure fair assessment of learners' growth and knowledge of course content in the affordance analysis (Walters, 2019) and faculty were using the rubrics in conjunction with these affordances. Furthermore, participants shared that the rubrics provided learners transparency on how they would be graded on assignments. Rubrics were used extensively by many of the participants and were linked to assignments, discussion board posts, blogs, and journals. According to the participants of this study, rubrics were shared using the rubric feature in Blackboard Learn or by the instructor uploading a PDF version of the rubric. Finally, the item analysis tool was identified, by both the affordance analysis and focus group data, to

analyze assessment questions for their ability to measure against the learning objectives. Participants used item analysis to check for discrimination, gauge difficulty, identify heavily missed questions, and provide insight on whether questions were worded poorly.

The use of these tools in alignment with their pedagogical affordances can be attributed to the perceived task-to-technology fit of the faculty members. McGill et al. (2011) found that the better fit that an LMS has to the skills an instructor possesses, as well as the task they are trying to complete, the more positive feedback an instructor will have on using that tool. In other words, if the tool meets their needs and is something they know how to use, they will be more likely to use it. The findings from this study did not reveal any lack of knowledge surrounding how to use assessment tools. Furthermore, the affordances of the assessment tools leave little room for interpretation, which would further explain why the tools are being used as intended.

Communication and Collaboration Tools

The communication and collaboration tools that were used most by the participants in this study were discussion board, announcements, and Blackboard Collaborate. Unlike administrative and assessment tools, there was some variation in the way these tools were implemented. However, all the different uses fell within the affordances of communication and collaboration tools.

The main themes that emerged for how discussion boards were used were to provide space for learners to answer prompts, complete group work, build a sense of community amongst learners and engage in peer reviews. When using discussion boards to answer prompts, the participants shared that they implemented prompts that would

avoid surface-level interactions that would, in turn, generate variation between responses. Examples of prompts that were used by the participants in this study included asking learners to describe their understanding of different financial statements, solve problems with an emphasis on the process from which they engaged, connect intelligence theories with real life examples, and respond to case studies. Dabbagh et al. (2019) posited that for communication and collaborative tools to be effective they need to be leveraged by instructors to promote constructive, cooperative, authentic, intentional, and active learning. The types of prompts that faculty were using align with this belief. Providing a space for group work was another common use for discussion boards. According to Kitsantas and Dabbagh (2010) and Dabbagh et al. (2019), the communication and collaborative tools include discussion forms and group workspaces. By using the discussion boards as a space for group work, the participants are meeting this requirement. Building a sense of community was another theme that emerged from how participants used discussion boards. Participants wanted to provide a space for learners to ask questions, talk about desired topics without worrying that it will count towards their grade, share special events, discuss how they work with clients and different approaches they implemented based on client needs, and vent when needed. Finally, discussion boards were also used by the participants to provide a space for learners to engage in peer reviews. This allowed learners to get feedback on their work from one another and have access to different perspectives and ideas. All these forms of implementation align with the affordances identified by the affordance analysis which found that discussion boards provide a space for communication amongst learners, distribution of learning, and

construction of knowledge (Walters, 2019). Asamoah and Oheneba-Sakyi (2017) yielded similar findings in their study when they found that instructors provided the learners with a social interaction platform that activated learning opportunities and facilitated knowledge building of the learners. While faculty members could engage with the students through communication and collaboration tools, they predominately created opportunities for learner-learner interaction, meaning that the tools were used to provide a space for peer interaction and group work, without the presence of the instructor (Moore, 1989).

Announcements afford instructors the ability to communicate with learners and the findings from this study revealed that participant use of the announcements feature aligned with this affordance (Walters, 2019). Participants shared that they used the announcement tool to provide learners with necessary details about the course. These details included notifying learners when a course has been opened, reminding students to check the course syllabus or of impeding deadlines, sharing the content and expectations for the week, and providing details around why grading may be delayed. Again, the findings from this study mirror those from Asamoash and Oheneba-Sakyi (2017), in that the announcement tool was used to provide information to learners and alert them to visit resource tools. The announcements feature highlights the implementation of the learner-tutor interaction where the teacher is communicating with the learner (Moore, 1989).

Lastly, Blackboard Collaborate was identified as a tool that afforded video interaction and the presentation of course material, synchronously. The findings from this study matched those of the affordance analysis (Walters, 2019) in that participants used it

as a replacement for the face-to-face setting approach to sharing content with learners. This finding is likely due to the face that there was a good representation of instructors who were teaching online courses in the focus groups. Additionally, Blackboard Collaborate was also used for small group discussions. While these implementations still matched the affordance of synchronous video interaction, the instructor was not leading or presenting during these interactions. This, like discussion boards, mirrors the use of the learner-learner component of Moore's (1989) interaction model where the focus is allowing students the opportunity to engage with, and learn from, one another.

Content Creation and Delivery

Content creation and delivery tools were being used by the participants as a repository of course content and information. These uses align with the affordances identified by the affordance analysis conducted by Walters (2019). While files, content area, folders, WebLinks, and item were all identified as being used by the participants, there was not much variation between how these tools were being used. However, findings from this study revealed variation in how participants structured their content. For example, it was found that folders were used to chunk content by week and modules to chunk content by concepts. Furthermore, when content creation and delivery tools were used by those implementing a cognitivist epistemological belief, they structured the content in a way that they perceived the learners would best process the subject matter. This corresponds with the findings of Nagowah and Nagowah (2009) that cognitivists emphasize the internal process of the learner during the learning process. Additionally,

when implementing an experiential pedagogical approach, participants designated each module to a stage in a career path that they wanted students to emulate.

It is also important to note that WebLinks, in the literature review, was categorized as a learning tool (Kitsantas & Dabbagh, 2010; Dabbagh et al., 2019). Yet, it was re-categorized as a content creation and delivery tool based on the findings from this study. The participants from this study revealed that they did not use WebLinks as an advanced search tool for learners, but rather to provide students with links to external content pre-determined by the instructor. While these findings contradict those of Kitsantas & Dabbagh (2010) and Dabbagh et al. (2019) for this particular tool, further research would need to be conducted to warrant formal reclassification of the tool. However, it can be inferred that, for some of the participants, the content creation and delivery tools were used to facilitate learners' learning by providing a multitude of content for them to leverage in conjunction with building problem-solving skills to be used in the real world (Asamoah & Oheneba-Sakyi, 2017).

Learning Tools

The findings from this study yielded some use of journals, blogs, and VoiceThread. Overall, journals and blogs were used in accordance with their affordances, however, VoiceThread was not. According to the affordance analysis of Blackboard Learn, journals and blogs both provide a space for learners to share their learning and ask questions about content (Walters, 2019). Where they differ is with whom those things are shared. For example, journals are only seen by the instructor, while blogs can be seen and commented on by all learners within a course. Therefore, journals afford interactions

between the learner and instructor and blogs afford interactions between learner and instructor and learners with other learners. Participants were using journals and blogs in alignment with these affordances. Journals were being used to provide a space for learners to work on research proposals and/or build on theories over the course of a semester. Additionally, learners can share how they are incorporating what they learn. Blogs were used by faculty to provide a space for learners to share knowledge growth and build towards final assignments. Additionally, blogs were implemented by faculty so that students can share with other students what they learned from professional development opportunities; this approach gives learners more ownership over the topics than that of discussion board functionality. The findings from this study mirrored previous research that blogs and journals can be used for learners to self-reflect (Osborne et al., 2013).

VoiceThread was identified, by the affordance analysis, as a tool that provides learners a space to share their learning and learn from one another. The findings from this research do not match the findings from the affordance analysis conducted by Walters (2019). According to the findings from this study, VoiceThread was used as a way to share slides and videos created by the instructor with the learners. In other words, the tool was used more as a content creation and delivery tool than a learning tool.

Summary of Findings for Research Question Three

The overall findings for this research question revealed that the LMS tools are being used by the faculty in accordance with their affordances. Administrative tools are being used for student management, assessment tools to track learner growth,

communication and collaboration tools to facilitate communication and collaboration in an educational setting, content creation and delivery tools to disseminate content to students, and learning tools to provide a space for learners to build on and present their learning. VoiceThread was the only tool that was found to be used outside of its identified affordance. Additionally, there was some variation in how participants were implementing the folder and module tools with the content creation and delivery category. This variation can be attributed to their implementation of specific epistemological beliefs and pedagogical approaches.

Research Findings for Research Question Four

The final research question of this study sought to determine why faculty members choose to use the tools within Blackboard Learn. Data from the focus group discussion was analyzed and produced five overall themes. The focus group participants chose to use specific tools because (a) the tools made tasks easier for them, (b) improved the learners' user experience, (c) provided students the information they needed for a course, (d) provided multiple options for how they could implement the tools, and (e) increased the learners' interactions and ability to construct their knowledge and/or learn from one another. Furthermore, the findings revealed that participants were actively deciding not to use tools within Blackboard Learn. There were four themes identified as to why, including (a) lack of knowledge or experience, (b) Blackboard Learn structure and weaknesses, (c) similar tools used outside of Blackboard Learn, and (d) hard to use tools to match epistemological beliefs. Both sets of these will be discussed in the subsequent sections below.

Make Tasks Easier for the Instructor

Griffin and Rankine (2010) found that LMSs afford time-saving efficiencies for instructors with assessment, communication and collaboration, and content creation and delivery. The same findings emerged from this study. For assessment tools, participants shared that they used quizzes and tests in the LMS because of the ease of grading, as it reduces the amount of time they would have spent grading them by hand. Furthermore, as previously mentioned, several participants chose to use the assignment feature in Blackboard Learn because of the ability to implement a cut-off time for submissions and easily detect late assignments. As for communication and collaboration tools, participants highlighted how easy it was to send any announcements directly to the learners' email addresses, thus saving them time from having to compile an additional email for those students who do not check Blackboard Learn regularly. Additionally, participants appreciated the ability to pre-deploy announcements in the beginning of the semester and adjust them, as needed, throughout. These findings align with the finding by Griffin and Rankine (2010) that communication and collaboration tools afford for communications between the instructor and student. Finally, some of the participants chose to use Blackboard Collaborate because the recorded sessions are automatically stored within Blackboard Learn without any additional work necessary on their part.

Findings also revealed that participants used content creation and delivery tools regularly to quickly share resources pertaining to the course content in Blackboard. According to Griffin and Rankine (2010), the most time-saving efficiency afforded by LMSs is the ability to source, reuse, and refresh unit components. This was also found in

this study when participants shared using course copy often, to either copy an entire course or specific modules from a course. Additionally, course copy was one of the most used tools by all 205 participants with 63.5% reporting that they use course copy *often* or *always.* Overall, these findings align with the task-to-technology (TTF) framework and research finding that LMSs afford improvements in productivity for instructors (McGill et al., 2011).

Improve Learners' User Experience

According to Borboa et al. (2014), students hold positive views toward technology tools, use them frequently, and believe that they enhance learning. Findings from this study revealed that faculty chose to use the tools they did to improve the learners' user experience. With LMSs being a universally used technology tool in higher education, Chaw et al. (2017) studied the expectations that students have for LMSs and found that students expect instructors to follow a consistent structure when organizing content for courses. This could include the streamlining of content. Participants in this study chose to use Blackboard Collaborate so that students would not have to go outside of Blackboard Learn to access any class materials, including the live sessions. According to Chaw et al. (2017), students also shared that they prefer when instructors use Blackboard Learn because they like to have all of their courses in one place. This supports why participants in this study chose to use the folders and modules tool, to ensure consistent structure and organization of the content for learners. This also ties to the cognitivist epistemology and the practice of grouping content in a way that the instructors perceive the students will best digest the information, as previously discussed.

Learners rated assignments and online test and quizzes highly in their LMS (Borboa et al., 2014). To that end, participants chose to use these tools in an effort to improve the learner experience. For example, by using the assignment feature, it reduced the risk of learners losing any assignments or forgetting to include a page. Tests and quizzes were identified, above, as making things easier for the instructor but were also used for the learners' benefit. For example, participants used the tools to provide automatic feedback to the learners, allow multiple attempts on tests and quizzes so students had an opportunity to achieve mastery, and opted for shorter quizzes as opposed to longer exams to reduce the amount of content the students needed to study prior to assessments.

Provide Learners the Information They Need for a Course

Instructors chose to use tools within Blackboard Learn to provide the learners the information that they need for the course. This includes content around both the course materials and logistical information. Tools such as announcements, rubrics, and those within the content creation and delivery category, were used by the participants to meet these needs. Participants reported using the announcements feature to provide information and updates about the course and provide document design details to help students with assignments. This provides an avenue for the instructor to proactively inform students about aspects of the course (Griffin and Rankine, 2010). Rubrics were also identified by many participants as a way to be transparent with learners about how they will be graded on assignments, inclusive of discussion boards and blogs. Finally, as previously mentioned, participants shared that Blackboard Learn is a repository of the

course content for learners to access. According to Chaw et al. (2017), learners also reported that they expect LMSs to allow easy access to learning materials and rated the announcement feature as high. The findings from this study suggest that the participants are making the effort to meet these expectations. Furthermore, when considering Moore's (1989) online interaction model, this theme highlights the faculty's focus on providing students with the opportunity for learner-content interaction. This interaction refers to the interaction that the student has with the course material (Moore, 1989).

Provide Multiple Options for How to Use the Tools

According to Gibson (1979), tools such a LMSs have certain affordances, or possibilities for action, that lead those using it to act based on their perceptions of these affordances. Additionally, Miduser (2015) stated that LMSs are complex systems comprised of multiple components and processes that influence pedagogical developments through the lens of the theory of affordances. These two ideas combined explain why participants appreciated the ability to use some of the tools in different ways. For example, as was described in how participants used discussion boards, it was found that they were used to present prompts to learners, build a sense of community amongst students, and provide a space for peer reviews and group work. Additionally, it was found that they enjoyed the freedom of being able to send announcements as written communication or through a recorded video. Furthermore, participants appreciated the ability to make the decision around how they implemented modules and folders, with some presenting content by week and others by concept, for example.

Increase Student Interaction and Ability to Construct Knowledge and Learn From Each Other

The final theme to emerge for why participants chose to use the tools within Blackboard Learn was to increase the interaction amongst the students and increase their ability to construct knowledge and learn from one another. This is evidenced through participant use of discussion boards, blogs, and journals. For example, participants implemented blogs and journals to allow learners to build upon and construct their knowledge, because it affords students the ability to share their aggregated learning. This is supported by Dabbagh et al. (2019), when they posited that tools such as these have affordances that allow for knowledge representation, and that support organization and synthesis. Furthermore, blogs can be read and commented on by other learners, which is a big reason why instructors chose to use blogs over journals. They wanted to provide not only a space to build on knowledge but also for that construction of knowledge to be shared with others, thus affording the students the opportunity to learn from each other.

Another way in which participants increased student interaction was through discussion boards. Discussion boards facilitate communication and collaboration in an educational setting and can help reduce isolation amongst leaners (Caladine et al., 2010). This explains why participants shared using the discussion board tool to not only answer prompts surrounding the content, but also to build community by allowing discussion boards to be used as an open forum for students to vent, engage with each other's research, and share upcoming events.

Reasons for the Nonuse of Tools Within Blackboard Learn

The findings of this study also revealed that participants felt that some Blackboard Learn tools were not conducive to presenting a course the way in which they would want. This aligns with Steel's (2009) argument that teachers need to see the connection between the affordances of a technology and their belief system. As previously mentioned, four overarching themes were identified from the focus group discussions centered around the nonuse of tools within Blackboard Learn. Each theme is discussed in further detail throughout the remainder of this section.

Lack of Knowledge or Experience. Gautreau (2011) found that level of experience with an LMS was significant in determining the utilization of the LMS. Approximately 27% of the participants in the study have less than five years of experience with Blackboard Learn, and an additional 33% have five to ten years of experience. Furthermore, McGill et al. (2011) found that the better fit of an LMS to the skills of an instructor and the tasks that the instructor must complete, the more positive effects on the instructor's ability to use the LMS. These two findings align with those from this study. Many participants shared that they were unaware of the existence of and/or how to use some of the tools within Blackboard Learn. Additionally, it was found that faculty do not have the time to try and figure out how to use the tools within the LMS on their own. This aligns with the findings from Ørngreen et al. (2019) that faculty felt alone when designing their courses using LMS. Ørngreen et al. (2019) also found that faculty were not always aware of the benefits of using the LMS beyond the dissemination of information because they usually met up with their students on campus on a regular basis. This study revealed similar findings in that LMSs are not needed for face-to-face

courses because all of the important information and content can be directly shared with students during in-person class sessions.

Blackboard Learn Structure and Weaknesses. Participants used the words unintuitive, clunky, and hierarchal, to describe Blackboard Learn. This could be causing faculty to miss the affordances of the tools with Blackboard Learn because they are fighting with the design of the LMS. While this study did reveal that many of the tools were being used in accordance with their affordances, this could explain the limited use of some of the tools, particularly those classified as learning tools (Table 49). This is supported by Park and Song's (2015) finding that many user interfaces have been developed with a focus on a design approach that does not pay attention to affordances. The hierarchal design of LMSs, and its top-down nature, was identified by learners in another study as a contributing factor for their struggles with the interface (Witte, 2018). Faculty members from this study shared their frustrations with attempting to implement some LMS tools and inevitably giving up because of difficulties with figuring out how to use the tool, and not being able to see the learner view. Participants also referenced weaknesses in tool functions such as grading and providing feedback within Blackboard Learn, interacting with learner blog posts, developing quizzes, editing audio and video files, and transferring grades out of Blackboard Learn into the University's grading system. As a result, these participants chose to not use tools within Blackboard Learn to accomplish these tasks. This aligns with the findings of DeLone & McLean (2003) that the nature, quality, and appropriateness of LMS use are important to the successful implementation of an LMS. If these things are not present, the key factors needed to

benefit learners are not present and it does not matter how often an LMS is used. Therefore, if faculty do not find the structure within the LMS to meet their needs they will be less likely to use the tools within. This can subsequently lead to the use of other tools, which is discussed in the next section.

Similar Tools Used Outside of Blackboard Learn. Gautreau (2011) found that faculty will apply available resources to enhance their instruction and meet the needs of learners. This, and the perceived weaknesses of Blackboard Learn, have led to many participants opting to use resources outside of the LMS. Additionally, Fathema et al. (2015) found that faculty members place emphasis on quality issues, and according to the faculty in this study, there were tools outside of Blackboard Learn that they believed to be of higher quality. One example was the use of Zoom. Many of the participants opt to use Zoom as opposed to Blackboard Collaborate. For the participants who chose to use Zoom, they felt the overall user experience of Zoom outweighed that of Blackboard Collaborate. Participants also chose to use Google Suite tools because learners felt more comfortable in those tools, it enhanced discussion amongst the learners, was easier to provide feedback through, and provided for seamless collaboration between learners and groups.

Hard to Use Tools to Match Epistemological Beliefs. The final reason as to why participants shared not using tools within Blackboard Learn was because the tools do not allow for the implementation of their epistemological beliefs. Participants shared that they explicitly chose not to use the LMS for some things because they do not think that the LMS provides what they need to implement their style of teaching. This aligns

with Steel's (2009) findings that if teachers do not perceive the technology to be supportive of their pedagogical approach, they may choose not to use it. Additionally, Steel's research (2009) posited that many university teachers struggle to use LMSs to create learning designs that are truly engaging and that LMSs are built as a one-size-fits-all tech solution, which may not be appropriate for all teachers' intentions. Ali et al. (2015) also found that most LMSs are designed with traditional lecture-based instruction in mind and, therefore, are not intrinsically conducive to a learner-centered approach. It can be inferred that because of the traditional lecture-based design, it would also lead to difficulty for faculty to implement a learner-centered epistemology. With 89% of focus group participants identifying as believing mostly in a constructivist epistemology, it is logical as to why they identified their epistemological belief as a reason for nonuse of the LMS.

Summary of Findings for Research Question Four

Overall, the findings from the final research question yielded that participants are choosing to use the tools for five reasons, (a) the tools made tasks easier for them, (b) improved the learners' user experience, (c) provided students the information they needed for a course, (d) provided multiple options for how they could implement the tools, and (e) increased the learners' interactions and ability to construct their knowledge and/or learn from one another. It was also found that there were multiple reasons as to why participants are choosing not to use the LMS. These were the lack of knowledge or experience of the participants, the weakness of the structure and tools within Blackboard

Learn, the availability of similar tools used outside of Blackboard Learn, and that it is hard to use the tools within the LMS in accordance with their epistemological beliefs.

Implications of this Study

This research study contributes to the knowledge body of how LMSs are being used by faculty in higher education by offering empirical evidence and information on how it is being used by faculty at a northeastern American university. The contributions of this research study are among the first to examine the influence that epistemological beliefs, pedagogical approaches, and course delivery modes have on faculty use of LMSs. It is also among the first to explore specifically how and why faculty are using the tools within LMSs. This study compared the findings from both survey responses and focus group discussions and represents an expanded investigation based on recommendations and knowledge gaps identified in prior research.

University administrators can use the findings of this research to assist with the decision-making process of selecting an LMS for an institution. This study revealed that while there are some tools being heavily used by faculty, there are also tools that are not being used often by faculty. The nonuse of tools could lead universities to decide on an LMS that does not offer as many tools while still providing the option to use tools that are used more often by faculty. For example, it was found that syllabus, announcements, assignments, course copy, tests, discussions, files, content area, folders, Weblinks, and item were used most often by the faculty. Administration can focus on finding an LMS that provides these tools for faculty use; conversely, they do not need to focus so much on the other tools. Furthermore, university administration can use the feedback about the

structure of the LMS to assist with the selection of an appropriate LMS for its faculty and students.

University administration can also use this study to provide context on how to ensure LMSs are used in a more holistic way to enable student engagement, learning interactions, and flexibles pedagogies. This information can be used to align their implementation and expectations for faculty use of the LMS. This information can also be used to communicate with faculty members about these expectations. In addition to communication, the results of this study can also be used to identify and provide training opportunities for faculty. This study revealed that many faculty members were unaware of some of the tools within the LMS and that they did not have the time to figure out how to use them on their own. The tools within the learning category, including journals, blogs, VoiceThread, and portfolio, were amongst the tools most unused and unknown by faculty. This data reveals a big knowledge gap for faculty members and therefore indicates that training should be provided to them. Furthermore, many of the tools that participants were using frequently, were the tools that the University had previously provided training for, thus demonstrating that the previous training the University has conducted has impacted faculty's use of the LMS.

Designers can use the findings of this study to inform their user experience (UX) design and human-centered interaction (HCI) design, as the findings of this study revealed some shortcomings of both the UX and HCI design of the Blackboard Learn LMS. This study uncovered that users found the LMS to be unintuitive, hierarchal, and clunky. It was also found that there are too many features and that these features have not

been successful in improving the user experience because of a lack of connectivity and intuitiveness. This information can be implemented into the creation of new LMSs or in updating pre-existing LMSs. Furthermore, the findings of this study highlight the need for LMS designers to elicit feedback from their users throughout the design process.

Finally, this study can be used to inform faculty on the pedagogical affordances of LMSs and how they align with their epistemological beliefs and pedagogical approaches. This study unveiled that many faculty members were unaware of the pedagogical affordances of the tools within the LMS. This study provides context around the different categories of tools and how they can be aligned with their epistemological beliefs and pedagogical approaches. Furthermore, by seeing how other faculty members are implementing the use of some of these tools in their courses, they can make connections on how they can transition those uses into their own courses. This has already been started through the focus groups as participants shared that they planned on trying some new tools because of how they heard their colleagues were integrating them into their courses.

Further Research Considerations

Research in LMS use has been conducted, however is still in its infancy as far as how it is influenced by epistemological beliefs, pedagogical approaches, and the delivery mode of a course. While it is recommended that explorations around these things continue, there were also some additional findings from this research study and the literature review that should shape future research. The following are some of those recommendations:

1. The findings from this study revealed that there is a need for more training around LMSs and how faculty members can use the tools in conjunction with their epistemological beliefs and pedagogical approaches. Research should be conducted to further explore what training is currently being provided and where there are gaps. Furthermore, the research can look into how successful existing trainings have been and the learning preferences of faculty members who are looking to implement more tools in their LMS use.
2. The focus group discussions from this study sometimes alluded to the size of the class having an impact on what tools were used by faculty, and how and why those tools were being used. Further exploration should be conducted to determine how class size has an impact on LMS use.
3. This study focused on faculty use at one university that implemented the use of Blackboard Learn. Additional research on different LMSs could yield different results, and better inform on the affordances within different LMSs. Furthermore, it could provide a greater opportunity for generalization around the impacts of the constructs from this study.
4. A deeper dive should be conducted on how epistemological beliefs and pedagogical approaches impact LMS use. The focus group participants from this study predominately identified as constructivists, therefore, there was not enough representation of cognitivist and objectivist, nor were the pedagogical approaches that are aligned with those beliefs well represented.

5. There was a gap in this study around how hybrid courses impact LMS use. Further research needs to be conducted to understand the impact this course delivery mode has on LMS use.
6. This study took place during the COVID19 pandemic and therefore included faculty members who were forced to teach online when they normally were teaching in mostly face-to-face environments. Some of the participants referred to their current experiences leading them to consider using the LMS in a different way, even when things return back to how they were prior to the pandemic. Research should be conducted to determine the long-lasting impact of the pandemic on faculty's use of LMSs.
7. As innovations with technology continue to be implemented, LMSs will likely change. Continuous research will need to be conducted to continue to understand how LMSs are being used by faculty and how they can be leveraged within higher education.

Limitations

In this research study, seven limitations were identified that could limit the generalizability of the findings. First, convenience sampling was used to choose the participants in this study. This resulted in focusing on faculty members at one university and therefore findings cannot be generalized for all faculty members at the higher education level. This is due to the fact that the resources available at one university may not match those at others. Secondly, the focus group members were mostly made up of faculty members who identified as having a constructivist epistemological belief.

Therefore, the focus group findings are mostly representative of those with a constructivist belief. Third, this research study only focused on the use of one LMS, Blackboard Learn. Blackboard Learn has different tools with different affordances and, therefore, the findings cannot be generalized for all LMSs. Fourth, this study is limited to time and is cross-sectional, meaning its findings could be tied to the time at which the research was conducted. This is heightened by the fact that during this time there was a global pandemic, and many faculty members were being forced to use the LMS for the first time, or in different ways than they had in the past. Fifth, there was low representation of the use of certain constructs in the participant field. This included representation and discussion around a hybrid course delivery mode, and the explicit discussion surrounding the implementation of direct instruction. Sixth, the DDA findings were not statistically significant for experiential and kinesthetic learning therefore no triangulation of findings for these pedagogical approaches could be found. Finally, the findings from this study were self-reported and some participants may have a greater interest in the content, which may have led to biased research results.

Conclusions

This is the final chapter and concludes this research study. It presented a brief overview of the study, discussed the research study findings and achievements, and highlighted the contribution implications this study has offered. This chapter also reported the recommendations for future work and identified the limitations of the study. This study has added to the literature surrounded LMS use and pedagogical affordances. To conclude, the findings of this study revealed that epistemological beliefs, some

pedagogical affordances, and the delivery mode of a course all impact the frequency of tool use by category in the Blackboard Learn LMS. Furthermore, this study revealed more information about how and why faculty members were using the tools within the LMS. Finally, the study revealed that faculty members were choosing not to use certain tools within the Blackboard Learn LMS.

Appendix A

Pedagogical Affordance and Categorization Theme of LMS Tools

Tool Name	**LMS Definition of Tool**	**Technology Categorization Theme**	**Pedagogical Affordance**
Bulk Delete	Instructor can select the materials they want to bulk delete and keep the rest for use in the future.	Administrative	Delete content and save course information
Building Block	Building Blocks are one means of extending the capabilities of Learn either by adding functionality or by integrating with external resources and services.	Administrative	
Calendar	Located in both Global Navigation and Course Tools. The calendar displays a consolidated view of all institution, course, organization, and personal calendar events. User can view events by day, week, or month andcan use the course calendar to provide students with dates for course-related events.	Administrative, Communication & Collaboration	Track course milestones, Communicate important dates to learners
Archive (within a course)	Archive Course creates a permanent record of a course including all the content and user interactions available at the time the Archive is initiated.	Administrative	Save course information
Auto Archive	Feature that automatically archives active courses on Blackboard Learn client sites.	Administrative	Save course information

Attendance	(See Qwickly Attendance)	Administrative	Track learner attendance
Contacts	Use the Contacts tool to add profile information about instructor and other staff for student use.	Administrative	Access learners' information, Access contact information
Course Copy	Course Copy can also make a copy of some of the materials and create a new course or add the materials to an existing course.	Administrative	Copy an old course
Course Link (linking to other parts of the course)	A Link is a shortcut to an area, a tool, or an item.	Administrative	Provide quick access to other areas/content in the course
Course Menu	Course Menu	Administrative	Provide quick access to areas of the course
Date Management	Update content dates when copying or restoring a course from a previous term or calendar year.	Administrative	Provide class schedule to learners, access to class schedule
Direct Submit (SafeAssign)	Directly submitting assignment or text to SafeAssign	Administrative	Check for academic honesty
Dividers and Subheaders	For making sections on the course menu	Administrative	Provide quick access to sections of the course, Divide course content up by concepts
Export	Export creates a package of course content for reuse.	Administrative	
Guest Access	Guest Access provides limited course access to view course materials in specifically designated content areas.	Administrative	Allows others to view course
Help	Help	Administrative	Access help using Blackboard
Import Package	A course import package is a ZIP file of exported course content.	Administrative	Upload saved courses/content to a new course

Lesson Plan	Lesson Plans hold lesson profiles, instructional objectives, and the content items students need to complete a lesson.	Administrative	Organize course content
Math Editor	Part of the text editor	Administrative	Edit/update text in course
My Grades	A page where students view grades for each assignment, test, and activity in their courses.	Administrative	Access to grades
myMason* / Course List *GMU specific name	Course List. Lists all courses that instructor is assigned to.	Administrative	Access to courses
OneDrive	Cloud Storage	Administrative	Store content
Portfolio Assignment		Administrative	Assign formal/summative assessment to students
Profile	Set up your profile in the My Blackboard menu	Administrative	Create and share a personal profile
Properties	Properties control the functional settings of the course	Administrative	Control settings of the course
Qwickly Attendance	Third party attendance tool	Administrative	Track learner attendance
Respondus LockDown Browser	Assessment Security	Administrative	
SafeAssign	Plagiarism tool	Administrative	Ensure students are following academic code of conduct
Student Preview	Allows instructor to become a student in their own course	Administrative	Allows instructors to view course as a student
Suggest URL	Suggest a new URL (website) as a SafeAssign service match lookup source.	Administrative	

Teaching Style	Course style options allow instructor to control the appearance, theme, course menu style and layout, content appearance, course entry point, and the banner image for a course.	Administrative	Organize course to personal preferences
Tasks	Use the Tasks tool to organize projects, define task priority, and track students' task status.	Administrative	
Tests - Delete		Administrative	Remove old assessments/ tests
Tests - Copy		Administrative	Copy an assessment
Tests Options	Test Options control the instructions, availability, due dates, feedback, self-assessment and presentation of the test.	Administrative	Control the settings of an assessment
Test Canvas Page / Test Question Settings	Test question Settings	Administrative	Control the settings of an assessment
TK20		Administrative	Assignment tracking for institution
Tools Area	Lists all available tools in course	Administrative	Access to Blackboard tools
Tool Availability	Control which tools are available in a course	Administrative	Control the tool settings for learners
Users	List of users in a course	Administrative	Access list of course participants
User Progress	The visibility and review status of content items for a specific user in a table	Administrative	Access learners' information, access contact information
WordPress CourseBlog		Administrative	Publish course
Adaptive Release	Use Adaptive Release to show the appropriate content, to select individuals at the appropriate time.	Administrative	Differentiate instruction

Anonymous Grading	Enable Anonymous Grading during the creation stage to eliminate grading bias for high-stake assignments.	Administrative, Assessment	Track learner growth/ability to meet learning objectives
Course Reports	Run Course Reports to view information about course usage and activity.	Administrative, Assessment	Pull data on course, analyze the learner utilization of course contents
Curve Grades	Instructors can choose to modify the student scores to equalize the scores.	Administrative, Assessment	Designate grades to learners, track learner growth/ability to meet learning objectives
Delegated Grading	Assign specific users in the course to grade particular sets of student assignment submissions.	Administrative, Assessment	Assign tasks to learners, allow learners to provide feedback on each other's work
Grade Center	To record scores and calculate midterm/final grades	Administrative, Assessment	Track learner grades, track learner growth/ability to meet learning objectives
Tests - Import	Only test packages created by the system can be imported.	Administrative, Assessment	Upload pre-existing assessments, tracker learner growth/ability to meet learning objectives
Needs Grading Page	The Needs Grading page helps instructor determine what needs attention first.	Administrative, Collaboration & Communication	Access to upcoming assignments, communicate to learners about assignments they need to complete
Home Page	Course module pages contain details about new content and due dates for the course being viewed .	Administrative, Communication & Collaboration	Quick access to more important course information, communicate important items to learners

Publisher - Content Integration	Publisher - Content Market, Pearson, McGraw Hill Education, Cengage, Macmillan Learning, Wiley Curriculm Pathways, Blackboard Open Content, OpenEdu	Administrative, Content Creation and Delivery	Share content from other publishers for courses
Visual Text Box Editor	With the editor, instructor can add and format text, attach files, embed multimedia, and insert equations, links, and tables.	Administrative, Content Creation and Delivery	Update course content, share course content with learners
Modules & Module Page	Modules contain information about what's happening in the courses, and user may be able to access commonly used tools.	Administrative, Content Creation and Delivery, Learning	Organize course content, provide course content by concept
Syllabus Builder	The Syllabus Builder provides a set of three text boxes and editable headings to organize information.	Administrative, Course Content and Delivery	Create and share course syllabus
Bookstore	Search for Textbook	Administrative, Learning	Provide space for learners to access required texts, provide space for learners to search for resources
Photo Roster	Photo Roster	Administrative	Provides roster of students with accompanying photo when applicable
Availability (course)	Available or Unavailable	Administrative	Provide access to the course
SCORM	Web-based learning content	Administrative	Make content accessible online
Retention Center	The Retention Center helps instructor discover which students in the course are at risk.	Administrative, Assessment	Track learners who may not be fulfilling course expectations
Learning Module	To present related pieces of course content. Studentmay	Administrative, Content Creation and	Groups content together based on concepts, share

	need to complete the module in a specific order. Has a table of contents.	Delivery, Learning	course content with learners
Date/Time Restrictions		Administrative	Give assignment and tasks due dates
Review Status	Review Status tracks user review of specific content items.	Assessment	Track user interaction with course content
Rubrics	Rubrics can help ensure consistent and impartial grading and help students focus on instructor expectations.	Assessment	Create rubrics to ensure fair assessment of learner growth and knowledge of course content
Achievements	An achievement is an indicator of an accomplishment, skill, competency, or interest students can achieve.	Assessment	Track learner growth/ability to meet learning objectives
Examity	Examity	Assessment	Track learner growth/ability to meet learning objectives
Goals	Instructors can align course content to one or multiple goals.	Assessment	Track learner growth/ability to meet learning objectives
Item Analysis	Item analysis provides statistics on overall test performance and individual questions.	Assessment	Analyze learners' performances
Mobile Compatible Test	Students are able to take certain tests and exams delivered through LMS on their Android and iOS devices.	Assessment	Increase course accessibility for learners, track learner growth/ability to meet learning objectives
Outcomes	For 9.1 and Ultra, see Goals	Assessment	Track learner growth/ability to meet learning objectives

Performance Dashboard	The Performance Dashboard shows types of user activity in the course or org	Assessment	Track learner interaction with course content and tools
Peer Review: Assignment	Self and Peer Assessments	Assessment	Track learner growth/ability to meet learning objective, peer reviews
Pools	Pools are sets of questions that can be added to any Test or Survey. Pools are useful for storing questions and reusing them in more than one Test or Survey.	Assessment	Store group of assessment questions
Self & Peer Assessment	Self and Peer Assessments can help distribute the workload and ensure that students receive feedback from several individuals.	Assessment	Track learner growth/ability to meet learning objectives, peer reviews
Set Review Status	Review Status tracks user review of specific content items.	Assessment	Track user interaction with course content
Survey	Surveys are not graded, and student responses are anonymous.	Assessment	Track learner growth/ability to meet learning objectives, track learner feedback
Test	Use tests and surveys to measure student knowledge, gauge progress, and gather information from students.	Assessment	Track learner growth/ability to meet learning objectives
Tests - Build	The Tests page stores all tests. Instructor can build a test from here.	Assessment	Create assessments
Tests - Item Analysis	Item analysis provides statistics on overall performance, test quality, and individual questions. This data helps instructors recognize questions that might be poor discriminators of student performance.	Assessment	Track learner growth/ability to meet learning objectives, analyze assessment questions/tools for ability to measure against the learning objectives

Test Questions	Reuse Questions: Find Questions, Reuse Question: Random Block, Reuse Question: Question Set, Upload Questions, Calculated Formula, Calculated Numeric, Either/Or, Essay, File Response, Fill in multiple blanks, Fill in the blank, Hot spot, Jumbled Sentence, Matching, Multiple Answer, Multiple Dropdowns, Text, Multiple Choice, Option Scale/Likert, Ordering, Quiz Bowl, Short Answer, True/False	Assessment	Track student growth/ability to meet learning objectives, create assessment questions
Turnitin	See SafeAssign	Assessment	
Inline Grading	Annotate and grade student files directly within the browser	Assessment Communication & Collaboration	Grade learner work, communicate feedback and/or needed changes/edits
Announcement	Announcements are a way to post time-sensitive information critical to course success.	Collaboration & Communication	Communicate to learners
Course Messages	Private and secure text-based communication that occurs within a course among course members.	Collaboration & Communication	Communication between instructor/learner, learner/learner
Notifications	Notifications are alerts that let the instructor know when events occur in their courses.	Collaboration & Communication	Alerts learner to important communications/tasks
Send Email	Send emails to others in the course without having to switch to an email provider.	Collaboration & Communication	Communication between instructor/learner, learner/learner
Banners	The banner (image) appears at the top of the course's entry point page.	Collaboration & Communicatio	Communicate to students, design course

		n, Administration	
Audio	Use Kaltura for uploading audio into a course or for feedback on assignments and assessments.	Collaboration & Communication, Assessments	Communicate feedback to learners
Video		Collaboration & Communication, Content Creation and Delivery	Present course content in a video format asynchronously, Communicate with learners
Collaborate	`	Collaboration & Communication, Content Creation and Delivery	Interact through video through the web, Present course content synchronously
Piazza	Piazza is a free online gathering place where students can ask, answer, and explore, under the guidance of their instructors.	Collaboration & Communication, Learning	
Discussion Board	A way to encourage students to think critically about the coursework and interact with each others' ideas	Collaboration & Communication, Learning	Communication amongst learners, distribution of learning amongst learners, construction of knowledge
Wikis	A Wiki is a collaborative tool that allows Students to contribute and modify one or more pages of course-related materials.	Collaboration & Communication, Learning	Collaboration amongst learners, presentation of what has been learned
Class Conversations	Enable class conversations on assignments, tests and content items. Students can now respond and reply to each other in conversations the same as they do in discussions.	Communication & Collaboration	Communication amongst learners

Groups	Create course Groups tool to create an interactive online environment.	Communication & Collaboration	Allows for groups of learners to work together on projects or share/build knowledge together
Content Area	Place to add content, assignments, tests, etc.	Content Creation and Delivery	Provide and organize content for learners
Content Folder	A Content Folder is a way of organizing content items.	Content Creation and Delivery	Provide and organize content for learners
Content Collection	To store, share, and publish content.	Content Creation and Delivery	Provide and organize content for learners
Content Packages (SCORM)	Web-based learning content (Shareable Content Object)	Content Creation and Delivery	Provide and organize content for learners
File	Use the File content type to add a file that can be selected and viewed as a page within the course	Content Creation and Delivery	Access to course content
Folder	A Content Folder is a way of organizing content items. Content Folders and sub-folders set up a hierarchy to group related material together.	Content Creation and Delivery	Provide and organize content for learners
Module	A module is a way of organizing content items.	Content Creation and Delivery	Provide and organize content for learners
Glossary	Add a glossary of terms to each of assigned course.	Content Creation and Delivery	Provide definitions of content terms to learners
Image	Upload an image file into a content area	Content Creation and Delivery	Share images relevant to course
Images option in a text box (Insert/Edit Image)	Embed an image in the text box or edit an existing selected image.	Content Creation and Delivery	Share images relevant to course
Import Course Cartridge	Course Cartridges are premade materials produced by professional authors,	Content Creation and Delivery	Share preexisting content that is

	editors, and publishers that can be downloaded and added to a course.		relevant to the course
Item	A content item is any type of file, text, image, or link that appears to users in a Content Area, Learning Module, Lesson Plan, or content folder.	Content Creation and Delivery	Provide quick access to course content
Kaltura	Video management system	Content Creation and Delivery	Create videos relevant to course
Library Subject Guide	Link to University Library	Content Creation and Delivery	Provides link to access content
Mashup	To link to Kaltura videos, YouTube videos, Flickr photos, and SlideShare presentations.	Content Creation and Delivery	Share media content from other places
Media Gallery	The Kaltura My Media library within Blackboard contains all media contributed by the user, regardless of the course.	Content Creation and Delivery	Share media content
Pearson MyLabs	Publisher	Content Creation and Delivery	Access to other content published by Pearson
Adaptive Release Advanced	With advanced adaptive release, an instructor can add multiple rules to a single content item.	Content Creation and Delivery & Administrative	Differentiate instruction, present content
Assignments	Assignments are a form of assessment that adds a column to the Grade Center.	Content Creation and Delivery, Administrative, Assessments	Assign tasks to students, track learner growth/ability to meet learning objectives, provide space for learners to upload assignments
Blank Page	Create a blank page and include files, images, and	Content Creation and	Provide course content, provide links to search

	text as a link in the content list.	Delivery, Learning	engines/tools for research
Content Market	A gateway for users to find and add external learning materials to their courses.	Content Creation and Delivery, Learning	Provide content to learners, provide a space for learners to search for resources and learners can share resources
Blogs	A personal online journal that is frequently updated and intended to share with others.	Content Creation and Delivery, Learning, Communication & Collaboration	Provide course content, provide space for learners to share their learning and learn from each other
Slide Share Presentations		Course Content and Delivery	Share content relevant to course
Spell Check (Content Editor)		Course Content and Delivery	Fix mistakes made in content
Tests - Export	In the Original Course View, instructor can export and import tests, surveys, and pools to use in other courses or share with other instructors.	Course Content and Delivery	Move course content to different courses
Lynda.com Course		Learning, Content Creation and Delivery	Provides access to other learning resources
VoiceThread	A place for students to build presentations, share videos, and interact around course content.	Learning	Provides learners a space to share their learning and learn from each other
Web Links	A Web Link is a shortcut to a Web resource.	Learning, Content Creation and Delivery	Provides access to other learning resources
YouTube Video		Learning, Content Creation and Delivery	Share content relevant to course, access needed information/resource

Portfolios	Portfolios offer a means to demonstrate formative and/or summative progress and achievement.	Learning	Presentation of learner knowledge gained
Journals	Journals are a personal space for students to communicate privately with the instructor	Learning, Communication & Collaboration	Provide an area for learners to share their knowledge, ask questions, and communicate with the instructor
LTI	LTI integrates externally hosted web-based learning tools into courses.		Depending on what is integrated this could fall into any category

Appendix B

Learning Management System Use Survey Sent to Participants

Blackboard Learn Use at George Mason University

Start of Block: Informed Consent

Q38 **INFORMED CONSENT**
RESEARCH PROCEDURES This research is being conducted to determine how faculty members' epistemological beliefs, pedagogical approaches, and course delivery mode influence learning management system use. If you agree to participate, you will be asked to agree to answering a survey that will take approximately 10 minutes. The responses to your survey will then be used to establish themes, identify focus group members, and further inform the focus group questions. The survey will be presented using Qualtrics.
RISKS There are no foreseeable risks for participating in this research.
BENEFITS There are no direct benefits to you for participating in this study. However, the findings from this study could lead to a deeper understanding in the field around the topic of course design using learning management systems in conjunction with faculty epistemological beliefs, pedagogical approaches, and course delivery mode.
CONFIDENTIALITY The data in this study will be confidential. No names will be used in the dissemination of the data gathered throughout this research. For coded identifiable data, the researcher will be the only individual with the knowledge that your responses have come from you as there will be no reference to names in the data. Identifiers may be removed from the data and the de-identified data could be used for future research without additional consent from participants. While it is understood that no computer transmission can be perfectly secure, reasonable efforts will be made to protect the confidentiality of your transmission.
The Institutional Review Board (IRB) committee that monitors research on human subjects may inspect study records during internal auditing procedures and are required to keep all information confidential.
PARTICIPATION Your participation is voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate or if you withdraw from the study, there is no penalty or loss of benefits to which you are otherwise entitled. There are no costs to you or any other party.
CONTACT This research is being conducted by Shea Walters at George Mason University. She may be reached at [redacted] for questions or to report a research-related problem. You may also contact Dr. Nada Dabbagh at [redacted] You may contact the George Mason University Institutional Review Board office at [redacted] if you have questions or comments regarding your rights as a participant in the research. The IRB Net numbers for this research is 1646079-1.

This research has been reviewed according to George Mason University procedures governing your participation in this research.

CONSENT

○ I have read this form, my questions have been answered by the research staff, and I agree to participate in this study. (1)

○ I do not agree to participate in this study. (2)

Skip To: End of Survey If INFORMED CONSENT RESEARCH PROCEDURES This research is being conducted to determine how faculty me... = I do not agree to participate in this study.

Page Break

End of Block: Informed Consent

Start of Block: Demographics

Q34 Thank you for agreeing to assist me with my dissertation research.

I know how valuable your time is and this survey should only take about 10 minutes.

Q3 Gender

- Male (1)
- Female (2)
- Non-binary (3)
- Prefer not to say (4)

Q5 Age

- 20-29 years (1)
- 30-39 years (3)
- 40-49 years (4)
- 50+ years (5)

Q27 Ethnicity

- ○ Hispanic/Latinx (2)
- ○ American Indian or Alaska Native (3)
- ○ Asian (4)
- ○ Black or African American (5)
- ○ Native Hawaiian or Other Pacific Islander (6)
- ○ White (7)
- ○ Two or More Races (8)
- ○ Race and Ethnicity Unknown (9)

Q1 How long have you been teaching in higher education?

- ○ Less than 5 years (6)
- ○ 5 - 10 years (7)
- ○ 10 - 15 years (8)
- ○ 15 - 20 years (9)
- ○ More than 20 years (10)

Q8 How long have you been a faculty member at George Mason University?

- ○ Less than 5 years (6)
- ○ 5 - 10 years (7)
- ○ 10 - 15 years (8)
- ○ 15 - 20 years (9)
- ○ More than 20 years (10)

Q35 Which best describes your position at Mason?

- ○ Full Professor (1)
- ○ Associate Professor (2)
- ○ Assistant Professor (3)
- ○ Instructor (4)
- ○ Lecturer (5)
- ○ Adjunct (6)
- ○ Other (7) _____

Q13 A what level are you currently teaching at George Mason University?

- ○ Undergraduate (1)
- ○ Graduate (2)
- ○ Both (3)

Q10 What school/college are you primarily affiliated with at Mason?

_____

Q34 Have you recently (within 2 years) used the Blackboard learning management system to support your teaching at Mason?

- Yes (1)
- No (2)

Skip To: End of Survey If Have you recently (within 2 years) used the Blackboard learning management system to support your... = No

Q11 Select a course to think about as you answer the questions in this survey; please provide the course number and subject (example, EDRS 811: Quantitative Methods).

_____

Q12 What is the typical delivery method of this course? (If you usually teach the course face-to-face and are currently teaching it online due to COVID, please answer the questions in this survey based on how you used Blackboard for the face-to-face delivery mode)

- Face-to-face (1)
- Hybrid (2)
- Fully online (3)

Q2 How long have you had experience with learning management systems (LMS) as an instructor? (any) Example: e.g. Canvas, Moodle, Desire2Learn, Blackboard, etc.)

- ○ Less than 5 years (6)
- ○ 5 - 10 years (7)
- ○ 10 - 15 years (8)
- ○ 15 -20 years (9)
- ○ More than 20 years (10)

Q4 How long have you had experience with the Blackboard LMS as an instructor?

- ○ Less than 5 years (6)
- ○ 5 - 10 years (7)
- ○ 10 - 15 years (8)
- ○ 15 -20 years (9)
- ○ More than 20 years (10)

Q32 Which epistemology do you most closely align with?

- ○ Constructivism: Learners generate their own rules and mental models through experience and reflection (1)
- ○ Objectivism: One true and correct reality that is passed from one to another (2)
- ○ Cognitivism: Knowledge is absolute and given but focus is on the internal processes of the learner (3)
- ○ Other (4) _____

Q33 How often to use you the following pedagogical approaches (teaching methods)?

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
Direct Instruction/Lecture (1)	○	○	○	○	○
Game-based learning (2)	○	○	○	○	○
Problem-based learning (4)	○	○	○	○	○
Experiential learning (5)	○	○	○	○	○
Flipped Classroom (6)	○	○	○	○	○
Kinesthetic/Hands-on Learning (7)	○	○	○	○	○
Differentiated Instruction (8)	○	○	○	○	○

Page Break

End of Block: Demographics

Start of Block: Administrative Tools

Q18 How often do you use the following administrative tools in Blackboard?

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
Calendar (1)	○	○	○	○	○
Contacts (2)	○	○	○	○	○
Course Copy (4)	○	○	○	○	○
Teaching Style (Interface) (5)	○	○	○	○	○
Tasks (6)	○	○	○	○	○
Sandbox (8)	○	○	○	○	○
Attendance (9)	○	○	○	○	○
Syllabus (10)	○	○	○	○	○

Q19 You answered "Never" on the following items, which best describes the reason?

	I'm aware of it, but don't use it (1)	Unaware of this feature (2)	Use a similar tool outside of Blackboard (3)
How often do you use the following administrative tools in Blackboard? = Calendar [Never] Calendar (1)	○	○	○
How often do you use the following administrative tools in Blackboard? = Contacts [Never] Contacts (2)	○	○	○
How often do you use the following administrative tools in Blackboard? = Course Copy [Never] Course Copy (4)	○	○	○
How often do you use the following administrative tools in Blackboard? = Teaching Style (Interface) [Never] Teaching Style (Interface) (5)	○	○	○
How often do you use the following administrative tools in Blackboard? = Tasks [Never] Tasks (6)	○	○	○
How often do you use the following administrative tools in Blackboard? = Sandbox [Never] Sandbox (8)	○	○	○
How often do you use the following administrative tools in Blackboard? = Attendance [Never] Attendance (9)	○	○	○

How often do you use the following administrative tools in Blackboard? = Syllabus [Never]	○	○	○
Syllabus (10)			

Page Break

End of Block: Administrative Tools

Start of Block: Assessment Tools

Q20 How often do you use the following assessment tools in Blackboard?

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (6)
Anonymous Grading (1)	○	○	○	○	○
Rubrics (2)	○	○	○	○	○
Goal Performance (3)	○	○	○	○	○
Item Analysis (4)	○	○	○	○	○
Performance Dashboard (5)	○	○	○	○	○
Survey (6)	○	○	○	○	○
Test (7)	○	○	○	○	○
Safe Assign (8)	○	○	○	○	○
Assignment (9)	○	○	○	○	○
Self and Peer Assessment (10)	○	○	○	○	○
Kaltura Video Quiz (12)	○	○	○	○	○

Q21 You answered "Never" on the following items, which best describes the reason?

	I'm aware of it, but don't use it (1)	Unaware this feature existed (2)	Use a similar tool outside of Blackboard (3)
How often do you use the following assessment tools in Blackboard? = Anonymous Grading [Never] Anonymous Grading (1)	○	○	○
How often do you use the following assessment tools in Blackboard? = Rubrics [Never] Rubrics (2)	○	○	○
How often do you use the following assessment tools in Blackboard? = Goal Performance [Never] Goal Performance (3)	○	○	○
How often do you use the following assessment tools in Blackboard? = Item Analysis [Never] Item Analysis (4)	○	○	○
How often do you use the following assessment tools in Blackboard? = Performance Dashboard [Never] Performance Dashboard (5)	○	○	○
How often do you use the following assessment tools in Blackboard? = Survey [Never] Survey (6)	○	○	○
How often do you use the following assessment tools in Blackboard? = Test [Never] Test (7)	○	○	○

How often do you use the following assessment tools in Blackboard? = Safe Assign [Never] SafeAssign (8)	○	○	○
How often do you use the following assessment tools in Blackboard? = Assignment [Never] Assignment (9)	○	○	○
How often do you use the following assessment tools in Blackboard? = Self and Peer Assessment [Never] Self and Peer Assessment (10)	○	○	○
How often do you use the following assessment tools in Blackboard? = Kaltura Video Quiz [Never] Kaltura Video Quiz (12)	○	○	○

Page Break

End of Block: Assessment Tools

Start of Block: Communication and Collaboration Tools

Q22 How often do you use the following communication and collaboration tools in Blackboard?

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
Announcements (1)	○	○	○	○	○
Course Messages (2)	○	○	○	○	○
Send Email (3)	○	○	○	○	○
Discussion Board (4)	○	○	○	○	○
Wiki (5)	○	○	○	○	○
Groups (7)	○	○	○	○	○
Blackboard Collaborate Ultra (8)	○	○	○	○	○

Q23 You answered "Never" on the following items, which best describes the reason?

	I'm aware of it, but don't use it (1)	Unaware this feature existed (2)	Use a similar tool outside of Blackboard (3)
How often do you use the following communication and collaboration tools in Blackboard? = Announcements [Never] Announcements (1)	○	○	○
How often do you use the following communication and collaboration tools in Blackboard? = Course Messages [Never] Course Messages (2)	○	○	○
How often do you use the following communication and collaboration tools in Blackboard? = Send Email [Never] Send Email (3)	○	○	○
How often do you use the following communication and collaboration tools in Blackboard? = Discussion Board [Never] Discussion Board (4)	○	○	○
How often do you use the following communication and collaboration tools in Blackboard? = Wiki [Never] Wiki (5)	○	○	○
How often do you use the following communication and collaboration tools in Blackboard? = Groups [Never] Groups (7)	○	○	○

How often do you use the following communication and collaboration tools in Blackboard? = Blackboard Collaborate Ultra [Never]			
Blackboard Collaborate Ultra (8)			

Page Break

End of Block: Communication and Collaboration Tools

Start of Block: Content Creation and Delivery

Q24 How often do you use the following content creation and delivery tools in Blackboard?

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
Content Area (1)	○	○	○	○	○
Files (2)	○	○	○	○	○
Folders (3)	○	○	○	○	○
Glossary (4)	○	○	○	○	○
Images (5)	○	○	○	○	○
Mashups (Link Videos) (6)	○	○	○	○	○
Assignments (7)	○	○	○	○	○
Media Gallery (8)	○	○	○	○	○
Item (9)	○	○	○	○	○
Audio (10)	○	○	○	○	○
Web Link (11)	○	○	○	○	○
Lesson Plan (12)	○	○	○	○	○
Module (13)	○	○	○	○	○
McGraw-Hill Tools (14)	○	○	○	○	○
Pearson Lab Tools (15)	○	○	○	○	○

Q25 You answered "Never" on the following items, which best describes the reason?

	I'm aware of it, but don't use it (1)	Unaware this feature existed (2)	Use a similar tool outside of Blackboard (3)
How often do you use the following content creation and delivery tools in Blackboard? = Content Area [Never] Content Area (1)	○	○	○
How often do you use the following content creation and delivery tools in Blackboard? = Files [Never] Files (2)	○	○	○
How often do you use the following content creation and delivery tools in Blackboard? = Folders [Never] Folders (3)	○	○	○
How often do you use the following content creation and delivery tools in Blackboard? = Glossary [Never] Glossary (4)	○	○	○
How often do you use the following content creation and delivery tools in Blackboard? = Images [Never] Images (5)	○	○	○
How often do you use the following content creation and delivery tools in Blackboard? = Mashups (Link Videos) [Never] Mashups (Link Videos) (6)	○	○	○

How often do you use the following content creation and delivery tools in Blackboard? = Assignments [Never]	○	○	○
Assignments (7)			
How often do you use the following content creation and delivery tools in Blackboard? = Media Gallery [Never]	○	○	○
Media Gallery (8)			
How often do you use the following content creation and delivery tools in Blackboard? = Item [Never]	○	○	○
Item (9)			
How often do you use the following content creation and delivery tools in Blackboard? = Audio [Never]	○	○	○
Audio (10)			
How often do you use the following content creation and delivery tools in Blackboard? = Web Link [Never]	○	○	○
Web Link (11)			
How often do you use the following content creation and delivery tools in Blackboard? = Lesson Plan [Never]	○	○	○
Lesson Plan (12)			
How often do you use the following content creation and delivery tools in Blackboard? = Module [Never]	○	○	○
Module (13)			

How often do you use the following content creation and delivery tools in Blackboard? = McGraw-Hill Tools [Never]			
McGraw-Hill Tools (14)	○	○	○
How often do you use the following content creation and delivery tools in Blackboard? = Pearson Lab Tools [Never]			
Pearson Lab Tools (15)	○	○	○

Page Break

End of Block: Content Creation and Delivery

Start of Block: Learning Tools

Q26 How often do you use the following learning tools in Blackboard?

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
Blogs (1)	○	○	○	○	○
Portfolios (2)	○	○	○	○	○
Journals (3)	○	○	○	○	○
VoiceThread (5)	○	○	○	○	○
WebLinks (6)	○	○	○	○	○

Q27 You answered "Never" on the following items, which best describes the reason?

	I'm aware of it, but don't use it (1)	Unaware this feature existed (2)	Use a similar tool outside of Blackboard (3)
How often do you use the following learning tools in Blackboard? = Blogs [Never] Blogs (1)	○	○	○
How often do you use the following learning tools in Blackboard? = Portfolios [Never] Portfolios (2)	○	○	○
How often do you use the following learning tools in Blackboard? = Journals [Never] Journals (3)	○	○	○
How often do you use the following learning tools in Blackboard? = VoiceThread [Never] VoiceThread (5)	○	○	○
How often do you use the following learning tools in Blackboard? = WebLinks [Never] WebLinks (6)	○	○	○

Page Break

End of Block: Learning Tools

Start of Block: Block 6

Q28 Are you willing to partake in a focus group discussion for this research?

- Yes (1)
- No (2)

Display This Question:

If Are you willing to partake in a focus group discussion for this research? = Yes

Q30 Thank you for your willingness to partake in a focus group. Please complete the following questions.

Display This Question:

If Are you willing to partake in a focus group discussion for this research? = Yes

Q29 Name

_____

Display This Question:

If Are you willing to partake in a focus group discussion for this research? = Yes

Q31 Email Address

_____

Display This Question:

If Are you willing to partake in a focus group discussion for this research? = Yes

Q32 Phone Number

_____

End of Block: Block 6

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Biography

Shea Walters graduated from Miller Place High School, Miller Place, NY, in 2002. She received her Bachelor of Arts in Psychology and a Bachelor of Science in Human Development from Binghamton University in 2007. She was employed as a teacher in Horry County, SC for two years and received her Master of Arts in Instructional Technology in 2011. From there she moved to Fairfax, VA where she taught 3rd grade for two years, and was a school-based technology specialist for another two years at Belvedere Elementary School in Falls Church, VA. It is during this time that she entered George Mason University (GMU) to pursue a doctoral degree in Learning Technologies Design Research. Shea also was a grad research assistant for 2 years under Dr. Jered Borup at GMU. During this time, she also made a career change to become an instructional designer. She is currently a learning consultant at Capital One, based out of McLean, VA.