Faculty Perceptions and Utilization of a Learning Management System in Higher Education

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ABSTRACT

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Past research has indicated that e-learning technology is not utilized to its full potential in education despite greater degree of access within higher education institutions. The issues of pedagogy in current e-learning technologies and the importance of interface design in future e-learning systems have also been raised in past research studies. The purpose of this study was to do close examinations of these issues and then investigate them through faculty's perceptions and utilization of Blackboard a commonly used Learning Management System, at a large Midwestern university.

Two specific research questions guided the investigation. The first research question investigated the relationship between faculty members' perception of Blackboard and their perception of Blackboard's design. The second research question was designed to find the relationship between faculty members' capacity of use and their pedagogical perspective of e-learning, as well as the perceptions of Blackboard's design. Open-ended questions were also designed to allow faculty to provide more in-depth description of their concerns with Blackboard. Twenty-six common features of Blackboard were selected and subdivided into three groups—instructional features,

interactive features, and visual features. Five Likert-type scales and one *check-all-that-apply* scale were designed by the researcher to collect empirical data.

A web survey was administered to 1208 faculty members. A total of 154 responses were received, which met the desired sample size of 117. Multiple regression analysis was used to answer the two research questions. The result of analysis demonstrated a significant relationship between the perception of Blackboard and the perceptions of the designs of the respective aspects of Blackboard features. A significant relationship was also found in the capacity of Blackboard use with pedagogical perspective of e-learning, as well as the perception of the design of visual features of Blackboard. However, no significant relationship was found in the capacity of use with the perceptions of the design of instructional and interactive features of Blackboard. Analysis of open-ended responses revealed a consistency with past research studies such that most faculty members used Blackboard primarily for administration of courses and very few faculty members considered pedagogical issues when using Blackboard in their teaching. Recommendations for future studies are provided.

Approved: _____

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To Caroline, Emmanuel and Abigail

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

Background of the Study

The increased popularity of distance learning, online learning, and the promotion of e-learning systems in the 21st century has changed the role of instructors tremendously. Instructors in general, who were traditionally seen as *transmitters of knowledge*, have to take on the role of a facilitator, a mentor, and what Salmon (2004) refers to as *e-moderator* (p. 3; as cited in Entonado & Díaz, 2006). Cantoni, Cellario, and Porta (2003) state that, "in e-learning, the teacher plays a new [and] different role. While devising a course, teachers become designers of experiences, processes and contexts for the learning activity: besides identifying the contents, they have to focus on motivations and active learning processes" (p. 336).

Past research (Bates, 1999; Souleles, 2005) has indicated that higher education institutions at large are receptive to the adoption of e-learning technologies. According to this research, many higher institutions believe the adoption of online learning technology is able to improve the quality of learning, better equip learners with information technology skills that are useful for their professional development, provide wider access in education to meet the demand for higher education, as well as improve cost effectiveness in the delivery of education.

The promotion of e-learning in the 21st century and the high degree of receptiveness to the new technology by the institutions per se, does not necessarily imply that a similar degree of utilization is achieved within the institutions. According to Surry (2000), faculty utilization of innovative technology in teaching has remained low despite

a greater degree of access within the institution. He comments that the use of the new technology in most institutions is restricted to administrative use or for data management, and that the effort to integrate the new technology into the classroom is less than satisfactory: “In spite of sporadic successes and isolated pockets of innovation, however, most faculty at most colleges make little use of technology as a tool for teaching” (Surry, 2000, p. 145-146).

Collis and Peters (2000) presented the results of a survey they conducted with 550 people involved with educational and training organizations in 41 countries. They concluded that those who already made personal use of some common *telematics* applications such as email and the Web, are not making educational use of what is available to them (p. 108). The research by Surry (2000) mentioned above provides evidence that faculty’s utilization of technology for teaching purposes is not at its desirable level. In other words, faculty are either not making enough use of the technology or are not using the technology to its full potential. The article by Collis and Peters (2000) provides additional evidence that people who are making personal use of technology are not using it for educational purposes. The above evidence led the researcher to ask the question: Why has the utilization of technology as a tool for teaching not reached its desirable level? If the research completed by Bates (1999) and Souleles (2005) indicates a higher degree of receptiveness to the adoption of e-learning technologies within higher institutions, it would be interesting to find out why is e-learning technology not utilized to its full potential in teaching? It may be difficult to really define what level is considered desirable, for desirability can be a relative term.

Nonetheless, continuing research may be a way to strive for the goal of reaching the desirable level at some point in time. Similarly, utilization of technology to its full potential may not be easily definable, but bringing the issue to faculty members' awareness within the higher institutions is a way to strive for an increased utilization of the new technology.

The Purpose of the Study

The present study attempts to explore the above questions by investigating the way in which Learning Management Systems (LMS), one of the most common e-learning technologies for teaching, are perceived and used by faculty within higher institutions. Learning Management Systems (LMS) are commonly known as Course Management Systems (CMS) or Virtual Learning Environments (VLE). For the purpose of this study, these three terms will be used interchangeably. The most popular LMS currently available to most institutions are Blackboard, WebCT, Moodle, LAMS, and SAKAI among many others. Blackboard and WebCT are two leading commercial systems that are used worldwide. LAMS, SAKAI and Moodle are open source LMS that are increasingly popular (Weller, 2006). According to Eduventures Inc., a Boston-based education market research company, Blackboard controls an estimated 45 to 50 percent of the higher education market for the online management of courses while WebCT takes on an estimated 35 to 40 percent of the market (Roach, 2006). In the beginning of the year 2006, Blackboard Inc. successfully acquired WebCT, Inc., and the acquisition tremendously increased Blackboard's market in LMS (Borja, 2005). In January 2005, Blackboard Inc. was awarded a U.S. patent that "describes the basic framework of an

LMS" (*e*School News, 2006, ¶ 3) and then sued Desire2Learn, another learning management system, for infringement on the day when its patent was announced (2006, ¶ 5). The dispute is still ongoing.

A report conducted by the Organisation for Economic Co-operation and Development (OECD) in 2005 indicated that "universities primarily use LMS for administrative purposes, and that LMS so far have had a limited impact on pedagogy" (Dalsgaard, 2006, Introduction section, ¶ 1). The comment made by this report is consistent with the problem cited earlier on the limited use of new technology as a tool in teaching. Schindelka (2003c) maintains that effectively designed instructional multimedia must be based on some theory of learning and/or cognition; and that pedagogy must ultimately be the master of technology. Educational technology without education is still just technology—like a form without its content (Schindelka, 2003c). Dalsgaard (2006) notes, "Use and organization of tools within e-learning can be approached in different ways depending on the chosen pedagogy. . . . A discussion of the educational value of different tools must use pedagogy as a starting point. The usefulness of different tools in support of learning depends on which learning activities the tools should support." (Integrating or separating tools section, ¶ 3)

The challenge of multimedia instructional design for e-learning platforms in the 21st century is to find a balance between designs and pedagogy. The word *designs* used in this study is used broadly to include the design of instructional features, interactive features, and visual features. In this study, the design of instructional features refers to course management, the creation of the course using the LMS, the implementation of the

course within the e-learning platform as well as the content of course materials, course documents, assignments, resources from the Internet, quizzes and surveys. The design of interactive features refers to the design of interactivity and the involvement of transfer of data within a computer or through a network, which include the design of the chat room, discussion board, digital dropbox, the creation of external links and homepages within the LMS, the act of uploading or downloading of files (text document, graphics, video, audio or animation), and the act of electronic file transfer between the LMS and other application software such as Microsoft Excel and Microsoft Word, or creating a backup document in software format. The design of visual features refers to the way in which an e-learning platform is displayed visually, and this includes the layout, use of colors, shapes of buttons, types of font, sizes, as well as the relationship of all these elements to one another.

Surry (2000) discusses the two aspects of technology innovations proposed by Hooper and Rieber (1998), namely, *product technologies* and *idea technologies*. Product technologies commonly refer to the hardware and/or software innovations while idea technologies refer to ways of conceptualizing the teaching-learning-technology partnership. Idea technologies focus more on the potential to which one is able to implement the new technologies rather than the physical availability and/or accessibility of the new technologies. In other words, with idea technologies, “the potential of emerging technologies is considered in concert with unique learning opportunities and processes that can result” (Surry, 2000, p. 146). Bennett and Marsh (2002) maintain that it is not enough for any staff development and training program to use information and

communication technologies in education to simply cover the technical issues. The authors propose that there is a need to go beyond the focus on the technology to aim at raising awareness and developing competence in the support of learning. Therefore, it is important to consider appropriate integration of learning theories when it comes to the implementation of innovative technology in education. Bennett and Marsh's research highlighted that the "purchase, plug-in and turn-on" approach in staff training and development to use innovative technology in teaching is insufficient for effective teaching and learning through innovative technology to occur (p. 14). Thomas, Carswell, Price, and Petre (1998) recommended that an effective integration of technology into education requires "an understanding of the whole education process and a critical examination of its functions" (as cited in Bennett and Marsh, 2002, p. 14).

Perkins (1985) proposed three conditions on achieving the effectiveness of technology utilization: "(a) the opportunity is indeed available, (b) users recognize it, and (c) users are sufficiently motivated to take it" (as cited in Surry, 2000, p. 146). The first condition proposed by Perkins is met in most higher education institutions. The question is whether or not the second and third conditions have impacted on the limited use of e-learning technologies on teaching. This study will examine the awareness of faculty regarding the purpose and capability of the LMS in teaching. Such investigation would necessarily involve a look into the possible problems that lie in the design of the instructional features, the interactive features and the visual features of the current LMS. In order to have an effective e-learning platform that faculty would recognize and would

be motivated to use, it is essential to understand the ways in which a faculty member uses, interacts with, or adapts an e-learning platform.

Problem Statement

A recent study (Kidd, 2005) concerning the key aspects affecting students' perceptions regarding the instructional quality of online and web-based courses, indicates that visual appeal of website material is one factor that highly affects students' perception of instructional quality. Ironically, clarity and purpose in introduction to content components do not seem to be an immediate concern to students. Kidd's study indicates, "Visual appeal of online courses may not seem to be critical to students' learning of content of the course, but [it] affects the students' level of interest and desire to use the site to obtain information." If students as learners and users have such reaction towards the visual quality of an online course, could it be possible that faculty as facilitators and users of the e-learning system carry a similar point of view when trying to set up a course using the available LMS? Are instructors aware of the design of the instructional features, the interactive features and the visual features of the LMS in general? Could the design be a concern in using the LMS but an issue that has not been addressed?

Cantoni, Cellario, and Porta's (2003) emphasized the nature of interactivity and visual designs as two important and necessary aspects for creating a more natural and effective e-learning platform. The importance of instructional design in education is evident. The importance of the nature of interactivity and visual design, on the other hand, may not be as apparent to many as the importance of instructional design in education. To better understand the importance of the nature of interactivity and visual

designs within an e-learning environment, it is worthwhile to understand how these designs contribute to the advantages of e-learning. Cantoni, Cellario, and Porta (2003) suggested that the use of different media, such as video, audio, images, and games, to reinforce a message would lead to increased retention and a stronger grasp on the subject. The interaction between instructor and students would also improve through the design of interactivity tools such as chat room, discussion board, and email. Cantoni, Cellario, and Porta (2003) state it well that nowadays using a computer often implies interacting with visual formalism, because practically every application has a graphic interface that requires a user to interact with it by pressing buttons, making a selection from drop-down menus, or simply manipulating icons. The attributes of graphic elements, such as shape, dimension, position and colors, help a user better understand the possible associations of the content that it represents (Cantoni, Cellario, & Porta, 2003).

Surry (2000) mentions that the successful implementation of educational technology requires recognition of two major properties of the technology involved: “the actual properties of a technology feature and perceived properties the learner believes will support him or her” (p. 146). Perceived properties deal with the perception of opportunity. In the case of this study, do faculty members recognize the introduction of LMS as an opportunity to facilitate their teaching? Actual properties, on the other hand, refer to the “capabilities that are inherent to the technology that dictate how it is designed or intended to be used” (p.146). Faculty may have increased access to the new technology and be receptive in implementing it in their teaching, but they may not know how to utilize the *machine* to its actual potential, or they may have been intimidated by the

complexity of the e-learning tools. Cantoni, Cellario, and Porta (2003) associated the usability issues concerned in any new technology with the issues of *learnability*. They explained that when someone has a negative experience with e-learning tools, it would usually affect their perceptions of the e-learning experience, which in turn, leads to misunderstanding, biases and prejudice that prevent him or her from achieving the goals within the e-environment. From another perspective, the actual features of the new technology may have discrepancies with some faculty's pedagogical approach and those discrepancies in turn lead to a compromise and thus a limited use or the failure to utilize the new technology to its full potential.

Zurita and Ryberg (2005) noted, "A change in educational media does not create in and of itself a positive development, nor a change or development in the teaching styles or the pedagogical assumptions" (Introduction section, ¶ 2). The changing of pedagogical practice is a difficult enterprise. Understanding the three dimensions of *digital competence*—a word coined by Bygholm and Boisen (2004)—is important when considering a change in pedagogical practice (as cited in Zurita & Ryberg, 2005, ¶ 9). Digital competence comprises three levels, namely, factual knowledge, knowledge of the tool in context, and constructive knowledge. Factual knowledge concerns the functionality and hardware portion of the IT-system (information technology system). A second level of knowledge involves knowing how the system is used within a practice, in its context, so to speak. The highest level of knowledge—the constructive knowledge—requires not only knowing the system and its use in context, but being able to use it to develop and change the work practices. After doing a few case studies on methods to help

several universities in developing countries make transition from traditional courses to online courses, Zurita and Ryberg (2005) discovered that information and communication technology (ICT) does not necessarily cause a change in pedagogical practice, instead it may reinforce existing pedagogical foundation and outlook. In order for ICT to change pedagogical practice, a user has to arrive at the highest level of digital competence with tools such as forums, chats, portfolios, and so on, and be able to think creatively with them, so as to bring the experience to the next level of making qualitative changes to existing pedagogical practice. In other words, the users of the tools are required to feel genuinely a need for change in pedagogical practice with ICT and be willing to re-evaluate and revise existing practices (Zurita & Ryberg, Section 4).

It is therefore important for instructors to be aware that the new delivery systems and e-learning environment requires new modes of teaching (MacKnight, 1998). It is equally important to allow the instructors to have a holistic view of the principles and philosophies behind the designs of an e-learning system in order for them to better apply appropriate pedagogies and learning theories to their teaching (Bennett & Marsh, 2002, p. 14).

Research Questions

The problems described in the above will be examined closely using Blackboard as a LMS. Specific research questions, described below, are designed to illuminate the problems.

1. Is there a relationship between faculty's perception of Blackboard and faculty's perception of the design of interactive features, visual features, and

instructional features respectively within Blackboard? If such a relationship exists, to what extent does each predictor (the design of interactive features, visual features, and instructional features respectively) account for a faculty's perception of Blackboard?

2. Is there a relationship between faculty's capacity of utilizing Blackboard and faculty's pedagogical perspective on e-learning, the perceptions of the designs of interactive features, visual features, and instructional features of Blackboard? If a relationship exists between capacity of use and any of the four predictors (pedagogical perspectives on e-learning, perception of the designs of interactive features, visual features and instructional features respectively), to what extent does each predictor account for a faculty member's capacity of utilizing Blackboard?

Significance of the Study

The prominent themes in current e-learning research include explorations on the enhancement of learning using the new technology, explorations on new instructional models, discussion of effective assessment, explorations of the technical, managerial and structural requirements for e-learning, discussion of staff development, the protocols and standards for transferability of materials in e-learning environment, as well as issues related to accessibility, copyright and plagiarism (Conole, Oliver & Isroff, 2004; Souleles, 2005). There is also research on the importance of staff training in the implementation of technology in education (Bennett & Marsh, 2002; Murphy, Mahoney, Chen, Mendoza-Diaz & Yang, 2005), research suggesting the use of new technologies in

education (Bennett & Marsh, 2002; Salmon, 2004), and studies on the effectiveness of respective e-learning tools such as computer-mediated communication (Comeaux & McKenna-Byington, 2003), but research on faculty member's perceptions of the designs of both the current and the future e-learning platforms is not sufficient. Some research addressed the limitations of current e-learning technology in teaching (Cardoso & Bidarra, 2007; Collis & Peters, 2000; Dalsgaard, 2006; Surry, 2000; Weller, 2006), and others made proposals and recommendations for future e-learning system (Dalsgaard, 2006; Weller, 2006). Although these research studies do address the issue of design in an e-learning platform, more research is required to investigate the relationship between users' perceptions of the design of an e-learning platform and their utilization of e-learning technology. This study is designed to investigate a few aspects of a specific e-learning technology: faculty's perceptions of the e-learning technology, faculty's perceptions of the design of the e-learning technology, and faculty's utilization of the e-learning technology. The study will also take into consideration faculty's pedagogical perspective of e-learning and examine whether it affects faculty's perceptions and utilization of the e-learning technology. Hopefully the results of the study will be useful to understand a specific area of the limitations in the current LMS, and hopefully, this piece of information will be useful for the design of future e-learning platforms so that future designs can be better aligned with pedagogical practice.

As noted by Surry (2000), "A key element in the effective utilization of any innovation in higher education is promoting faculty buy-in. Faculty motivation to use technology will not be increased simply by purchasing more technology" (p. 152). The

motivation to use a new technology has much to do with the degree of understanding of the *actual properties* of the new technology. If a faculty member is unable to appreciate the unique attributes inherent within a new technology, it would be difficult for him or her to integrate the new technology into his or her teaching in a manner that would utilize the new technology to its full potential. On the other hand, as described by Zurita and Ryberg (2005), "users [of technology] should not only be trained in mastery of the tools, but be willing to re-evaluate and revise existing [pedagogical] practices" (Section 4). If the new technology cannot be aligned with a faculty member's teaching philosophy or pedagogical perspective, then the utilization of the new technology would be limited. Cantoni, Cellario, and Porta (2003) state, "Life cycles of new technologies not only require new teaching paradigms, but recurrent updating of courses" (p. 334). Alternatively, the new technology may not be catching up with current pedagogy; the discrepancies may have rendered the new technology incompatible.

Limitations and Delimitations of the Study

Considering the purpose of this study, the reality of finances and the time frame allowed for this study, it is necessary to define the scope of this research accordingly.

1. This study involves only the Learning System in Blackboard Academic Suite.

   The products of Blackboard, Inc. can be broadly classified into two categories, namely the Blackboard Academic Suite and the Blackboard Commerce Suite. The Blackboard Academic Suite consists of the *Blackboard Learning System*, a course management system; the *Blackboard Community System*, a community and portal system; and the *Blackboard Content System*, a content management system. The

Blackboard Commerce Suite consists of the *Blackboard Transaction System*, a Transaction Processing System tied to university IDs; the *Blackboard Community System*, an e-commerce front end for the Transaction System; and *Bb One*, a network of commercial and retail business that accept Blackboard-powered debit card transactions. On top of the above, Blackboard also provides an open architecture, called *Building Blocks*, which can be used to extend the functionality of Blackboard products, through a technology called *PowerLinks*.

Although over 2200 educational institutions in more than 60 countries are using Blackboard, different institutions may not be using the exact same components. For instance, most institutions may have chosen to use the *Learning System* in Blackboard Academic Suite, but not all institutions choose to include also *Content Management System* or to include the *Building Blocks* feature when making the purchase of the course management software system. This study and the survey administered would apply only to institutions that use the *Learning System* in Blackboard Academic Suite.

2. Classification of features in Blackboard used in this study.

The researcher recognizes that at times an action within the LMS involves more than one aspect of designs discussed in this study (instructional, interactive and visual). For instance, the involvement in the discussion board may be instructional in its nature (providing students a chance to have an in-depth discussion on a topic), but it also involves the use of interactive feature (sending a cyber message or responding to one) to improve interactivity among students and between students and instructor.

When using the definitions for each of the design aspects used in this study, the discussion board as an instructional design becomes one part of the entire implementation of a course, but the discussion board as a feature in its entirety involves interaction in the form of electronic communication through transferring of data within the computer network or the Internet. In such a case, the discussion board will be classified under design of interactive feature instead of instructional feature. Alternatively, although the action of adding announcements, course information, or staff information may involve uploading files and creation of external links, they are predominantly text information to serve as content for the implementation of a course. The adding of multimedia files and creation of hyperlinks constitute only part of the content; however, the act of uploading of files and creation of external links will be classified under design of interactive features.

3. The classification of the features within Blackboard in this study is solely for the purpose of this research. The researcher does not claim that Blackboard as a LMS has such categorization.
4. The features selected for the questionnaire used in this study are delimited by a couple of conditions. First, what is made available to the faculty through the Center for Academic Technologies within the institution selected for this study; next, the features available in the *Learning System* of Blackboard Academic Suite version 6.3, and any new module made available to this version (such as the new features on Application Pack 3) before June 2007 when the delimitation is defined for this study.

5. The survey used in this study was conducted at a mid-western university with about 60% of faculty using Blackboard as a tool to facilitate teaching for classes conducted online, in a classroom setting, or a hybrid of both. The above factors—nature of courses (online, classroom, or hybrid), the geographical location of the university, as well as the fact that the LMS is adopted by the university (which implies faculty have limited choices)—should be taken into consideration when trying to generalize the results of this study.
6. The questionnaire was designed by the researcher based on a comprehensive review of the literature and classification of the features of Blackboard into the three aspects of designs defined by the researcher. Both reliability and validity tests were conducted to ensure the quality of the instruments. A pilot study was conducted to further refine the items to avoid ambiguity and improve the accuracy in the interpretation of each item in the questionnaire.
7. The results are based on the data collected from the number of completed surveys. The completion of surveys is solely based on the good will of the respondents; no incentive was given for doing the survey.

Definitions of Terms

Learning Management System (LMS)

Learning Management System (LMS), sometimes also known as Course Management System (CMS) or Virtual Learning Environment (VLE), is a term that is very widely used in the 21st century. It has become a topic worthy of research by itself. Learning Management System is a term that is used both academically and commercially.

Although many organizations, both academic institutions and commercial corporations, are purchasing LMS as a product to be used in their organization for learning, training and development purposes, many organizations have started to opt for building and hosting their own LMS. The number of LMS available today is in the increase. There are many open source LMS available, as well as commercial packages. Some examples of open source LMS are Moodle (developed by Martin Dougiamas, Australia), Claroline (developed by Université Catholique de Louvain), ATutor (developed by University of Toronto), ClassWeb (developed by University of California, Los Angeles), Coursework (developed by Stanford University), and LON-CAPA (developed by Michigan State University), to name just a few. Some examples of commercial LMS, in which a license must be purchased to use the product, include Blackboard Inc., ANGEL Learning, and Apex Learning.

Since LMS are very widely used for corporate learning, it is worth noting that the discussion in this study will gear towards the need of higher institutions. The term *LMS* or *Learning Management System* used in this study refers to an e-learning platform that allows instructors to manage their courses and exchange information with students through the different tools provided by the LMS, such as the tools for communication (discussion board, email, virtual chat) and the tools for course delivery (syllabus, course materials, assessments).

Instructional Features

Instructional features refer to those features in Blackboard that are used in course management, the creation of the course using the LMS, the implementation of the course

within the e-learning environment, as well as the content of course documents, assignments, resources from Internet, quizzes and surveys. The following are classified under *instructional features* in Blackboard for the purpose of this study.

1. Use survey manager
2. Use the grade book (add, edit, or delete graded items, view grade, weight grade)
3. Use test manager
4. Use syllabus builder
5. Add, edit, or delete announcements
6. Add, edit, or delete staff information
7. Add, edit, or delete course information
8. Use user management feature (to list/modify, create or remove user; manage groups)
9. Email a member or the entire group
10. Send messages to a member or the entire group within Blackboard

Interactive Features

Interactive features refer to those features in Blackboard that require a transfer of data within a computer or through a network. The interactive features in Blackboard include chat room, discussion board, digital drop boxes, the creation of external links and homepages within Blackboard, the act of uploading or downloading of files (text document, graphics, video, audio or animation), and the act of electronic file transfer between Blackboard and other application software such as Microsoft Excel and

Microsoft Word, or creating a backup document in software format. The following are classified under *interactive features* in Blackboard for the purpose of this study.

1. Add assignments (with ability to check status of completion and provide feedback)
2. Use digital drop box
3. Manage discussion forum (add, reply, modify, delete or archive discussion thread, and assign discussion forum settings)
4. Use synchronous collaborative tools such as chat or virtual classroom
5. Create an external link
6. Upload a file (which can be text document, graphics [gif and jpeg], video [mpeg, Quicktime, avi], audio [wav,aiff], or animation [shockwave Flash])
7. Import or export grades (e.g. upload grades from Excel or backup grades to Excel)
8. Archive or export a course

Visual Features

Visual features in Blackboard refer to those features that make up the visual appeal of the entire e-learning platform, which include the overall layout, the design of graphic interfaces, and the overall design of Blackboard using colors and shapes of buttons, the different types and different sizes of font, sizes, as well as the relationship of all these elements to one another. The following are classified under *visual features* in Blackboard for the purpose of this study.

1. Customize course menu buttons by types, shapes and colors

2. Change course banner
3. Use the visual representation of a course: Quick View (the original menu design) and Detail View (a course map)
4. Organize content into folders
5. Use of font style and formatting for emphasis
6. Use of course menu navigation style (the choice between button and text)

CHAPTER TWO: LITERATURE REVIEW

Introduction

The increasing accessibility of e-learning environments within the educational world is an inevitable phenomenon in the digital age. This is a time for educators to reevaluate the current pedagogies, and for scholars and researchers to think about instructional design in terms of the current e-learning and e-teaching environments. The emergence of the Internet alters the role of an instructor in a classroom by providing encyclopedic information to users in the classroom. Students are only required to type in a search word to get information about certain subject matter they wish to know more about. Although Internet searching has its shortcomings, the results of the search may vary between different users or the users may need to filter through a vast amount of information to get to the essence of the subject they are looking for, it allows students to by-pass the role of instructor as information provider. The advancement of online facilities allows instructors to offer on-line courses and provide homework assistance, answering questions beyond their physical office hours, and generate discussion in their subject areas even outside the classroom.

While educators may be enjoying the convenience brought about by digital technology, it is crucial for educators to take a moment to ponder upon any shortcomings that accompany such teaching medium and e-learning environments, just as they would do to any other teaching media. Smulders (2003) contends that a great proportion of the online discussion within e-learning environment was focused on troubleshooting the technical failings and logistical flaws of the course, with very little discussion about the

actual course content. Does the current e-education benefit from the convenience of the e-learning environment? Are the students learning something through e-learning courses? Smulders' observation is a good wake-up call to educators and researchers at large in re-evaluating the impact of the e-learning environment on education. Both educators and students may be too overwhelmed with this new technology and the countless potentials and possibilities that come with it, to an extent that these conveniences and innovations may be at the expense of jeopardizing the issue of pedagogy.

This chapter reviews the literature and examines some of the potential issues and concerns in an e-learning environment through an assessment and re-evaluation of the relationship and necessary interaction among instructional development, media design and visual aesthetics in an e-learning environment. The chapter will begin with a brief discussion of current e-learning environments and some of their current problems, providing a brief survey of the history of instructional development and the problematic issues in dealing with the definitions of instructional development. More specifically, the discussion in this chapter will be focused around a few major areas: First, a brief evolution of e-learning will be outlined and defined; the limitations and drawbacks of e-learning will be briefly discussed; and a projection of a future e-learning environment, the VLE 2.0, by Martin Weller will be outlined. Second, there will be a discussion on the issues of instructional design, pedagogy and learning theories. Third, media design and its implications in an e-learning environment will be described. Fourth, there will be a discussion on the visual aesthetics and instructional design, with focus on the compromises and conflicts. Next, the researcher will outline the importance of the

marriage of instructional design and creativity. Finally, the chapter will make an attempt to outline some suggestions gathered from past literature regarding the goal of creating an e-learning environment with seamless integration of instructional design, media design and visual aesthetics. Faculty members' perceptions and utilizations of a selected LMS, the Blackboard, will also be addressed in this chapter. The future success of e-education requires the collaborative efforts and inputs from educators, researchers, instructional designers, media designers, and professionals from various fields in the arts and sciences.

What is E-learning?

Distance Learning, Computer-Assisted Learning, and E-learning

Distance learning or distance teaching is not a new concept. It has been around well over a century (Valentine, 2002, History of Distance Learning section, ¶ 1). According to Valentine, distance learning started very early in Europe as correspondence courses. This form of instructional correspondence started to change when instructional radio and television become popular, roughly in the middle of the twentieth century. Distance learning continues to change in its delivery methods, while the conventional ones keep on; in the past few decades, videotaped lectures started to become a popular delivery method for distance learning (History of Distance Learning section, ¶ 1). The emergence of the Internet has brought about changes in almost every area of our lives; it was not surprising to see how that has taken distance learning in new directions. The Internet and compressed video have allowed real time delivery of distance education. In the 1980s, both the concepts of computer-based training (CBT) and computer-assisted learning (CAL) have been in used in the industry as well as education. The ubiquity of

the World Wide Web in the early1990s brought about a convergence of distance education and the concepts of computer-based training and computer-assisted learning. According to O'Mahony (2003),

> A number of factors have assisted this convergence. Increasingly sophisticated web browsers; increasingly sophisticated web scripting languages; increasing bandwidth, improved data compression techniques; increased access to powerful personal computing devices; and increased levels of user knowledge and understanding are some of these factors. (p. 685)

When delivery of instruction is conducted online and web-based, the term *e-learning* begins to better describe the form of education. Distance learning is not e-learning or vice versa, neither is computer-assisted learning e-learning in its absolute; however, all these types of learning sometimes have delivery methods that overlap. O'Mahony distinguishes e-learning from computer-assisted learning by emphasizing the use of web-enabled technologies in e-learning. He cited Jones's (2003) definition of e-learning, "E-learning is online training that is delivered in a synchronous (real-time, instructor-led) or asynchronous (self-paced) format," and that defined by Morrison and Khan (2003), which states that e-learning is "an innovative approach for delivering electronically mediated, well-designed, learner-centred and interactive learning environments to anyone, anyplace, anytime by utilizing the internet and digital technologies in concert with instructional design principles" (as cited in O'Mahony, section 2.1, p. 3). Valentine (2002), on the other hand, provided a few definitions for distance learning, which in essence, point to the primary distinction of distance learning,

namely the separation between the instructor and students by space, but not necessarily by time. And the most obvious example of this would be the use of compressed video which can be delivered in real time (section 3, ¶ 1).

If one were to recall the evolution of e-learning components that are used today, one will find that it has really only been about a decade since the emergence of many components that support the current e-learning system. For instance, it was only in the 1990s that Tim Berners-Lee proposed his idea for a World Wide Web; during the fall of 1994, the early version of Netscape launched; in late 1995, both Windows 95 and the first Internet Explorer were launched; and in 1996, both the early version of WebCT and Blackboard were launched.

Advantages and Disadvantages of E-Learning

It is important to identify some of the advantages and disadvantages of e-learning. The advantages of e-learning are multiple. Cantoni, Cellario, and Porta (2003) point out that e-learning is usually less expensive to deliver; it can be self-paced; it will not be restricted by physical location; it is more flexible in terms of time (learners are able to take sessions when they want); and it provides benefit to instructors who have to manage large groups of students. In many forms of e-learning, content subject are often presented using a combination of visual and audio elements to improve learner's retention of the subject content. The interaction and communication between learners and instructors are often encouraged through the use of chat room, discussion boards, instant messaging and email. E-learning also makes it possible for learners to customize learning materials to their own needs, leading to more effective learning and hence a faster learning curve

when compared to instructor-led training. The benefit of e-learning environment being a virtual world provides learners the courage and opportunity to explore new materials without having to worry about being identified or making upfront exposure (p. 336).

The disadvantages of e-learning, on the other hand, are demonstrated in different aspects. For instance, institutions that decide to promote e-learning may require new funding to purchase new technology, as well as to allow staff members such as a content developer to achieve new skills. Moreover, new technology often brings about frustration, especially during the process of its adoption.

The Current E-Learning Environment

The situation and phenomenon of current e-learning environment can be examined through both the commercial LMS such as Blackboard and WebCT, and the open source LMS, such as LAMS, SAKAI and Moodle, to name just a few most notable ones. According to Weller's (2006) discussion on the future direction of e-learning environments, both the current commercial LMS and the current open source LMS available have wrought the foundation for the VLE 2.0, a term he used side-by-side with Web 2.0 (as opposed to Web 1.0) to describe a projected e-learning environment for the future. It is noteworthy at this point that, the term *VLE (Virtual Learning Environment)* used by Weller in his article is the same as the term *LMS* used by the researcher in this study. For the convenience of discussion, when citing or paraphrasing Weller, the researcher will use VLE for consistency, but will include LMS in parenthesis. The drawbacks of the commercial LMS, when coupled with some aspects of the conceptual framework of certain open source LMS, set a good foundation for the development of a

future LMS. Some characteristics of the commercial VLE (or LMS) outlined by Weller (2006) include the following (p. 99):

1. They are content focused.
2. They have no strong pedagogy.
3. They are based around a teacher-classroom model.
4. The combine a number of average tools, but not the best ones.
5. They do not feature a particular tool.
6. They operate on a lowest common denominator approach.
7. They do not meet the needs of different subject areas.
8. It is difficult to exchange content between them, despite claims to interoperability.

The above characteristics noted by Weller are what made the commercial VLE (or LMS) popular, yet ironically, they are also what Weller refers to as some drawbacks of these popular commercial VLE (or LMS). These characteristics have made it less intrusive for e-learning to be integrated into current educational practice because they contain tools and features suitable for integration with current education practice, without requiring a drastic change in terms of teaching style or educational practices. In this way, the commercial VLE (or LMS) successfully gains the trust and reception from users, thus wrought the ground for further innovations. The commercial VLE (or LMS) will not only attract conventional users at large, but also enthusiasts who are usually of a smaller group. The enthusiasts started to look for something more, and that’s where the open source LMS come into play, as Weller (2006) states, “particularly systems that begin to

specifically address some of the pedagogical needs of e-learners, such as LAMS and Moodle, as well as closely integrated systems such as portals and eportfolios" (p. 100). Using an analogy, Weller (2006) describes that the commercial VLEs (or LMSs) "have acted as the pioneer species, moving in to the new environment and creating slight changes which make the habitat suitable for secondary colonizers [refer to VLE 2.0]" (p. 100).

In summary, the commercial VLE (or LMS) brought about a general acceptance of the e-learning approach; it has helped to integrate e-learning with the administrative systems; it has directly or indirectly recruited enthusiasts for further exploration of e-learning environments; it created changes in assessment practice; and it highlights the types of tools already used by students.

Limitations and Drawbacks of Current E-learning Environment

As with any teaching media and tools, there are drawbacks and limitations. Weller has indicated that those characteristics, as mentioned in the above, which are characteristics of the current commercial VLEs (or LMSs) are unfortunately also drawbacks when one look ahead to the design of future VLE. Dalsgaard (2006) highlighted in his article that LMS are suitable only for management of administrative tasks related to teaching such as management of student enrolment, examinations, assignments, course descriptions, lesson plans, messages, syllabus, and basic course materials among others. Dalsgaard's article took the social-constructivist approach to look at learning as a social and active process, a concept proposed by Vygotsky and

Jonassen, as well as by Brown, Collins and Duguid (Personal tools and social network section, ¶ 1). Dalsgaard (2006) maintains that

> Students' self-governed and problem-solving activities are considered the focal point of a learning process. This conception of a learning process means that it is not possible to structure or pre-determine the students' activities in a learning process—the activities must develop on the basis of the student's own problem-solving. As a consequence, a learning environment needs, in the words of Land and Hannafin (1996), to be open-ended. An open-ended learning environment provides students with multiple possibilities for activities. A similar approach is outlined by Jonassen (1999) who presents a model for designing *constructivist learning environments*. Students' activities in constructivist learning environments are initiated by a problem or project. Surrounding the student are different tools and resources which support the student's problem-solving process. (Personal tools and social network section, ¶ 2)

Dalsgaard suggested (2006) the use of social software such as the use of wikis and weblogs to support independent and student self-governed type of work. For instance, weblog (or commonly known as blogging) can be used to present ideas and thoughts through communication, wikis to develop a collaborative project, and the use of e-portfolio to arrange relevant resources. Other collaborative tools such as discussion forums and file sharing can also be used when working on a collaborative project. Dalsgaard described these tools as “individual personal tools [that] support self-governed and constructive processes” (Personal tools and social network section).

A Projection of Future E-Learning Environment

In providing a global overview on future learning systems, Cantoni, Cellario, and Porta (2003) emphasized the visual component of the e-learning experience as a significant feature for effective content development and delivery. In the article, they also projected that the adoption of new interaction paradigms based on multi-dimensional metaphors and perceptive interfaces as necessary direction to take in order to achieve a more natural and effective e-learning experiences (p. 333).

The benefits of such multi-dimensional interfaces can be understood through the effect of 3D virtual artifacts. A 3D virtual artifact is able to provide *real* communication and interaction among people beyond the physical-geographical limitations and constraints. An active engagement with such *real* artifact in turn improves student memory-learning mental models (Cantoni, Cellario, & Porta, 2003): "student may actively explore existing pre-built worlds (discovery learning) and build related internal models (constructivism), or actively create-modify worlds, to fully integrate their own models of the world (constructionism), while eventually sharing their evolving knowledge representations in a virtual collaborative environment" (p. 342).

With regards to perceptive interfaces, Cantoni, Cellario, and Porta (2003) proposed the exploitation on interfaces based on tracking of human features and gestures to enhance quality of interaction. In particular, they mentioned the importance of conducting research on facial expression recognition and use it to achieve more natural ways of interaction between learners and the e-learning environment. For instance, a user

who is observed knitting the eyebrows would trigger the computer to open a help window (p. 342).

Weller (2006) contended that one useful way to look at the future direction of e-learning environments is to look at some of the principles of *Web 2.0*, a term often use to describe the collective trends of current internet technologies. Web 2.0 represents a new phase of internet usage describes by Weller as "the result of the growing competence of users, the ubiquity of connection and the low cost of data storage" (p. 103). In his article, "What is Web 2.0?", Tim O'Reilly outlined some important principles for the new phase. First, it is the notion of the web as platform. O'Reilly explains that Web 2.0 does not have a hard boundary, it has a gravitational core. One can "visualize Web 2.0 as a set of principles and practices that tie together a vehicle solar system of sites that demonstrate some or all of those principles, at varying distance from that core" (O'Reilly, 2005, Section 1). O'Reilly further illustrates the concept of the web as platform by juxtaposing Netscape and Google. He contends that if one were to look at Netscape as the standard bearer for Web 1.0, Google would become the standard bearer for Web 2.0. The differences between the two are that one is based around a software product (Netscape) and the other a service (Google).

A second principle, one that is crucial to education, is that of "harnessing collective intelligence" (O' Reilly, 2005; Weller, 2006). Most people would agree that the use of hyperlinks on the web has not only brought about conveniences to the users, but a whole new way of constructing knowledge by linking resources in different but

unique manners. Hyperlinking is also one way of harnessing collective intelligence. O'Reilly (2005) describes

> Hyperlinking is the foundation of the web. As users add new content, and new sites, it is bound in to the structure of the web by other users discovering the content and linking to it. Much as synapses form in the brain, with associations becoming stronger through repetition or intensity, the web of connections grows organically as an output of the collective activity of all web users. (Section 2, ¶ 1)

A couple of other good examples that promote collective intelligence are the increasing popularity of Wikipedia and blogging. Wikipedia is an online encyclopedia with entries added by any web user and edited by any other web users. A blog, in its most basic form, is a personal home page in diary format. The most basic format of blog, together with a technology called RSS (Really Simple Syndication), has made the personal page the *live web* or *the incremental web*, whereby web users are able to not only link to the page, but to subscribe to it, and be notified every time the page changes (O' Reilly, 2005, Section 2, ¶ 2). The blog thus becomes more than an ordinary web page but a weblog with a continuous feed of updated data and a collective voice of web users, described by O'Reilly as "a kind of global brain," or what James Suriowecki calls "the wisdom of crowds" (as cited in O'Reilly, 2005, Section 2).

A third principle of Web 2.0 is that of lightweight programming models, in which systems within a model are loosely put together, rather than tightly integrated. The advantages of this kind of model is that it never really arrives at the end product, but is always in the process of becoming; to use a programming term to describe, it is *the*

perpetual beta so to speak. Such a model encourages constant assimilations of different tools and services of different providers to make the overall system more powerful (Weller, 2006, p. 104). Weller mentions that the RSS method for syndicating information is also part of this approach. RSS allows different information sources to be assembled to make possible a customized interface for the user. Such integration should provide some kind of an aggregate whole product, rather than an organic entity. The difference between the former and the latter lies in the way different parts are put together. A product with an aggregate whole property can be taken apart and rearrange in different manners without corrupting the core structure. A product with an organic whole property, on the other hand, cannot be taken apart without collapsing the entity because the parts are organically integrated to form the entity.

How do the above mentioned principles of Web 2.0 work for future e-learning environments? According to Weller (2006), the future e-learning environment, which he describes as VLE 2.0, can be viewed from two perspectives, first, its construction, and second, its state of mind. The former deals with its architecture and technological construction while the latter concerns its mindset. Although not all principles of Web 2.0 can be directly applied to VLE 2.0, Weller suggests that those principles carry different degrees of implications for the design of a future e-learning environment. Weller (2006) pointed out some specific principles that are useful. In its technology aspect, Weller (2006) proposes that VLE 2.0 should be based around a service-oriented architecture. Unlike many of the current e-learning platforms which develop tools to meet specific needs of a course or set of students, the emphasis of VLE 2.0 is on “developing tools that

can be reused in different contexts and assembled in different ways" (p. 104). In order for this to happen, the future e-learning platform should take an open architecture, based around standards. The result of which will be an e-learning platform that feel less of an *out of box* entity, like the current system, because "it will be constituted from a range of tools and services and configured differently for different users" (p. 105). The new e-learning platform will be comprised of components from different providers, some may be commercial products, some from open source and some in-house solutions. These flexibilities will lead to an institution-wide VLE with localization and adaptation capabilities. The service-oriented architecture and open approach will meet the needs of both the conventional and the lead users, while the lightweight assembly principle allows possibilities for localization and adaptation. In a practical situation, it means that a medical school may be able to use a different configuration of tools than the business school, but both are using the same underlying VLE. The principle of collective intelligence can be seen through the attitude promoted through the projected VLE 2.0, in which students play the role of co-creators of content. For instance, different students are able to create different content that contributes to a resource pool, or the instructor is able to make course content available in a wiki so that students can modify it, create shared bookmarks, and so on. One other principle that VLE 2.0 is able to adopt from Web 2.0 is the concept of reuse. When discussing this aspect, Weller (2006) does not only refer to reusing tools and services, he projects that once reuse becomes a common practice, it may also be apply to content and pedagogy (p.106).

Some Current Problems with E-Learning Environments

Learners versus Users

Smulders (2003) maintains that the rarely made distinction between learners and users is problematic in an e-learning environment. The fine line between learners and users may have resulted in such negligence. For instance, in certain situations one can only become a user after going through the process of learning, such as in the case of driving a vehicle. In order to be a driver, one has to learn to drive. Yet in an e-learning environment, the situation is quite different from that just cited. A user may know how to click through links to get to the end of a lesson but he/she may not have learned any content materials in the process of clicking through. Smulders (2003) provides a very good explanation of how a learner is distinguished from the user, or vice versa:

> Think of it this way: In a history course, a learner needs to know how to write an essay—that is forming ideas, doing research, synthesizing information, and presenting cogent arguments on a position. A user, on the other hand, needs to know how to submit the essay—what tools to use to create it and where and how to transmit it so that the instructor receives it on time. (p. 4)

The problem with current e-environment is that some designers emphasize extensively the part of the learners and fail to meet the minimal criteria for the users. While other designers pay too much attention in designing an e-environment with perfect ease-of-use, yet overlook the content materials required for true learning. The former will frustrate the learners with obstacles in getting through a learning process. The latter will provide an e-environment where the users have a clear sense of direction when

navigating through the e-environment, yet end up learning very little about the content materials. Smulders (2003) describes it well, such that the poor usability of the online course inhibits the students' ability to learn, as they end up spending the majority of their time figuring out the information architecture of the course in order to move efficiently from one section to another, instead of focusing their energy on a discussion thread or in reading online course materials.

Rediscovering Design

The article released by *elearnignpost* in August 2003, titled "Learning by design," reevaluates the task and responsibilities of an instructional designer. It states that oftentimes, an instructional designer acts more like a learning engineer: "Engineers mainly concern themselves with applying trusted techniques and processes to new situations. There tends to be a focus on the functional elements of a solution and its robustness" (Learning engineers section, ¶ 2). The article criticizes that many e-learning companies follow a set process when coming to instructional design: they define the learning objectives, perform a learning task analysis, structure the course, choose the content, decide on appropriate media and learning activities and then choose appropriate validation. The results of following such a uniform procedure are e-learning software and products that are functional, cost effective, reliable, yet uncreative and breed conformity. Such products usually fail to meet the individual needs and emotions.

Problems with Literature of Past Instructional Design

Schindelka (2002d) addressed the problem of past literature on instructional design in failing to make a distinction between visual/multimedia design and instructional

design. Each of these areas requires input from experts and professionals from different disciplines. She suggests that “the cross-fertilization of ideas” and “an interdisciplinary approach” are two essential beginning points in bridging the gap between visual/multimedia design and instructional design (Schindelka, 2002d, ¶ 5). A lack of expertise in either of these areas will lead to an e-learning environment or software that is either learner-centered or user-centered, but without a balance between the two: “Some designers (and their processes) tend to favor some aspects of educational technology (e.g. media design, technology development) and ignore others (e.g. pedagogy, management)” (Schindelka, 2002d, ¶ 2). The issues that concern visual and media design will be discussed later in this chapter with greater detail.

Problems with Terminology

The most difficult problem in understanding a subject is when there is no consistent use of terminology across the discipline. Terms such as *instructional development*, *instructional technology*, *instructional design*, *instructional system design*, *instructional message design*, and *educational technology* are confusing to many. They are sometimes used interchangeably; sometimes they are used to refer to slightly different things but with extensive overlaps; sometimes individually at different point in the history of instructional development, yet at other times distinctions were made between them. For instance, Shrock (1995) points out that some scholars use the terms instructional development and instructional technology interchangeably, while others use the terms instructional development and instructional design interchangeably (p. 11). Yet in her own discussion of the subject, she distinguishes between *instructional development*

and *instructional media* or *instructional design* (p.11). Dick and Carey (1996), on the other hand, define instructional design as an umbrella term that includes all phases of instructional system design (as cited in Schindelka, 2002b, ¶ 5).Gentry (1995) distinguishes between the term *instructional technology* and *educational technology* by providing considerable lists of definitions made by different authors on each of the terms, before summarizing to produce his own definition for each one in his own words. Even more problematic is that the definitions of these terms are changing temporally through history following the emergence of different technologies, new learning theories, and pedagogical philosophies. When the term *instructional system* was used by Robert Glaser (1962) and Robert Gagné (1962), it was used to refer to the design of educational concepts and teaching philosophy to aid in the development of the science of instructional technology (Shrock, 1995, p. 16). Thus instructional technology and instructional system were used to refer to quite different things.

Out of the confusion of the above cited terms, the terms *instructional design* and *instructional technology* seem to be two of the most commonly used in the current e-education world. It is not the task of this chapter to deal with definitions and its problems; yet it is crucial for anyone dealing with instructional development to be aware of the multiple definitions that exist. To facilitate the discussion in this study, the term *instructional development* is chosen here to refer to the process of developing effective form and content of instructional design for the e-learning environment in the digital age of the 21st century. The word *development* will be used in this context to encompass the idea of design, planning and multimedia technology. Shrock's (1995) definition of

instructional development will be adopted for the purpose of this study, which states: “An application of scientifically derived principles to the planning, design, creation, implementation, and evaluation of effective and efficient instruction” (p. 12).

The Term *Instructional Development* in Educational History

Understanding the implications of the term *instructional development* in educational history is important for the purpose of this study, which is in part concerned with the integration of media design in instructional development. Shrock (1995) maintains that despite the fact that the definition of instructional development implies instructional design, yet makes no explicit reference to instructional media; nevertheless, media professionals have played an important role in the history of instructional development (p. 12). A brief survey of the historical development of instructional development in the education field will help the reader see when and how instructional media came into play and the ways in which it has altered the direction of instructional design.

The advent of scientific investigation into human and animal learning before the 1920s made way for E.L. Thorndike’s effort in establishing an empirical knowledge base for education, which promoted the notion that empirically based principles can be applied to generate predictably effective instruction (Shrock, 1995, p. 12). The maturation of ideas such as educational objectives and individualized instruction in the 1920s were fundamental to instructional development. The advocates for these ideas include Franklin Bobbitt who promoted the social efficiency movement, such that schools should provide experiences specifically related to those demanded of citizens by their society. Bobbitt

viewed curriculum as educative experience: “[Curriculum is] that series of things which children and youth must do and experience by way of developing abilities to do the things well that make up the affairs of adult life” (Jackson, 1992, p. 7). It was in such a situation that the roots of job and task analysis germinated—that is the analysis of a complex skill into its component sub-skills before it was assigned to or learned by students. In light of this, the connection between outcomes and instruction was further emphasized, resulting in more individualized and objective-driven planning of instruction that aimed at the goal of achieving specific outcomes.

The Great Depression in the 1930s slowed down any progress toward the creation of any instructional system. Nevertheless, it was during this time that Ralph W. Tyler began his famous work, *Basic Principles of Curriculum and Instruction*, published later in 1949, that in retrospect advanced the evolution of instructional development, based on the four essential questions suggested in his book.

1. What educational purposes should the school seek to attain?
2. What educational experiences can be provided that are likely to attain these purposes?
3. How can these educational experiences be effectively organized?
4. How can we determine whether these purposes are being attained?

When one looks at Tyler’s four questions closely, it is not difficult to find a resemblance with the set process of instructional design discussed earlier: defining objectives, providing analysis, structuring course content, and finally performing evaluation and

validation. It is no wonder that Shrock (1995) describes Tyler's rationale as one that in retrospect advanced the evolution of instructional development (p.14).

In the 1940s, the explosion of World War II and the accompanied urgent requirement to rapidly train thousands of military personnel to perform thousands of tasks critical to their survival had a far-reaching impact on the evolution of instructional development (Olsen & Bass, 1982; Saettler, 1968; Shrock, 1995). Saettler (1968) stated that "instructional technology came of age during World War II" (p. 179); but Shrock (1995) contends that it was instructional media, rather than instructional technology that were nurtured by the war effort (p. 14). Their different views were again troubled by the problems with terminology. In any case, World War II had brought the advancement of instructional development in the education world one step further, especially with the research and development project in the field of instructional technology and the emergence of the role of instructional technologist. It was not difficult to imagine how the success of such developments in the military field was picked up by education professionals.

One of the most significance contributions in the 1950s was probably B.F. Skinner's Programmed Instruction Movement. Programmed instruction was a teaching technique that was based on Skinner's theory of behaviorist psychology, which believes that human behavior can be explained in terms of physiological responses to external stimuli. In programmed instruction, a student is presented with a series of ordered and discrete bits of information, each of which he or she must understand before proceeding to the next stage in the series. The contribution that programmed instruction made to

instructional development is seen in the way in which it reaffirmed the feasibility of self-pacing and mastery learning, and made apparent the need for carefully constructed materials (Shrock, 1995, p. 15). The systematic format of programmed instruction made possible the design of a variety of teaching machines on a very large scale through the use of instructional media. Skinnerian psychology has had a great influence on many instructional designs even until today. Dick (1995) maintains that "the historical roots of much of what today is referred to as instructional design was Skinnerian psychology, especially as it was manifested in programmed instruction" (p. 5).

It is noteworthy that the impact brought about by different events and different historical movements continued through the decades. Therefore before the 1960s, there were already accumulative efforts and resources for the advancement of instructional development. There were a few significance milestones in the 1960s: First, there was the refinement of instructional development, especially with the employment of the term *instructional system* in the early 1960s by Robert Glaser and Robert Gagné. In 1965, Robert Gagné published *The Conditions of Learning*, in which he relates different classes of learning objectives to appropriate instructional designs (Shrock, 1995, p.16). Then there was the support of the federal government on instructional development, both in the military and the education fields. The Elementary and Secondary Education Act (ESEA) in 1965 helped established a total of 20 federally funded research and development laboratories. The U.S. Office of Education was at the same time funding the Instructional Development Institutes, which were making attempts to disseminate instructional development procedures to public teachers across the nation (Schuller, 1986; Shrock,

1995). Finally the emerging trends of instructional development and the encouragement brought forth by federal governmental support encouraged many educational professionals who had considered themselves primarily media specialists to begin their collaborative efforts in broadening the field of audiovisual (AV) instruction to embrace the larger concept of instructional development and technology (Schuller, 1986; Shrock, 1995, p. 17). While these professionals were attempting to better integrate media with instructional design, there were yet others who still held fast what they thought of as necessary separation between media designers and instructional developers. Such a tension, as Shrock (1995) contends, seems to remain in the field of instructional development in the present day. Historically speaking, there was indeed a close kinship between instructional media and instructional development, as Shrock (1995) points out, that many graduate programs that produced instructional developers had their roots in instructional media (p. 17).

The 1970s saw the proliferation of instructional development (design) (ID) models. By the 1980s, scholars Andrews and Goodson (1980) were able to identify about 60 ID models. The increasing number of ID models called for improvement and re-evaluation of many of the previous models as well as a thought into the role of an instructional developer. It was during this decade that many instructional developers looked to cognitive psychology for ideas to serve as their basis for instructional design. The issue of different learning theories began to enter into the scene of instructional development. There was also a growth in graduate programs focusing on the field of

instructional design; yet the gap between instructional media and instructional design remains.

It was not until the 1980s onwards, with the increasing popularity of instructional applications for microcomputers that the issue of instructional media and instructional design was being debated again by professionals in the different fields. Although the possibilities brought along by microcomputers once hastened the utilization of cognitive psychology and knowledge engineering strategies that was popular in the mid-1980s, this phenomenon was soon overtaken by a new concept of teaching—the constructivist approach.

From the 1990s onwards, proponents of the new digital technologies began to challenge the theoretical and analytical bases of many instructional design models that were designed based on behavioral or cognitive psychology, and started to promote newly designed ID models that are suitable for the constructivist approach in instruction. An interesting question to ponder here may be this: Was it the new learning theories—constructivism and others—that influenced the perspective on instructional design (which is used here to include also media design)? Or was it the nature of the instructional media of this century (the digital devices, such as computers, wireless devices, Internet, etc) that hastened the emergence of new learning theories?

Instructional Design, Pedagogy and Learning Theories

An intricate interaction between instructional design, pedagogy and learning theories is necessary for a successful e-learning environment. In the year 2001, MIT established their OpenCourseWare (OCW), an ambitious 10-year project to make all MIT

course materials available on the Internet free of charge. By doing that, MIT announced to the professionals within the e-education world that information by itself does not make an e-education successful. The essence of e-education lies in its pedagogical strategies expressed through the use of multimedia instructional design and any visual aesthetics that come with it. In an interview, the president of MIT Charles M. Vest stated that, “We are not providing a MIT education on the Web. We are providing our core materials that are the infrastructure that undergirds an MIT education. Real education requires interaction.” The act of interaction is one of pedagogical strategies. The establishment of MIT OpenCourseWare, if successful in the long run, will serve to promote growth of innovation, such that instructional developers and designers are able to worry less about researching for and developing quality content materials, instead more quality time and energy will be able to be allocated to the development of its delivery and innovations of technology and pedagogy in an e-learning environment (Salter, 2002, p. 3). If sufficient courseware were made available through the participation and contributions from other colleges and universities, there will come a time when the emphasis of the e-learning environment will inevitably have to shift from building of information to implementation of pedagogical strategies. In other words, the focus will shift from making information available to e-learners to a focus on the learning process and the dynamic interaction between e-learners and e-teaching activities.

Pedagogical Considerations

In a physical classroom where instructor and students have immediate contact, the instructors may be able to gather information through observations of various aspects to

get a sense of whether a student is actually learning in class. In an e-learning environment, when immediate contact is unavailable, an instructor would have to design appropriate learning and teaching activities to gather the same amount of information. In this aspect, the four categories of pedagogical considerations suggested by Chen (1997) for distance education may also be applied here when considering the design of a good e-learning environment:

1. Interaction between instructors and students;
2. Instructional strategies;
3. Motivation;
4. Feedback and evaluation.

Past research (Barker, 2002; Kidd, 2005; Shih, 2004; Shotsberger, 2000; Webb, Jones, Barker & Schaik., 2004) indicates the importance of synchronous and asynchronous communications (or interactions) within an e-learning environment as one very important factor that contributes to effective online instruction. One of the problems in many e-learning environments is the lack of effective interaction between instructors and students. For instance, many colleges are using Blackboard for e-learning courses and instruction, but many instructors restrict themselves to uploading course materials (such as syllabus, reading materials and lecture outline) to the course web site and never use the interactive features (chat, discussion forum, email, messages). The year 2005 OECD report indicated that many universities all over the world use a Learning Management System (LMS) (the most common ones are Blackboard, WebCT, and Moodle) merely for administrative purposes, and that LMS have had very little impact on

pedagogy (as cited in Dalsgaard, 2006). Some instructors may be using the discussion board to generate class discussion among students and between instructor and students through different discussion threads, but the lack of immediate feedback with the discussion board in Blackboard software has resulted in a lack of satisfactory results of many of these e-learning courses. Although the virtual classroom, with capacity for live chat, utilization of a collaborative whiteboard, and group web browsing, is available in Blackboard, its capacity for use by instructors may still be limited owing to its demand on the commitments from both instructor and students during a specific time frame. Such technology features, nevertheless, may work better with another form of e-learning environment that provides tutorial services to students, such as tutor.com, where tutor-student interaction is better enhanced with the use of chat and whiteboard for the student to express their problems doing homework and for the tutor to provide coaching through written expression or visual means. To a certain extent, tutor.com has practiced the use of simulation (although still a primitive one at its current stage)—the use of the whiteboard and chat room resembles a physical classroom in which there is an instructor whom you may consult and get immediate feedback and evaluation for the problems you have in your work. If a student is having a problem with mathematics, he/she is able to avoid the tedious typing of mathematical symbols by going to the whiteboard and scribbling the mathematical statement just like he/she would on a piece of scrap paper.

Role of Context in Instructional Design

The word context can be defined as “the whole situation, background or environment relevant to a particular event” (Tesser & Richey, 1997, p. 87). In an e-

learning environment, context can refer to things such as how the interface is laid, the way learners interact among themselves and the way they interact with the instructor, the means of interaction, and the interacting environment. The role of context is very much overlooked in instructional design and this is an issue that needs to be addressed especially when an e-learning environment (the context of learning) may become a dominant learning environment for future education.

Why is context so important in the design of a learning environment? One does not learn in a vacuum. Context is an influential and inevitable part of everyday experience. One may choose to ignore context but is nonetheless influenced by it. Context may inhabit or facilitate learning to various degrees. For instance, in the case of an e-learning environment, if too many animations are included, they may distract students' attention from the content materials. Alternatively, when audio and visual teaching aids are incorporated appropriately within an e-learning environment, they facilitate learning (Schindelka, 2001d, ¶ 7). A learning event may take place in multiple contexts, for instance, while students are browsing through content materials within an e-learning environment, they may also be doing online discussion, or video conferencing with fellow classmates. Tessmer and Richey state (1997) instructional design can accommodate context, but cannot control it. Therefore it is the task of an instructional designer to be versatile to contextual factors, or to adjust instruction to fit the context.

Depending on the basic principles and philosophy (as in various learning theories) that an instructional designer uses to guide his/her design, an e-learning environment that aims at achieving the result of drill-and-practice ought to look and feel different from an

e-learning environment that promotes a constructivist approach or problem solving. Contexts are especially important when designing an e-learning environment with the constructivist approach in mind, since constructivism is context-dependent. The constructivists consider knowledge and learning as contextually based and rooted in meaningful experience gained from the surrounding environment (Schindelka, 2002b). Understanding psychology (which includes learning theories) and human development is thus one of the many duties of an instructional designer. As Winn (1997) maintains, "A successful practitioner or researcher needs to be thoroughly versed in at least the immediately underlying discipline[s] [in the case of instructional design, the underlying disciplines are psychology and human development] to his or her own" (p. 37).

Learning Theories and Instructional Design

There is no one-size-fits-all type of instructional design. Winn (1997) puts it well that "a theory of instruction that contains a prescription for every combination of learning outcome and student characteristic will collapse under its own weight" (p. 35). The earlier outline and discussion on instructional development in educational history shows that learning theories have considerable impact on the way instructions are designed. Although learning theories may serve as a good beginning guide in the design of instructional models, they should only be used as signposts, not to be followed with hard-and-fast rules. No instructional design should be strictly prescriptive since human beings do not behave as predicted (Winn, 1997, p. 37). Just like many social sciences and humanistic history, new learning theory does not invalidate the old ones. Criticism of one theory as more remote or advanced than the other does not give justice to either one of

them. The decision to use a specific learning theory or combination of theories in guiding an instructional design is influenced by many contextual factors, the targeted audience, and the desired goals and objectives. When an instructional design fails to achieve its goal, the designer may first approach the problem through learning theory. If the problem persists, the designer should not substitute another prescriptive learning theory but evaluate by thinking through the processes of a learner engaged in the entire e-learning process. Such approach to a problem will often lead to new discovery and innovation in instructional principles, and a more successful instructional design guided by learning theories. There are three major learning theories that have continually influenced instructional design models in the past decades—the behaviorist theory, the cognitive theory and the theory of constructivism. It is important for instructional developers/designers to be aware of the different theories in order to identify and understand the theoretical basis behind the different types of e-learning environments.

Behaviorist Theory

Skinnerian psychology has influenced instructional development for many decades. As a matter of fact, until the mid-eighties, most instructional designers came from the behaviorist tradition. Behaviorists designed most of the instructional drill-and-practice software programs that appeared in the first ten years of instructional use of microcomputers in schools (Cates, 1993, p. 135). Behaviorism emphasizes practice and reinforcement (Gropper, 1983; Sulaiman & Dwyer 2002). Therefore the content materials are broken down into smaller chunks, each of which is taught sequentially, and the design of its learning often takes the form of sequential instructional programs whereby the

mastery of one lesson is a prerequisite to the next one. Students are given immediate feedback and responses as they go through the drill-and-practice exercises (Cates, 1993).

Cognitive Theory

Cognitivism emphasizes internal processes, information processing, long and short term memory and how learners acquire knowledge (Seels & Glasgow, 1998; Sulaiman & Dwyer, 2002). Cognitivist theorists propose that learners are able to absorb more information and process it in a shorter time if they know the way to minimize their cognitive load (the amount of information the mind can handle). Cognitive instruction seeks to help learners form schemata (patterns of learned material) and supplies them with memory aides. Techniques such as the use of keywords and mental imagery are common strategies in cognitive instruction (Cates, 1993).

Constructivist Theory

Constructivism is oriented towards problem-solving (Seels & Glasgow, 1998). The constructivist approach to learning emphasizes learning as an active process of knowledge construction, rather than knowledge acquirement (Sulaiman & Dwyer 2002). An e-learning environment that takes a constructivist approach is usually heavily learner-controlled. As Cates (1993) puts it:

> In this school of instructional design, the designer's task is to provide the learner with control (or empowerment), and learners then examine the materials and draw their own conclusions. The key is to provide a wealth of materials and techniques for examining them in different sequences and under a high degree of student

> control. Unlike the two earlier schools of instructional design, constructivism puts the learner in charge of his or her learning and the teacher is viewed as a facilitator. (p. 135)

In other words, constructivism moves a step further from the study of how the brain stores and retrieves information to look at the way in which learners make meaning from experience. As McMahon (1997) puts it, “learning is an internal process of interpretation,” and creates interpretations of the world based upon their interactions in the world (Social constructivism section, ¶ 1). From this perspective, context is important to learning. To a constructivist, there is no objective knowledge (despite a possible existence of an objective reality) because everybody constructs meaning in different ways, based on many variables, such as experiences, past knowledge, the existing context, as well as the interaction and interrelationship of all these. As Duffy and Jonassen (1992) describe, “there are many ways to structure the world, and there are many meanings or perspectives for any event or concept” (as cited in McMahon, Constructivism section, ¶ 3).

In this century when the Internet and the World Wide Web have become almost part of every facet of one’s life, their use in education is an aspect that needs to be addressed. Some view the Web as a “cognitive tool for investigating and representing knowledge (Reeves & Reeves, 1997, as cited in McMahon, 1997); while others view it as “a semantic knowledge space which will mirror learners’ own developing cognitive structures (Lambert & Walker, 1996, as cited in McMahon, 1997). McMahon himself looks at the Web as an ideal forum for constructivist learning, especially with its

hypertext links, or commonly known as hyperlinks, whereby texts or images are *highlighted* and indexed to create a link that takes someone who clicks on it to another virtual space represented by a new webpage, a new window, or simply a refresh page, for new information or materials that has some associations with the indexed texts or images. The nature of such association in a way opens up new possibilities for new construction of knowledge because based on the interest, past experience, and many other variables, there is a high possibility for different users of the Web to click on different links, hence creating an association, or group of information that lead to different ideas and knowledge when considered in its aggregate, which oftentimes provide a highly interconnected but complex knowledge base. It is here that McMahon suggested the theory of social constructivism, a theory pioneered by Vygotsky (1978), is able to offer some assistance to this kind of learning.

A social constructivist looks at culture and context as important elements in forming understanding. According to McMahon, “Vygotsky favored a concept of learning as a social construct which is mediated by language via social discourse” (as cited in Social Constructivism section, ¶ 3). McMahon argued in his article that a theory such as the social constructivism would be suitable for web-based education, since this kind of education would involve a high level of social rather than physical interaction. The complex process involved in human use of language during the process of communication, when coupled with practical activity, is able to foster a higher level of intelligence. Here language and communication have become the focus; thus many Social Constructivist models in teaching, such as that proposed by Jonassen (1994), emphasize

collaborative work among learners (as cited in McMahon, Social Interaction and Learning, ¶ 5). McMahon's study seems to indicate that the Web has great potential for e-learning because of its nature of free association through hyperlinks, and the Web as communications medium, as seen in common Internet communication tools such as the use of email, newsgroup, Internet Relay Chat; or the slightly more recent use of tools such as the discussion forum, blogs and wikis.

Media Design in an E-Learning Environment

The 21st century is a century that immerses itself in the media world. People, both adults and children, are so much influenced by their *mediated life* that their interactions with computers, television and new media are becoming primarily social and natural—people expect mediated life to adhere to social rules and natural rules of the physical world (Reeves & Nass, 1996; Schindelka, 2002a). Reeves and Nass (1996) suggested that in this respect, much of what social science learned about human social interaction can be used to explain how people feel about and respond to media (as cited in Schindelka, 2002a). In a recent article *Learning Circuits*, another scholar Salter (2002) expresses his confidence that in the near future, purely computer-based interaction, such as the use of simulations, is going to proliferate in an e-learning environment. He contends that such means of interaction offers vast potential for enhanced pedagogy. It has both cost savings (since humans must be paid for their time) and convenience (since computers never take time off) (Salter, 2002, p. 3). As discussed earlier, some e-learning environments like Blackboard are restricted to one-way, remote interaction between instructor and students because of the limitation of time, energy and work load any instructor can offer. The

result of which is an e-learning environment that is falling short in pedagogical considerations. The integration of computer-based interaction such as the future possibility of high-end simulations in an e-learning environment is bound to enhance the implementation of previously neglected pedagogical considerations.

A decade ago, there were still arguments among scholars on whether media influence learning. These arguments ended up with no apparent results because the issue did not seem to be a real debating point (Cobb, 1997). The continual development and advancement of new media have made clear the fact that media are here to stay. So instead of debating whether they influence learning, the effort would be more worthwhile at this point to see the ways in which media have affected people's lives at large. When they affect people's lives, it seems logical then to think that they are bound to also influence the way they learn. The argument on the issue, nevertheless, casts unnecessary doubts on the roles and potentials of media design in instructional technology. One of the most influential advocates who proposed media development as mere technician-level work is Richard Clark. Clark held firm the idea that any media are capable of delivering any instruction, therefore it matters less what media one uses in giving instruction, what matter most is the instructional method employed (Cobb, 1997). While Clark may not be entirely wrong in the point that he is emphasizing, his insistence on learning being affected by instructional method and not media per se has imposed a dangerous misconception which may have indirectly led to the disengagement of instructional media and learning research. Cobb (1997) states:

> Clark's writings . . . [downgraded] the importance of instructional media so thoroughly and apparently so irrefutably, making outcomes-based media research seem impossible to do correctly, they probably helped widen the divide between learning research and media development unnecessarily. . . .With such a divide in place, the logic of Clark's analysis becomes circular and self-fulfilling: media do not affect learning, so few learning specialists are attracted to media work, and then instructional media are produced commercially without input from learning research, and are indeed largely equivalent to each other and peripheral to learning. (p. 22)

Clark's proposal may have diverted and delayed any possible research into the role that media play in instructional design; yet a new ground of research and exploration soon began when researchers realized the amount of power that media design has on instructional design and e-learning. Cobb (1997), for one, takes a bold step in attempting to look at Clark's proposal from a new perspective. He maintains that while Clark may suggest that there is no interesting difference between using voice or computer as instructional media, such comparison can easily achieve an entirely different result when one look at these two media as two different information distributors.

> One involves verbal learning via the medium of voice or Braille, with all information held in memory, while the other involves verbal-visual learning via the computer program, which controlled amounts of information processed outside the mind and remembered on a computer screen. (p. 33)

Cobb describes that using a computer instead of voice will achieve what he termed *cognitive efficiency*, since a computer is able to potentially reduce the cognitive load in a learner, and thus assist him/her in processing the information received.

Paivio's dual code theory is also being explored by some scholars, such as Hodes (1994) and Lai (2000), to support the idea that media design does affect the effectiveness of e-learning. Paivio's (1969, 1972, 1975) dual-coding theory suggests that memory and cognition are served by two separate symbolic systems—verbal and nonverbal information. Visual images are referred to as nonverbal information; whereas verbal information relates to speech or a language system. Hodes (1994) states that, "The nonverbal system is specialized for perceptual knowledge: encoding, storing, organizing, transforming, and retrieving spatial information about concrete objects and events. The verbal system deals with information in discrete linguistic units and is specialized to deal with sequential information" (p. 2). Although each system can function independently, most processing involves connections and reinforcement between the two systems.

What has Paivio's dual-coding theory to do with media design and its implication in instructional design? As Lai's (2000) research suggests, Paivio's theory helps a designer to take an in-depth look when incorporating multimedia design in instructional design, especially when it is used in the e-learning environment. The research on the effective use of words, graphics, pictures, sound, and animations in an e-learning environment is varied and inconsistent. Schindelka's (2001c and 2001d) explored the appropriate amount of different types of media (such as video, animation, etc.) that some course designers incorporated in their instructional design for an e-learning environment.

Schindelka does not provide any hard-and-fast rules or guidelines for readers to follow in this aspect, because there are simply no such rules that exist. The most difficult task as a media designer is to work with an instructional designer and a content developer, so that appropriate amount of media is incorporated that meets the targeted audience's need and also achieves the educational objective. Yet even with this, constant feedback and evaluation are still two required processes to go through in order to produce effective instruction. Although some scholars, such as Misanchuk, Schwier, and Boling (2000), provide guidelines on aspects of instructional multimedia design, these guidelines require fine tuning and tailoring when one attempts to apply them to a specific e-learning environment with a specific group of learners. Ultimately, the rule of thumb in general is to achieve balance. Any experienced media designer will gradually find that it is not possible to talk about media design putting aside visual design, because one serves to complement the other. Cantoni, Cellario, and Porta (2003) state that "among the most effective e-learning approaches are those exploiting streaming video, rich visualization and interactivity to deliver the training experience to the user's machine" (p. 339). This statement clearly suggests the importance of using visual design to complement media design and vice versa. The balance between media design, visual aesthetic and instructional design is one of the toughest jobs that any instructional developer will have to face.

Visual Aesthetics and Instructional Design

Both Schindelka (2003) and Boling (1997) claim that an appropriate balance between instructional design and visual/creative multimedia design fundamentals is

integral in well-designed multimedia products. In order to achieve such quality, many scholars in the field of instructional design (Schindelka, 2003; Schwier, Misanchuk, & Boling, 2000) suggest collaborative team work among an instructional designer, media designer, and visual designer is necessary. Each expert will have his/her role to play: "The instructional designer is ultimately to ensure that the product will be effective from an educational or instructional point of view; and the visual/multimedia designer to ensure creative, interesting, and intuitively aesthetic appeal" (Schindelka, 2003a, ¶ 2). Although this situation may seem ideal in theory, it is not often the case in realistic situations because of the difference in cultures and ideologies that each expert may possess and hold fast. A visual person tends to measure the quality of instructional media by its visual and sensory appeals while an instructional designer may overly emphasize the presentation of content materials. A media designer, on the other hand, may focus too much on the logistics of application and overlook its aesthetic aspects. Instructional multimedia design for an e-learning environment requires a little input from every expert to possess such qualities as richness in content, ease of use, and visual appeal—a balance between function and form. As a matter of fact, most things in life require both a balance between the functional and aesthetics aspects to be truly beautiful. Norman (1988) expressed it well:

> If everyday design were ruled by aesthetics, life might be more pleasing to the eye but less comfortable; if ruled by usability, it might be more comfortable but uglier. If cost or ease of manufacture dominated, products might not be attractive,

functional or durable. Clearly, each consideration has its place. Trouble occurs when one dominates all the others. (p. 151)

Visual aesthetics in a way contribute to the nature of context in an e-learning environment. To use a gardening metaphor suggested by Schneider (1978) and Peters, O'Connor, and Eulberg (1985), learners with their individual differences and abilities are seeds; instructors and designers are the gardeners who help the seeds grow; and context is the soil in which the seed is embedded. Successful gardeners consider both seeds and soil in their gardening (as cited in Tesser & Richey, p. 87). The use and integration of pictures, graphics and sound within an e-learning environment vary: It may be affective to engage a learner, to affect his/her emotion and attitudes; it may be integrated to portray a mood, an atmosphere of the e-environment, to create a setting. At other times, these multimedia elements—graphics, pictures, animation and sound—may have an entirely instructional purposes (Schindelka, 2001d).

Both Hodes (1994) and Winn (1989) suggest that incorporation of visual elements in multimedia instructional design will actually help learners in acquiring information, interact with the content, recall prior knowledge, as well as process information. Winn (1989) argues that use of visual elements make the abstract more concrete: "It is the concreteness that stimulates the imaginal process" (as cited in Hodes, 1994, p. 5). Cantoni, Cellario, and Porta (2003) maintain that "through visual e-learning it becomes possible to deliver clearer and more engaging training, which is more likely to be understood and remembered (especially in the case of complex topics)" (p. 339). While it is not always easy for an instructional designer to understand the need for a creative

design, or act like a creative designer, there are some attitudes in handling design that an instructional designer may be able to learn from a creative designer (Learning by design, 2003). For instance, a creative designer always sees a situation anew by avoiding a routine way of doing things. They will avoid filling new wine in old bottles to minimize the tendency of stereotypes. The habit of generating more than one solution and idea is also one good working attitude that any designer should have. Finally peer review and critiques are critical to a designer's professional development. A good designer does not work within a vacuum but always keeps the eyes open to observe and gain inspiration from his/her surrounding—always observing others while keeping his/her own design unique and original. A creative designer should always be bold to experiment and play with new ideas. The problem with instructional designers may be that each designer is too eager to come out with his/her own theory, the result of which is a vast amount of instructional theories that greatly overlap. Oftentimes different terms may be used to refer to the same thing.

Recent advancement in digital technology has provided more choices than ever to instructors engaging in an e-learning environment to select what to include in the organization and presentation of their instruction. It is important to know what types of visual elements to include and to what degree should detailed information be provided in the visual graphics. Yet guidelines for making these choices are not available because creativity is allergic to rule-binding. As early as the 1970s, researchers such as Dwyer (1972) began researching the ways in which visual illustrations affect the level of student achievement. It was found that different types of visual illustration carry different kinds

of stimuli characteristics. As these visual elements varied in kind, amount, and degree of realism, it affected student achievement accordingly. Dwyer's (1978) research discovered that "the primary problem associated with the relationship which exists between differences in the amounts of realistic stimuli contained in different types of visual illustrations and the level of student achievement is that the relationship is not linear but curvilinear" (p. 5). Dwyer (1978) explained that although visual information with too little information may not be adequate in providing any more information than he/she already has got from the text description, visuals that contain too much information may also overwhelm the learner and cause him/her to withdraw from rather than engage in the necessary interaction needed in the learning process (p. 14). Cantoni, Cellario, and Porta (2003) explain a similar phenomenon associated with the layout of any presented material:

> People learn more from what they notice than from what they ignore or are unaware of. Attention is an essential aspect in the learning process. Attention can improve learning, while distraction can interfere with learning, drawing essential resources away from the material being taught and therefore hindering learning itself. (p. 339-340)

The principle for selection and inclusion of visual elements is similar to the principle for the selection and inclusion of multimedia elements within an e-learning environment—balance is the keyword for success.

The Marriage of Instructional Design and Creativity

When Dick (1995) did his research on instructional design and creativity, he asked his respondents what factors they considered as crucial to the design of creative instruction. Three major areas of concern were outlined: Firstly, understanding the needs of learners and tailoring the design to that need. Secondly, the instructional strategy that deals with the ways content is organized, delivered and presented. Learner's motivation is an important pedagogical consideration; in this case, instructional strategy has direct impact on motivating learners. The third area of concerns was given to formative evaluation, in which learners are approached for feedback and evaluation of the newly designed instructional model after they have had a chance to go through it. Questions such as these are asked: Does the model hold their interest? What can be improved? What was the most interesting part in the model?

Dick (1995) added two areas which his respondents did not specify, and they are the knowledge of subject-matter domain under consideration and knowledge of the context for the learners. Just as creatively designed instructional multimedia requires a team effort, each specific role also requires internal team work with input from specialists with special knowledge and skills. When such a situation is not possible in a realistic situation, research work and cross-disciplinary consultation may be required to achieve a certain level of quality. For instance, an instructional designer, while possessing the expertise to work with the design of instruction, requires a specialist in the subject matter to provide content knowledge. A media designer, although familiar with design of

multimedia using different multimedia software, may require input from a programmer for certain background work, such as what is required in a web application.

The issue of contextualizing the instruction deals directly with presentation and organization of content materials, and this is where the expertise of a visual designer is needed. Dick (1995) states that successful contextualizing of instruction will help learners transfer knowledge and skills learned from the learning context to the performance context. In an e-learning environment, the organization and presentation of multimedia elements is even more critical than the incorporation of these elements in a physical classroom because they are basically everything that the learners will be looking at and engaging with—the atmosphere, mood, its visual appeal and the ease of accessibility. While the incorporation of multimedia in classroom instruction needs to be concerned with integrating with the context, the integration of multimedia in an e-learning environment is the *environment*. Cantoni, Cellario and Porta (2003) suggest that the cognitive efficiency of static displays and the use of visual cues are two significant areas for users and learners to extract valuable task information. They cited *navigational cues* as one major example, emphasizing that it is one important means through which one interacts with the e-environment. It is through such navigational cues that one makes decisions on where to go, or what to click on, for a further exploration to extract deeper meaning of a topic. Thus, Cantoni, Cellario, and Porta suggest that “the main goal of designers of e-learning systems should be to understand the principles which cause cognitive effort and decision making, and incorporate them into the learning environments” (p. 340). Ultimately, the question boils down to: What criteria should an

e-learning environment comprise? There is no easy answer to this question because this is not a one-answer question. The author of the article, “Learning by design,” urges an instructional designer to think of himself/herself as a gardener designer, for a gardener designer treats each problem as unique.

> Each garden has its own opportunities and constraints; each client is different: two clients can have similar gardens but want them to do different jobs; though they are creative they follow rules: each plant will only grow under the right circumstances of light, soil, maintenance, etc.; each client wants a bit of magic and something that ‘fits’ them; and each client has a budget the designer must work within. An instructional designer’s work has the same issue; it is just a different medium.

A creatively designed instructional design will also take into consideration the problem discussed earlier on the balance between the role of a learner versus the role of an user, as well as a balance between information acquisition and learning. In the past decade, attention has also been drawn to the impact of human emotions on learning, later known as *emotional intelligence* (Goleman, 1995).

Learner and User

Smulders (2003) points out that one of the problems he observed in an e-learning environment is that instructional designers have given considerable time and effort to the development of learning goals, activities, assignments and the assessment of learning outcomes, but comparatively little amount of time and effort is spent on making an e-learning environment transparent for users. A creative instructional designer should

regard the role of learner and the role of user as two parts of a whole. A good student in an e-learning environment/classroom should be both a good user and a good learner. The MIT OpenCourseWare is not an e-learning environment, but an e-resource center for courseware because it makes no attempt in weaving in any pedagogical considerations, such as student-instructor interaction, student motivation, feedback and evaluation. In that case, a designer would design a space for users to access resources, without having to take into consideration whether the users who access the site learn any of its content materials, as that is not the purpose.

Smulders (2003) suggests that the issue with users and learners resembles the issue involving form and content. Form functions like an outer appearance of something that catches one's eyes before he/she has a chance to explore the inner nature of that something. In a way, a user has to interact with the form of the e-learning environment (interface, navigation, information structure, and the visual design of screen layout and of the actual content) before he/she is able to access its content (the actual course materials, such as lecture notes, outlines, assignments; the discussion board; feedback from instructor; and eventually grades). From this perspective, a successful e-learning environment should aim at a fusion of form and content—the interchangeable role between the learner and the user. The importance of the architecture and user interface of an online course's site is also addressed by researchers such as Brush (2001) and Kidd (2005). Both Brush and Kidd indicate the site architecture as something that establishes the sequence of a course, provides an organization of course information, as well as creates an order of procedures for users to follow. Kidd's research shows that "interface

design influences students' focus on learning and their ability to obtain the necessary course information" (2005, p. 4).

Processing of Information and Learning

Another problem with e-learning is that often a learner has to filter through vast amount of information, which eventually exhausts him/her, before he/she has a chance to get into the mode of learning. Salter (2002) states that, "Students who research on the Web often spend huge amounts of time finding marginally relevant or accurate resources" (p. 2). Some scholars (Finke, Pinker, & Farah, 1989; Hodes, 1994; Shepard, 1978) have found that the use of imagery helps learners process information faster. Imagery can be generated internally in a learner as he/she perceives something. Alternatively, imagery can serve as stimuli for high-level thinking skills. Hodes (1994) holds the former view: "Imagery, which is generated internally, is the result of information processing. The perceptual system processes and interprets visual information about the world and the imaginal system uses similar interpretive processes" (p. 3). On the other hand, Shepard (1978) holds the view that "imagery is important for high-level thinking skills where concrete representations merge with related associative processes at abstract conceptual levels" (as cited in Hodes, 1994, p. 3). Cantoni, Cellario and Porta (2003) maintain that even though people learn in different ways, research suggests that what is presented in a virtual lesson is almost always more easily remembered, regardless of the user's preferred learning style (p. 339).

These views about mental imagery and information processing can be traced back to Paivio's dual code theory discussed earlier. Hodes (1994) stated that dual-coding is

most likely to occur in the presence of familiar or clearly labeled pictures since distinct verbal and visual codes tend to interact extensively. It is therefore the task of an instructional designer (together with media designer and visual designer) to apply this knowledge when designing instruction to be used in an e-learning environment. The function of imagery does not stop here. Hodes' (1994) research also showed that many experts actually solve problems by first generating sophisticated mental representations of problem components. He contends that many scientists and inventors claimed that imagery has an important role in their creative process. For instance, Einstein claimed that he rarely thought in words.

Instructional Design and Emotional Intelligence

Although the term emotional intelligence was employed in academic literature on an occasional basis since the early mid-1960s, it was not given much attention; and thus, no further research was done on the subject. It was not until the 1990s that the idea of emotional intelligence was more clearly developed and defined by the research of two American university professors, John Meyer (University of New Hampshire) and Peter Salovey (Yale University). Meyer and Salovey's (2000) latest version for the definition of emotional intelligence came in year 2000: "The capacity to process emotional information accurately and efficiently, including the capacity to perceive, assimilate, understand, and manage emotion." Although Meyer and Salovey initiated more thorough research on emotional intelligence, the promotion of this new idea owes much to the publication of Daniel Goleman's best-selling book *Emotional Intelligence* (1995), and the lectures and speeches he conducted nationwide.

According to Astleitner and Leutner (2000), traditional instruction and instructional design only focus on learner's cognitive and motivational process while their emotional needs in the process of learning are left out. Therefore, a new concept—emotional intelligence—has been promoted to help overcome those shortcomings. Some research institutions have begun to look into the ways in which human emotions impact human learning behavior. MIT's Affective Computing Research Group, for one, is a group of scholars who are interested in studying how emotions affect learning and implementing this knowledge to create machines with emotional intelligence (Astleitner & Leutner, 2000, p. 498). The research project of the MIT group is still developing; thus it will not be available for implementation on e-education in the near future.

Ultimately, it has to be the collaborative work among the instructional designer (with assistance from subject area specialists), the media designer, and the visual designer to seek a dynamic balance in the dimensions and strategies provided, together with an appropriate selection of instructional technology features to make possible a successful e-learning experience. The issue of balance is also mentioned by Walter (1995):

> There is no perfect design. Accommodating one constraint well can often lead to conflict with others. . . .Every design problem lends itself to many alternative solutions, depending on what values people place on the various constraints. . . . The task is to arrive at a design that reasonably balances the many trade-offs, with the understanding that no single design is ever simultaneously the safest, the most reliable, the most efficient, the most inexpensive, and so on. (p. 10)

Integration of Instructional Design, Media Design and Visual Aesthetic

Current e-learning environments are still some distance away from the goal of a seamless integration of instructional design, media design and visual aesthetic. The evaluation and review done in this chapter on the current issues and concerns of e-learning environments is a first step in working towards that goal. Some major characteristics of the e-learning environment of the future, that is, one with a seamless integration, however, may be outlined at this point based on the issues and concerns discussed so far.

A collaborative team and an interdisciplinary attitude seem to be two of the major characteristics. Smulders (2003) maintains that collaborative work is one of the most efficient ways to achieve that goal. Team work allows the sharing of responsibilities and workloads by letting the experts do what they know how to do best: “You wouldn’t ask a Web designer to write the content for your business writing course. Why, then, would you ask a content expert to design the interface for your course? It works both ways” (Smulders, p. 4-5). Schindelka (2001b) holds the same view: “It’s crucial that each role, either as an instructional designer, a media designer, or a programmer, has a specific and clear mandate, dictated in large part by the nature of the position” (¶ 4).

Another characteristic involves the organization and creation of an interface environment that encourages a fusion of the role of learner and user. A learner should not have to learn how to get through a complex interface structure to begin learning. The interaction with the interface should be the beginning of the learning process for the content materials. The organization of the interface within the e-learning environment should be both visually appealing and educational. For instance, a designer could use the

interface or any multimedia element incorporated in the e-environment to motivate a learner to begin thinking about the content materials, make connections with past knowledge, or form conceptual mapping. Smulders (2003) points out that "learning is all about making connections [between the short-term and the long term memory, between past knowledge and current learning]" (p. 5). In acknowledging the importance of considering the habits of users, Smulders (2003) also points out that the design of an online environment, which can be expanded to apply to an e-learning environment concerned in this paper, is comprised of connections—that is "recognizing where to go, what to do, and how to do it, and how to get back where you've already been" (Smulders, 2003, p. 5). The concept of connections used in the learning process is more cognitive, while the concept of connections that involves user's behavior is more functional. With a collaborative effort and input from different experts in the field of instructional design, media design and visual aesthetics, however, it should not be an impossible task to set up a complementary role situation between the two concepts of connection, so that the learner does not have to perform the role of a user before he/she begins his/her role as a learner. A seamless integration requires a fusion of the roles and a dynamic balance between the form and the content.

Faculty and Instructors' Perceptions and Utilizations of Blackboard

In order to look at a realistic situation of an example of an e-learning environment, some literature on faculty perceptions and utilizations of Blackboard is reviewed to illuminate the research questions in this study. In terms of Blackboard use, the study of Heaton-Shrestha, Gipps, Edirisingha, and Linsey (2007) reported that features such as the

announcements and course documents were features that were most used in Blackboard, while features such as discussion board and the virtual classroom were used the least. They also reported that there are also some faculty members who specifically chose the discussion board to maximize student contribution and engagement, but in such cases, the use of course documents was sparse. There was also a small group who used Blackboard only as a gateway to Internet-based tools and resources, or for the purpose of linking to non-web-based resources such as the use of dvds (p. 445). Halawi and McCarthy's (2007) study measuring faculty perceptions of Blackboard indicated that faculty members will use Blackboard if they perceive it to be useful and if they perceive that the technology is easy to use and supports their needs (p. 164).

Woods, Baker and Hooper's (2004) study on faculty use and perception of web-based courseware as a supplement to face-to-face instruction indicated that faculty made little use of Blackboard for instructional purposes. The primary use for most faculty members was for administrative course management such as making course documents available to students and managing students' grades. In terms of attitude, Baker and Hooper found that the attitude towards Blackboard classroom management was overall a positive one, whereas it was either neutral or undecided when asked about their attitude towards its instructional benefits. The experience with Blackboard tools is a main factor that affects Blackboard usage.

Anderson (2003) did qualitative interviews with five faculty members within the School of Education at the University of Alabama at Birmingham to understand their perceptions about Blackboard. Of the five being interviewed, only one was not a

Blackboard user. Anderson developed ten categories out of the transcripts of the five in-depth interviews. These ten categories summarized the overall perceptions of the five faculty members about Blackboard (Anderson, p. 11-21).

1. *User friendly / Intuitive.* The execution and operation of Blackboard is user friendly and the interface intuitive, and that has helped to reduce faculty and student's time in figuring out minute details of operation so that they are able to focus on teaching and learning.
2. *Freedom / Flexibility.* The ability of Blackboard to provide freedom and flexibility, in that the flexibility of online course support helps to expand communication beyond the class. It also provides learners flexibility of reviewing the materials taught because the materials are there online anytime, when they want it. Some faculty members found that such freedom and flexibility have changed the nature of the class from the focus of the usual rote didactic lecture to activities that focus more on analysis, critical thinking and discussion.
3. *Communication.* The expansion of communication beyond the class. This has helped the promotion of student-to-student interaction and that student-to-instructor communication has also improved.
4. *New Challenges / Opportunities.* New challenges and opportunities brought about by the technology. There are the challenges of learning the most meaningful way to use Blackboard, and learning to make good use of the potential of this technology.

5. *Productivity.* Using Blackboard and technology helped to increase productivity. The course management tools when use appropriately can help faculty to spend time more meaningfully and foster a very independent learner. Students are able to receive more immediate feedback after submitting an assignment without having to wait until the next classroom time or wait for the instructor to mail a hard copy.
6. *Work Load / Expectations.* The change in workload and expectations through using Blackboard. The immediacy of technology has caused students to expect instructor feedback quicker. For instance, as one faculty commented in the interview, "even though the students take their full week to do their assignment, they're wanting turn around time in 48 hours" (Anderson, p.17). There are faculty who indicated an increase in workload and increase in expectations happened at the same time. While instructors spent more time putting materials in Blackboard for students, students were expected to read them and react to the materials, and they have no excuse for time because Blackboard is available anytime and anywhere there is an Internet connection.
7. *Discussion / Community.* The promotion and creation of community and collaboration. The use of the chat feature and the discussion board helps to foster a learning community in Blackboard. It is important for instructors to structure the environment for such a purpose. This is important especially for subjects like social studies.

8. *Intrinsic Motivation.* The promotion of intrinsic motivation through peer pressure. As one instructor indicated in the interview, “That’s how learning happens. You know, when they internalize that part of learning, and to involve students in constructing the knowledge base and to determine what is the learning objective and what is the outcome, is a good way to handle it” (Anderson, p. 18).
9. *Very Useful / Useful Features.* Features of Blackboard were found to be useful. Features indicated by faculty as being useful include the feature to post syllabus, the assignments, web sites, announcements, the grade book, and the supplemental materials in Blackboard such as that with curricula of varying kinds.
10. *Negative aspects*. This category discussed Blackboard’s limitations and needs for improvement or enhancement. A few comments were made on both the usefulness and the difficulties in using the integrated calendar. Another commented on the limitation of Blackboard to hold large amount of materials. Also other commented on the limitations of the test manager in Blackboard as having too few choices on question types. All who were interviewed in Anderson’s study indicated that they wish Blackboard would allow the camera, as well as video based interaction within Blackboard system itself, as an integrated tools with all other course tools available in Blackboard. The users are not satisfied with the mini-clips that were capable in Blackboard currently and wish to see it taken to a different level, such as having virtual

reality. In summary for this category, video and audio support seems to be an important feature users wish to see.

Govindasamy (2001), although not doing a study on Blackboard directly, commented on the drawbacks often seen in a general LMS. The writer described, “There is a serious mismatch between the abundance of features in LMS and the lack or total absence of explanation on the pedagogy underlying the inclusion of these tools” (Section 2, ¶ 2). Govindasamy (2001) viewed such discrepancy as a reason for many features and tools of LMS left unused by instructors, resulting in a waste of resources because these tools indirectly accounted for the cost of implementing e-learning within an institution (Section 2, ¶ 3). The lack of pedagogical considerations and appropriate guidelines for use of tools may also result in tools “being used in a manner entirely opposed to pedagogical principles, and in turn, will hamper learning” (Govindasamy, 2001, Section 2, ¶ 3).

CHAPTER THREE: METHODOLOGY

Research Design

Strategy

The purpose of this study is to investigate the way in which Learning Management Systems (LMS) are perceived and used by faculty within higher education. There are a few major LMS available to higher education. For instance, the most popular LMS currently available to most institutions are Blackboard, WebCT, Moodle, LAMS, and SAKAI among many others. Blackboard and WebCT are two leading commercial systems that are used worldwide. LAMS, SAKAI and Moodle are open source LMS that are increasingly popular (Weller, 2006). Beside these more popular LMS, many institutions are trying to develop their own LMS with specific purposes. In order to better observe how faculty members perceive and use LMS, Blackboard, one of the most popular LMS adopted by many higher education institutions, is selected for this study.

Faculty members' perceptions of Blackboard are observed from two perspectives: first, faculty members' perceptions of Blackboard as LMS; second, faculty members' perceptions of Blackboard's design, namely, the designs of its instructional features, interactive features and visual features respectively. Next, the relationship between these two perspectives is observed to see if such a relationship exists and whether or not the specific aspects of design—instructional, interactive, or visual—affect a faculty member's perception of Blackboard in general. Faculty members' capacity of utilizing Blackboard is also investigated in this study through gaining knowledge on how many different features of Blackboard they use in a typical quarter. This study also looks at

whether a relationship exists between faculty members' perception of each of the design aspects and a faculty member's capacity of utilizing Blackboard. If such a relationship does exist, it will be examined to see how well the perceptions of each design aspect influence faculty members' capacity of utilizing Blackboard. In order to address the issue of pedagogy raised by the review of literature, faculty members' pedagogical perspectives on e-learning are surveyed to better understand the way in which pedagogical perspectives interact with the capacity of utilizing Blackboard. Specific research questions are proposed to better address the above problems:

1. Is there a relationship between faculty's perception of Blackboard and faculty's perception of the design of interactive features, visual features, and instructional features respectively within Blackboard? If such a relationship exists, to what extent does each predictor (the design of interactive features, visual features, and instructional features respectively) account for a faculty's perception of Blackboard?
2. Is there a relationship between faculty's capacity of utilizing Blackboard and faculty's pedagogical perspective on e-learning, the perceptions of the designs of interactive features, visual features, and instructional features of Blackboard? If a relationship exists between capacity of use and any of the four predictors (pedagogical perspectives on e-learning, perception of the designs of interactive features, visual features and instructional features respectively), to what extent does each predictor account for a faculty member's capacity of utilizing Blackboard?

Quantitative research methods will be used to answer the above research questions. Since quantitative research methods require quantifying of variables, a questionnaire has been designed to collect data. A set of 5-point Likert scales was designed to measure faculty members' perceptions of Blackboard, perceptions of Blackboard's design, the degree of usefulness of the different features in Blackboard, as well as faculty members' pedagogical perspectives on e-learning, respectively. Open-ended questions were also included. The design of the questionnaire will be discussed later in greater detail. Multiple regression analysis was used to answer the research questions. The detailed procedure will be described later in this chapter.

Population

The target population is the entire group to which a researcher wishes to generalize the study findings. The target population for this study is all faculty members who teach in the main campus of the Midwestern university. According to the most current data (Fall 2007) from the Office of Institutional Research at the university (http://www.ohiou.edu/instres/faculty/AllFacultyByType.html), there are ten classifications of colleges with 1,286 total faculty members (918 full-time, 368 part-time) teaching at the main campus during academic year 2007-2008. Of the 1,286 faculty members, 554 belong to College of Arts and Sciences, 91 belong to College of Business, 103 belong to College of Communication, 74 belong to College of Education, 100 belong to College of Engineering and Technology, 130 belong to College of Fine Arts, 110 belong to Health and Human Services, 113 belong to College of Osteopathic Medicine, 2

belong to University College and the other 9 belong to colleges other than the above mentioned.

Sampling Plan

Sample Size

Sample is the selected group chosen for participation in a study. The selection of sample size depends on the statistical methods used to answer the research questions, as well as the estimated response rate if a survey is conducted. Since this study used multiple regression analysis to answer the research questions, and used a questionnaire to conduct a survey, sample size was computed based on the criteria required for multiple regression analysis and the estimated response rate projected by the researcher.

There was no previous study or literature that the researcher was able to use as a reference for a good effect size and shrinkage value for the multiple regression analysis, Park and Dudycha's (1974) sample size table was used as references for these values. Park and Dudycha presented a sample size table based on effect size, shrinkage, probability, and number of predictors to decide the sample size (table presented in Stevens, 1999, p. 287-288). The table recommended that effect size of .5 is adequate for social science. In order to increase cross-validity power for the model to be robust for generalization, the researcher used an effect size of .25, alpha level at .05. Shrinkage refers to how much loss in predictive power a researcher can accept. This study chose a small amount of shrinkage of about 20% (.05). There are three predictors for Research Question 1 and four predictors for Research Question 2. Therefore, the recommended

sample size according to the sample size table used here would be 91 and 117 respectively.

Since the purpose of this study is to learn about the perceptions of faculty on Blackboard, the researcher decided to send the questionnaire to everyone in the accessible population in order to maximize the possibility to include the estimated 60% who have adopted Blackboard. With such consideration, the researcher sent out 1286 surveys. The researcher chose to use a web survey as the administration method for this study. A complete list of 1208 faculty email address contacts was acquired from the Academic Technology department. Therefore, the researcher would consider 1208 to be the entire population, instead of 1286.

Sampling

Since a decision was made to include the entire accessible population for this research, there is no sampling required. A list of faculty members' email addresses was obtained from the Academic Technology department of the large mid-western university involved in this research. Next, an email invitation with a hyperlink (http://smartstrategiesllc.com/chphd/survey) requesting voluntarily participation was sent to all the 1208 faculty members in the university.

Data Collection

Data for this research was collected using an online questionnaire. An online questionnaire is a more efficient and economical way of collecting data from faculty in a university because most faculty today are avid users of the web. Communication using email is almost inevitable for faculty since almost all students are using such

communication as a primary source for communication outside the classroom. Most university announcements and event updates are also communicated through the web or email communication, which make accessing the web and knowledge of email communication an inevitable tool for faculty.

The online questionnaire was designed in such a way that when participants first clicked on the link to the questionnaire, they were shown an informed consent letter explaining the purpose and structure of the questionnaire, their rights as a participant, as well as any possible risk involved in participation of this research. In the letter, participants were also given the email address of the researcher in case there were other questions regarding the research that a participant wished to clarify. The email may also be used if a participant is interested in knowing the results of the research study.

The online questionnaire was divided into six different sections. After reading the informed consent letter, the participant was asked a question to indicate if Blackboard was ever used. Participants who have used or are using Blackboard completed all six sections of the questionnaire. Participants who had never used Blackboard or had never heard of Blackboard were directed to only three sections of the questionnaire—demographic information, pedagogical perspectives, and open-ended questions. Both groups of participants completed the questionnaire in a section-by-section manner, that is, after the completion of one section, the participant was asked to click a *next* button to go to the next section, until all sections were completed. The questionnaire was also designed with an embedded program such that if a participant chose to skip any item, a remark designed using JavaScript appeared requiring the participant to complete the

missing item before he or she proceeded to the next section. After completion of the entire questionnaire, the participant clicked on a *submit* button, which sent the completed questionnaire to a secure server accessible only by the researcher. Two follow-up emails were sent to faculty who did not respond to the first email invitation requesting voluntary participation in the survey.

Instrumentation

Original Questionnaire

The original questionnaire, presented in Appendix A, was developed by the researcher based on a review of literature and a careful observation and analysis of those features in Blackboard that are available to the accessible population group. According to the information requested from the Center for Academic Technologies within the institution selected for this study, about 60% of all faculty members in the institution use Blackboard in their teaching (X. J. Bi, personal communication, July 2, 2007). It is therefore necessary to find out whether or not the participant doing the questionnaire is one of the 60% who use Blackboard. In the case that the participant does not use Blackboard, it is worthwhile to find out what other LMS or technology the participant uses in his or her teaching. This piece of information may provide new insights into the research problems of this study and may be useful for future research and study. It is also informative for the purpose of this study to find out why the participant has not chosen to use Blackboard in his or her teaching. With such consideration, the very first question that the participants need to respond to is whether or not they have used Blackboard. If the answer is affirmative, then they may proceed with the rest of the survey. In the case

when the answer is not an affirmative one, they were asked to specify the other types of computer technology, including other LMS beside Blackboard, that they may have used or are using in their teaching. They would then be directed to answer only three sections of the survey. The three sections include a section which asks about their demographic information, a section which asks about their teaching pedagogy and a section with open-ended questions in which they are asked why they have not chosen to use Blackboard in their teaching.

The structures of the six sections in the original questionnaire are described below.

1. Perceptions of Blackboard

The design of this section is based on these components: ease of use (items 1 and 9), time (item 5), design (items 7 and 10) and functionality, which includes communication (item 2), effectiveness (items 3 and 8), pedagogy (item 4) and nature of class delivery (item 6).

2. Perceptions of Blackboard's Design

The design of this section is based on three components, namely, the design of instructional features, the design of interactive features and the design of visual features. The definition of each of these components is stated earlier in *Definition of Terms* in Chapter 1. The classification of items to each of the components is described below. An item indicated with the letter *N* in parenthesis represents a negative item.

A. Design of instructional features

a. It is difficult to plan a creative course using Blackboard. (N)

b. Blackboard is able to enrich my course content through its ability to include resources from the Internet.

c. Using Blackboard alone is not sufficient to implement the course I teach. (N)

d. I wish I am able to customize Blackboard to suit the way I teach. (N)

e. The most useful feature in Blackboard is its administrative function.

f. The similarities between the structure of Blackboard and regular classroom teaching (e.g. use of syllabus, course materials, grade book, survey, etc) make it easier for me to adopt it in my teaching.

g. Blackboard is not suitable for certain instructional design models. (N)

h. I find the survey manager useful in learning about how much students knew from the course.

B. Design of interactive features

a. The synchronous collaborative tool such as chat or virtual classroom within Blackboard is not user friendly. (N)

b. The navigation style in Blackboard lacks interactivity.

c. The use of hyperlinks provides enrichment to course content.

d. Blackboard improves my communication with students.

e. Discussion forum takes up too much of my time. (N)

f. I wish to see simulations in Blackboard associated with real-life teaching scenarios. (N)

g. Digital dropbox is an efficient feature.

h. I find uploading files (which can be text document [doc, txt and pdf], graphics [gif and jpeg], video [mpeg, Quicktime, avi], audio [wav,aiff], or multimedia [shockwave Flash]) to Blackboard complicated. (N)

C. Design of visual features

a. There is very little I can change on the overall visual design of Blackboard. (N)

b. The ability to organize content into folders within Blackboard makes my teaching more organized.

c. The *Quick and Detail View* feature of Blackboard provides a clear layout of the information architecture of the course.

d. I wish there would be audio-visual incorporated in the interface of Blackboard. (N)

e. The graphic interfaces (e.g. buttons, icons, or drop-down menus) in Blackboard do not help a user much in knowing the possible associations of the content it represents. (N)

f. I like the feature where I am able to customize menu buttons.

g. The overall visual design of Blackboard needs improvement. (N)The formatting tools (e.g. font style, font format, font colors,

and layout of page) in Blackboard make teaching materials more interesting.

3. Perceptions on Pedagogy

The design of this section is based on three components deriving from the three major learning theories that have continually influenced instructional design models in the past decades—the behaviorist approach, the cognitive approach and the constructivist approach to learning. The list below presents the classification of items to each of the components.

A. Behaviorist approach
   a. It is better for an instructor to direct student learning.
   b. Evaluation is necessary to know whether learning objective is met.
   c. Repetition is important to learning.
   d. The role of an instructor is to teach.
   e. I believe in sequential learning.

B. Cognitive approach
   a. Acquisition of knowledge requires understanding.
   b. A learner can better remember information if he/she knows how different information are interrelated.
   c. A learner learns faster when materials given to him/her are classified into meaningful chunks.
   d. I believe a learner learns best when new information given to him/her is built on his/her existing information.

e. It is more effective to learn information from general to specific.

C. Constructivist approach

a. I believe a learner constructs his/her own knowledge.

b. Realistic context is important to learning.

c. A learner learns best with problem-solving.

d. Learners control learning.

e. The role of instructor is to coach.

4. Capacity of Blackboard Use

The design of this section is based on three components, namely, instructional features, media features and visual features, of Blackboard. The list below presents the classification of items to each of the components.

A. Instructional features

a. Use survey manager

b. Use the grade book (add, edit, or delete graded items, view grade, weight grade)

c. Use test manager

d. Use syllabus builder

e. Add, edit, or delete announcements

f. Add, edit, or delete staff information

g. Add, edit, or delete course information

h. Use user management feature (to list/modify, create or remove user; manage groups)

i. Email a member or the entire group

j. Send messages to a member or the entire group within Blackboard

B. Interactive features

a. Add Assignments (with ability to check status of completion and provide feedbacks)

b. Digital drop box

c. Manage discussion forum (add, reply, modify, delete or archive discussion thread, and assigning discussion forum settings)

d. Use of synchronous collaborative tool such as chat or virtual classroom

e. Create a hyperlink

f. Upload a file (which can be text document [doc, txt and pdf], graphics [gif and jpeg], video [mpeg, Quicktime, avi], audio [wav, aiff], or multimedia [shockwave Flash])

g. Import or export grades (e.g. upload grades from Excel or backup grades to Excel)

h. Archive or export a course

C. Visual features

a. Customize course menu buttons by types, shapes and colors

b. Change course banner

c. Visual representation of a course: Quick View (the original menu design) and Detail View (a course map)

d. Organize content into folders

e. Use of font style and formatting for emphasis

f. Use of course menu navigation style (the choice between button and text)

5. Something About Yourself

The purpose of this section of the questionnaire is to gather demographic information about the participants, such as the colleges that they belong to, the nature of their professional appointment with the institution (part time or full time), how long they have been using Blackboard, the number of courses they teach in a typical quarter, and the nature in which they deliver their courses (online, face-to-face or a hybrid of these two methods).

6. Additional Comments

This is an open-ended question in which participants are given a chance to share their views on why they choose to use or not to use Blackboard.

Revision of Questionnaire

A revision of the original questionnaire was conducted based on the results of the pilot study, pretesting, and the validity and reliability tests done using Statistical Package for the Social Sciences (SPSS) 15.0 for Microsoft Windows after conducting the pilot study. The content and construction of the original questionnaire were also evaluated by four judges. Two of them were professors in the field of Instructional Technology, one professor from the Research and Evaluation Department and one from the Linguistics Department. The original questionnaire was then revised based on the suggestions from

the four judges in the pretesting and results gained from the pilot study. The revised questionnaire, presented in Appendix B, contains six parts. The revisions and the revised questionnaire are described below in six parts: (1) the *Perceptions of Blackboard* scale, (2) the *Perceptions of Blackboard's Design* scale, (3) the *Pedagogical Perspective of E-Learning* scale, (4) the *Capacity of Use* scale, (5) demographic information, and (6) the *Additional Comments* section.

The Perceptions of Blackboard scale

In the Perceptions of Blackboard section, only one item was rephrased. The original item read "Blackboard is an organized e-learning platform." The revised version read "I like Blackboard because it is a structured e-learning platform." The word *organized* is confusing to participants, because it tends to imply *something* is organized, while indeed the researcher is trying to describe the overall structure of Blackboard being somewhat predesigned with specific tools integrated for specific tasks. The Perceptions of Blackboard scale is therefore a 10-item Likert scale with 5 being *strongly agree* and 1 being *strongly disagree*, and the total possible summated score is between 10 and 50.

The "Perceptions of Blackboard's Design" scale

The section Perceptions of Blackboard's Design has gone through some changes in terms of rewording and rephrasing of items to avoid ambiguity and misleading implications. Three items were deleted based on content evaluation and result of item analysis. Specific changes made to the items are indicated below.

Table 1

Revision of Items in "Perception of Blackboard's Design" Scale

Original	Revised
The synchronous collaborative tool such as chat or virtual classroom within Blackboard is not user friendly.	The chat feature within Blackboard is not user friendly.
The use of hyperlinks provides enrichment to course content.	The use of external links provides enrichment to course content.
Blackboard is not suitable for certain instructional design models.	Blackboard is not suitable for my style of teaching.
The discussion forum takes up too much of my time.	The discussion forum is worthwhile even though it is time consuming.
I wish there would be audio-visual capabilities incorporated in the interface of Blackboard.	I can incorporate audio or visual materials into my Blackboard course site.
The digital drop box is an efficient feature.	I like the digital dropbox feature where students are able to submit class work and projects online.
Using Blackboard alone is not sufficient to implement the course I teach.	(Item de leted from questionnaire)
I wish to see simulations in Blackboard associated with real-life teaching scenarios.	(Item deleted from questionnaire)
The most useful feature in Blackboard is its administrative function.	(Item deleted from questionnaire)

A new category *NU (Never Used)* was added as one of the choices for participants to choose in this section, so that faculty members who have never used certain features in Blackboard are able to indicate so.

In summary, the Perception of Blackboard's Design scale is a 21-item Likert scale with 5 being *strongly agree* and 1 being *strongly disagree*. Since there is a NU category in this scale, an averaged score is computed for each participant before final analysis is made. The total possible averaged score is between 1 and 5. A score of zero is assigned to item indicated as NU. For instance, if a case indicated the use of 4 out of the 7 interactive features, 5 out of the 8 visual features and 5 out of the 6 instructional features. The overall score for that particular case is 15, 12 and 19 for *the design of interactive features* subscale, the *design of visual features* subscale, and the *design of instructional features* subscale, respectively. The score 15 is for a total of 4 items, score 12 is for a total of 5 items, and score 19 is for a total of 5 items. The averaged score for the perception of the design of interactive features, visual features and instructional features for that particular case will therefore be 3.75 (15/4), 2.40 (12/5), and 3.80 (19/5), respectively.

The Pedagogical Perspective of E-Learning scale

The original section Perceptions on Pedagogy was altogether eliminated because of the problems it displayed from the results of the pilot study. The original questionnaire was designed based on three components deriving from the three major learning theories—the behaviorist approach, the cognitive approach and the constructivist approach to learning. The researcher was originally planning to see if the section was able to discriminate participants so that observations can be made to see if participants

with different pedagogical approaches would have different kinds of perceptions of Blackboard; or participants with different approaches in teaching would use Blackboard differently. Nevertheless, as Dowling (2003) puts it, “the human act of teaching is more than the sum of its parts” (as cited in O’Mahony, 2003), there is very little possibility that any one faculty member would always take a behaviorist approach, or a cognitivist approach, or a constructivist approach. Just as the human brain works in a complex manner, the approach to teaching often times contains too many variables and complexities that it becomes difficult to analyze. The responses received from participants demonstrated that most participants would in a large part agree or strongly agree with most of the items, resulting in the items being meaningless in the survey. In light of this, the researcher decided to eliminate this category and create a new one with focus on pedagogical perspectives of e-learning. It is noteworthy at this point that the term e-learning use in this survey is used to refer to web-based and internet-based learning, as well as the use of e-learning platforms, commonly known as Learning Management System (LMS), or Course Management System (CMS), or Virtual Learning Environments (VLE) to facilitate teaching.

The development of the items in this category was based on the researcher’s reading of the literature (Cantoni, Cellario, and Porta, 2003; Dalsgaard, 2006; McMahon, 1997; O’Reilly, 2005; Weller, 2006) with discussions on the projection of future designs of e-learning systems, as well as discussions on pedagogical approaches that are suitable for web-based learning. Although not all e-learning is web-based (e.g. those that required only CD-ROM or DVD), the type of e-learning that concerns this study is either web-

based or internet-based learning. McMahon (1997) states that “the Web is an ideal forum for constructivist learning” (Beyond Cognition section, ¶ 1); and Dalsgaard’s article took the social-constructivist approach to look at learning (and Dalsgaard is mainly talking about e-learning) as a social and active process. Dalsgaard supported the use of social software such as weblogs and wikis in learning, and commented on the lack of pedagogical considerations in LMS. O’Reilly (2005) and Weller (2006) are somewhat interrelated because the latter based his discussion on VLE 2.0 on O’Reilly’s (2005) proposal of Web 2.0. In these articles, both writers discussed the nature of Web 2.0 and VLE 2.0 as being more interactive, less static, with light weight programming and being user-centered or learner-centered. Cantoni, Cellario, and Porta (2003) emphasized the importance of visual components in the development of future e-learning systems. In the article, they also predicted that the adoption of new interaction paradigms based on multi-dimensional metaphors and perceptive interfaces are a necessary direction to take in order to achieve more natural and effective e-learning experiences.

The insights gained from the above articles have led the researcher to develop the Pedagogical Perspectives on E-Learning scale based on four components: the importance of web technology, design (learner-centered, interactivity, social interaction, contexts), constructivist approach, and personal preferences. The items related to each of the four components are described below.

A. The importance of web technology

a. External links are valuable tools to me when conducting e-learning courses. (Note: Some examples of external links include Wikipedia, e-journal websites, Google scholar, open courseware, etc.)

b. It is difficult to talk about e-learning pedagogy without talking about web technology.

c. The use of web-based resources in e-learning encourages deeper learning.

d. I like to use a web-based e-learning system to facilitate my teaching.

e. I like to develop as much of my course materials using the web technology available to me.

B. Design (learner-centered, interactivity, social Interaction, contexts)

a. I believe that a good e-learning environment is one that encourages social interaction among learners.

b. A successful e-learning environment is one in which learners play active roles in the design of course materials.

c. I think interactive course content is important in e-learning. (design)

d. Interface with high degree of interactivity is important for e-learning. (For example: A *pull-down menu* has a higher degree of interactivity than an *external link*.)

C. Constructivist Approach

a. I believe that new pedagogical approaches (as opposed to approaches use in traditional classroom) are necessary for the success of e-learning.

b. In e-learning courses, an instructor's focus should be on pedagogical strategies, not course information.

c. The role of an instructor in e-learning is to facilitate.

d. An e-learner learns best through problem-solving.

e. The use of discussion forum encourages brain-storming among e-learners.

f. I believe that the context (virtual e-learning environment) in which e-learning occurs is central to the learning itself.

D. Personal Preferences

a. I prefer to teach a course entirely online if given a choice.

b. I would adjust my style of teaching when I use an e-learning platform to teach a course.

c. I would spend as much time as is required to learn about new technology for teaching.

d. I would try different communication tools available on the web to improve the dynamic of interaction among learners.

The 19-item Pedagogical Perspectives on E-Learning scale was designed using five-point Likert scale, with 5 being *strongly agree*, and 1 being *strongly disagree*. The possible total summated score for this scale is from 5 to 95. The higher score represents a more supportive attitude towards a pedagogical approach that includes the following elements: a constructivist approach; viewing web technology as an important element to e-learning; preferring an e-learning system design that promotes learner-centered activity,

interactivity, social interaction, and emphasis on contexts; and someone who loves to invest time and effort to use different features of a new technology.

The Capacity of Use section

The title for this section is changed from *Capacity of Using Blackboard* to *Capacity of Use*. The new section contains two scales. One measures the overall capacity of use of features in Blackboard by each respondent and the other measures the degree of usefulness of the features in Blackboard as perceived and indicated by the respondent.

Capacity of use. The changes made on the original Capacity of Use scale was based on the suggestions provided by the judges that certain tasks or features in Blackboard are unlikely to be used more than once or twice in a typical quarter for a course. Therefore the five-point Likert scale was eliminated and replaced by a *check all that apply* scale. In this case, participants were asked to indicate features that they would usually use in a typical quarter without having to indicate the frequency of use. There are a total of 26 major features of Blackboard included in this section, which means a total of 26 items in this scale. The score for this section is computed as a percentage of the 26 items. Two additional features were added to the revised questionnaire. First, the *chat* feature and the *virtual classroom* feature, which were originally in one item, were now separated into two items. Next, the *add assignment* feature and *check status of assignment* feature, which were originally grouped in one feature, were now listed as two different features.

The degree of usefulness. An additional scale of 26 items was added in this section to gain knowledge on participants' perceptions of the usefulness of the 26 different features included in the Capacity of Use scale. This additional scale was designed using a 5-point Likert scale. The leftmost radio button represents *most useful* and has the highest score, 5, and the rightmost radio button represents *least useful* and has the least score, 1. The 26 items can be classified into groups of three, namely, the instructional features, the interactive features and the visual features. A separate category *NA (Not Applicable)* was also included as a choice so that any participant who has never used a certain feature could indicate so. A score of zero will be assigned to the item indicated as NA. Due to the addition of the NA category, computation of an overall score becomes problematic. A solution was applied by computing the averaged score for the variables being measured. Therefore, the highest possible averaged score for the overall scale is 5 and the lowest is 1. For instance, if a particular case indicated NA for 7 out of the 26 features, that particular case would have evaluated 19 out of the 26 features. If the overall score of that particular case for the 19 features evaluated is 64. Then the averaged score for that particular case would be 3.37 (64/19).

Demographic Information

The section *Something about Yourself* was to gather demographic information about the participants. Suggestions were made by the judges to include more open-ended questions to gain knowledge on the experience of participants with Blackboard, and whether they have attended professional development seminars about Blackboard, among others. The demographic information of the revised questionnaire attempted to gather the

following information from the participants: college and department that the participant belongs to, the number of years of their teaching experiences, the employment status, the number of classes taught in a typical quarter, experience with other LMS, and experience in professional development seminars.

The "Additional Comments" section

The last section of the questionnaire, Additional Comments, was revised to include two versions, one for those who have used or are using Blackboard and the other version for those who have never used Blackboard. Open-ended questions for those who have experiences with Blackboard include other LMS experiences that participants may have, as well as their expectations on future e-learning systems. Open-ended questions for those who have no experience with Blackboard asked about the experiences they may have with other technology in teaching, and asked their reasons for not choosing Blackboard as an aid in their teaching.

Pilot Study

The purposes of conducting a pilot study for this study are multiple. First, a pilot study is an economical way to allow the researcher to gain knowledge of the accessible population on a smaller scale. Next, it allows the researcher to determine whether or not the research problem is worth pursuing before investing considerable amount of effort, time and money into a project. Third, a pilot study is an effective way to know the effectiveness of the instrument through an assessment of its validity and reliability. An original questionnaire usually would need to be revised before administering it to a larger sample group. The process of administering the pilot study, an analysis of the

demographic information, an outline of descriptive statistics, and the results of the pilot study will be described below.

The Process of Pilot Study

For the pilot study, the original questionnaire was sent to 187 faculty members—about 15% of the accessible population. A good sample is one that reflects the population. In order to ensure that the group for the pilot study is as representative as possible, stratified random sampling was used. About 15% of faculty members from each of the colleges were randomly selected from the university web directory. The names of faculty members selected, their email addresses, and the colleges which they belong to were recorded, to ensure that the group was identifiable. An email message with a hyperlink to the survey was sent to the group asking for voluntary participation. Out of the 187 faculty members, 80 belonged to College of Arts and Science, 14 belonged to College of Business, 16 belonged to College of Communication, 11 belonged to College of Education, 16 belonged to College of Engineering and Technology, 18 belonged to College of Fine Arts, 16 belonged to College of Health and Human Services and 16 belonged to College of Osteopathic Medicine.

Analysis of the Demographic Information

The response rate for the pilot study was quite low; only about 11% of the group responded, which was 21 faculty members. Of the 21 respondents, 17 of them use Blackboard in their teaching and 4 of them either do not use Blackboard or were using another Learning Management System. Out of the 17 respondents who use Blackboard, there were 8 from the College of Arts and Science, 3 from the College of Health and

Human Services, 2 from the College of Fine Arts and 1 from each of the other colleges, except the College of Osteopathic Medicine, in which there were no respondents. All except one of the respondents were full-time faculty. Most respondents were considered experienced users of Blackboard in terms of the number of years they have used this Learning Management System: seven faculty members indicated that they have used Blackboard more than 4 years, eight reported to have used Blackboard for 3 to 4 years and only two of the respondents used Blackboard for 1 to 2 years. There were 12 faculty members who taught two classes in a typical quarter; three faculty members who taught one class; one faculty member who taught three classes and another one faculty member taught four or more classes in a typical quarter. Only three faculty members indicated they have classes in which they taught predominantly online. The other 14 faculty members either conducted their classes using the hybrid method or in a classroom face-to-face. Of this group, there were nine faculty members who conducted all of their classes using the face-to-face method.

Out of the four faculty members who did not use Blackboard, two of them taught three classes in a typical quarter and another two indicated that they taught one class in a typical quarter. Only one faculty member conducted his or her classes using the hybrid method. The other three faculty members taught all of their classes predominantly face-to-face. One faculty member used an open source Learning Management System called LON-CAPA for teaching, and one of them indicated that he or she used a website and email tailored to his or her class. Some comments provided by respondents who chose not to use Blackboard include: “The functions of Blackboard are adequately served by

the internet, email, and face-to-face interaction. Blackboard is redundant." and "Limitations to styles of questions that can be used. The homework engine in LON-CAPA is vastly superior for a large array of problem types with a high degree of randomization."

Results of the Pilot Study

The means and standard deviations of the variables are presented in Table 2.

Table 2

Descriptive Statistics

Variable	No. items	*M*	*SD*
Bb's Perceptions	10	36.53	7.15
Bb Design's Perceptions	24	74.94	9.31
Instructional	8	24.06	3.72
Interactive	8	26.47	3.02
Visual	8	24.41	4.00
Perceptions of Pedagogy			
Behavorist	5	18.12	2.47
Cognitivist	5	19.53	1.42
Constructivist	5	19.12	3.02
Capacity Bb Use	24	70.24	13.65

Validity and Reliability of the Instrument

Validity

The validity of this instrument was assessed through content validity, pre-testing and a pilot study.

Content validity. The questionnaire was developed based on issues raised by past research and studies, as well as concerns mentioned in the literature related to this study. In order to see if the result of this research is consistent with past literature, research and studies, the researcher tried to match specific items with issues and concerns raised by other researchers. The correspondences for the Perception of Blackboard scale and the Perception of Blackboard's Design scale are presented in Table 3 and 4 below.

Table 3

Matching of Items with Literature for the "Perception of Blackboard" Scale

Literature	Item from original questionnaire
User friendly/ Intuitive (Anderson)	Blackboard is user friendly.
	Blackboard is an organized e-learning platform. (original) Blackboard is an organized e-learning platform. (revised)
	The technical aspects of Blackboard discourage me from using it more frequently.
Productivity, Intrinsic motivation (Anderson)	Blackboard facilitates the way I teach.
	I do not think using Blackboard in my teaching has helped improve overall student performance.
	Blackboard helps make a course more successful.
Freedom / Flexibility (Anderson)	I find it too time consuming to use Blackboard.
	Blackboard is good only if you are teaching online.
Communication (Anderson; McMahon)	I find it too time consuming to use Blackboard.
	Blackboard is good only if you are teaching online. Blackboard helps improve the teacher-student relationship in a course.
Average tools, but not the best ones; operate on a lowest common denominator approach; lack interoperability (Weller)	Blackboard lacks customization.

Table 4

Matching of Items with Literature for the "Perception of Blackboard's Design" Scale

Literature	Item from original questionnaire
Commercial VLEs are based around a teacher-classroom model (Weller)	The similarities between the structure of Blackboard and regular classroom teaching (e.g. use of syllabus, course materials, gradebook, survey, etc) make it easier for me to adopt it in my teaching.
They do not meet the needs of different subject areas (Weller)	Blackboard is not suitable for certain instructional design models. (original) Blackboard is not suitable for my style of teaching. (revised)
User Friendly / Intuitive (Anderson); the importance of visual cues in relationship to task information it represents (Cantoni, Cellario, & Porta)	The graphic interfaces (e.g. buttons, icons, or drop-down menus) in Blackboard do not help a user much in knowing the possible associations of the content it represents. The formatting tools (e.g. font style, font format, font colors, and layout of page) in Blackboard make teaching materials more interesting.
Current e-learning environment lacks natural interactivity (Cantoni, Cellario, & Porta)	I find uploading files to Blackboard complicated. The navigation style in Blackboard lacks interactivity.
Anderson's study indicated that they wish Blackboard would allow the camera, as well as video based interaction within Blackboard system itself, as an integrated tools with all other course tools available in Blackboard. (Anderson)	I wish there would be audio-visual capabilities incorporated in the interface of Blackboard. (original) I can incorporate audio or visual materials into my Blackboard course site. (revised)

Table 4 (continued)

Matching of Items with Literature for the "Perception of Blackboard's Design" Scale

Literature	Item from original questionnaire
User friendly / Intuitive (Anderson)	The synchronous collaborative tool such as chat or virtual classroom within Blackboard is not user friendly. (original) The chat feature within Blackboard is not user friendly. (revised)
Average tools, but not the best ones; operate on a lowest common denominator approach; lack interoperability (Weller)	It is difficult to plan a creative course using Blackboard.
	I wish I were able to customize Blackboard to suit the way I teach. (original) I am able to customize Blackboard to suit the way I teach. (revised)
	Using Blackboard alone is not sufficient to implement the course I teach. (original—deleted from revised questionnaire)
	I wish to see simulations in Blackboard associated with real-life teaching scenarios. (original—deleted from revised questionnaire)
	The digital drop box is an efficient feature. (original) I like the digital dropbox feature where students are able to submit class work and projects online. (revised)
	The formatting tools (e.g. font style, font format, font colors, and layout of page) in Blackboard make teaching materials more interesting.
	I find the survey manager useful in learning about how much students know from the course.

Table 4 (continued)

Matching of Items with Literature for the "Perception of Blackboard's Design" Scale

Literature	Item from original questionnaire
Importance of visual elements in e-learning environment (Schindelka; Cantoni, Cellario, & Porta; McLoughlin)	The ability to organize content into folders within Blackboard makes my teaching more organized.
	The *Quick and Detail View* feature of Blackboard provides a clear layout of the information architecture of the course.
	The overall visual design of Blackboard needs improvement.
	I like the feature where I am able to customize menu buttons.
	There is very little I can change on the overall visual design of Blackboard.
Communication (Anderson; McMahon)	The discussion forum takes up too much of my time. (original) The discussion forum is worthwhile even though it is time consuming. (revised)
	Blackboard improves my communication with students.
LMS are suitable only for management of administrative tasks (Dalsgaard; Heaton-Shrestha, Gipps, Edirisingha, and Linsey; Surry; Woods, Baker and Hooper)	The most useful feature in Blackboard is its administrative function. (original—deleted from revised questionnaire)

Table 4 (continued)

Matching of Items with Literature for the "Perception of Blackboard's Design" Scale

Literature	Item from original questionnaire
Hyperlinking is also one way of harnessing collective intelligence (O'Reilly; Weller); the importance of hyperlinks in the Web and its use in web-based education (McMahon)	Blackboard is able to enrich my course content through its ability to include resources from the Internet. The use of hyperlinks provides enrichment to course content. (original) The use of external links provides enrichment to course content. (revised)

The usefulness of different features in Blackboard have been observed by different scholars (Anderson, 2003; Halawi and McCarthy, 2007; Heaton-Shrestha, Gipps, Edirisingha, and Linsey, 2007; Woods, Baker and Hooper, 2004). The section of the questionnaire on the capacity of use, and the degree of usefulness of the different features in Blackboard, which was added in the revised questionnaire, was designed to find out what features of Blackboard are more commonly used; as well as measure what features are perceived by faculty members as most useful. This information will be important to see if the results are consistent with what was available in the literature.

Pre-testing. In the pre-testing process, one professor in the Research and Evaluation Department, three professors in the Instructional Technology program, one professor in the Linguistics Department, and a staff member whose profession is to train faculty to use Blackboard evaluated the content and construct validity of the instrument.

In the information consent letter of the pilot study, the researcher has requested participants to provide their feedback on the questionnaire. Information gathered from these sources provided the researcher a better understanding on how effectively the instrument would measure the variables of the research questions. Suggestions were made to rephrase unclear items, eliminate terms that may not be clear to all participants, as well as clarifications of items that may lead to multiple interpretations. Major suggestions provided for revising the instrument are listed below.

1. A *NA (Not Applicable)* or *NU (Never Used)* category should be included in section II (Perception of Blackboard Design) of the questionnaire because faculty members who have never used certain features in Blackboard may not be able to provide their opinions on those features. For instance, in the item "The discussion forum takes up too much of my time," faculty members who have no experience using the discussion forum would not know whether this feature is time consuming for them.
2. A suggestion was given for Section III (Perception on Pedagogy) to include items that are geared towards the nature in which the discussion forum was used in teaching.
3. Section IV was pointed out to be problematic because participants were requested to indicate how frequently they use the different features in Blackboard, yet tasks such as change course banner and customize course menu buttons are unlikely to be frequent. On the other hand, task such as

creating external links may well be a feature frequently used by all participants.

4. Suggestions were given to include more questions about the demographic of participants.
5. Suggestions were made to add more open-ended questions that are more specific instead of a general one at the end of the survey. For instance, there could be an open-ended question asking for what other LMS besides Blackboard that the participant has used.
6. Many items were noted to be faculty dependent, and suggestions were provided to either rephrase, reword, or to eliminate those items.

Some of the suggestions are consistent with the results achieved through SPSS for internal consistency of items in the questionnaire. Items such as “the discussion forum takes up too much of my time,” “the synchronous collaborative tool such as chat or virtual classroom within Blackboard is not user friendly” and “the ability to organize content into folders within Blackboard makes my teaching more organized” are some problematic items that lowered the overall coefficient alpha of the constructs. The reason may be that faculty members were not able to appropriately respond to these items if they had not had experiences using features of Blackboard described in these items. The items within the construct Perception on Pedagogy were most problematic and this could be due to the some contradictory ideas among the components (behavorist, cognitivist and constructivist). For instance, the statement “It is better for an instructor to direct student learning” and the statement “Learners control learning” are two contrary pedagogical

approaches. And items such as “The role of instructor is to coach” and “The role of an instructor is to teach” may be ambiguous to participants who could have a tendency to interpret them in different ways. Some participants may associate teaching and coaching as similar actions while others may interpret them as entirely different pedagogical approaches.

Reliability Test

When executing a reliability test for internal item consistency (indicated by a coefficient alpha value), the researcher first ran the test for all the items except those asking for participants’ demographic information. A coefficient alpha value of .751 was achieved, indicating a high reliability. The researcher then conducted separate reliability tests for each construct, followed by each component within a construct. The results are presented in Table 5.

Table 5

The Coefficient Alpha of Constructs

Constructs and Components	Coefficient Alpha
Perception of Bb	.880
Perception of Bb Design	.846
Interactive features	.526
Instructional features	.610
Visual features	.786
Perception of Pedagogy	
Cognitivist	-.087
Constructivist	.769
Behavorist	.614
Capacity of Blackboard Use	.826

Item analysis. According to Mueller (1986), a reliability coefficient of .80 or .90 indicates that a scale is well-constructed and a coefficient in the .50s or .60s indicates that a scale is less well-constructed. The *cognitivist* component has coefficient alpha -.0870. The *behaviorist* component has coefficient alpha .610, which is not a satisfactory number. The items developed for the scale Perception of Pedagogy were the most problematic. The entire section was replaced by a new one as discussed earlier. The new

section was a 19-item Likert scale to measure faculty members' pedagogical perspectives on e-learning.

Next, although the overall coefficient alpha for the scale measuring Perceptions of Blackboard Design was good, with a value of .846, two of its components—*interactive* and *instructional*—had unsatisfactory coefficient alphas of .526 and .610 respectively. Items within these components need to be revised to achieve a higher reliability coefficient. The coefficient alpha of the component *instructional feature* went up, from .610 to .691, when the item "The most useful feature in Blackboard is its administrative function" was removed, and the coefficient alpha for the scale measuring Perceptions of Blackboard Design increased from .846 to .862. The analysis of item internal consistency indicated that this item had poor inter-item correlation with more than half of the total items in the overall construct. The problem with this item may potentially lie in the ambiguity of the term *administrative*. Although a note was included in italics explaining administrative function to include making announcements, providing staff and course information, sending messages and emails to the group, the building of a syllabus, and the use of the grade-book, it was still a very long list for participants to draw a conclusive statement. For instance, one who finds *making announcements* useful may not be finding *building of a syllabus* useful. A decision was made to delete this item.

The unsatisfactory coefficient alphas of .526 for the interactive component within Perceptions of Blackboard Design could have been caused by the following four items: "The synchronous collaborative tool such as chat or virtual classroom within Blackboard is not user friendly;" "The discussion forum takes up too much of my time;" "I wish to

see simulations in Blackboard associated with real-life teaching scenarios;" and "The digital drop box is an efficient feature." These four items do not correlate well with the other four items within the same component. The judges suggested that the item describing synchronous collaborative tool may be confusing to participants because some participants may not know what *synchronous* means technically. Consideration was made to revise this item, remove the word synchronous. The problem with the next item on discussion forum may be problematic due to the way the item was phrased, because it provides an implication of a task that was either faculty dependent or being worded too subjectively. The third item describing simulations and real-life teaching scenarios may have problem in the way in which it imposes a task for the participants to project a future LMS. Participants may not know what kind of scenarios the researcher considered as being *real-life* or what *simulations* in Blackboard really means since the current Blackboard definitely does not yet have such capability in its technical aspects to achieve such scenarios. It is difficult for participants to imagine what is not there. Finally the item about digital dropbox could potentially lie in a difference in perceptions between the students and faculty. A student may find digital dropbox efficient since they do not have to print documents out for submission; but faculty would need to print out each student's work to read, if chosen not to read them on screen. It could be such realistic life situation that causes faculty to hesitate whether digital dropbox is an efficient feature from an instructor's point-of-view. This item was revised to "I like the digital dropbox feature where students are able to submit class work and projects online," which gives participants more of a personal choice, then an absolute judgment of that feature.

Finally, the coefficient alpha of the component *instructional features* for the scale measuring Capacity for Using Blackboard was .578, and it appears that the item "Use a user management feature (to list/modify, create or remove user; manage groups)" is an item that requires revision. It could very possibly be due to the wording. Participants may not understand exactly what *user management* meant. If this item were deleted, the coefficient alpha will increase from .578 to .590. However, since the overall coefficient alpha of the scale measuring Capacity for Using Blackboard was high (.826), the item was reworded.

Data Analysis

Variables

The dependent variable for Question 1 is faculty members' perceptions of Blackboard. The dependent variable for Question 2 is faculty members' capacity for utilizing Blackboard. The independent variables (the predictors) for Question 1 are faculty members' perceptions of the design of instructional features, interactive features, and visual features respectively. The independent variables (the predictors) for Question 2 are faculty members' pedagogical perspective on e-learning and faculty members' perceptions of the design of instructional features, interactive features, and visual features respectively.

Operational Definitions of Variables

The dependent variable for Question 1, faculty members' perceptions of Blackboard, was measured using a 10-item questionnaire designed using a 5-point Likert

scale, with higher total points corresponding to a more positive perception. The total points ranged from 5 to 50.

The dependent variable for Question 2, faculty members' capacity for utilizing Blackboard, was measured using a 26-item questionnaire, each with a feature of Blackboard made available to faculty members through their institution. A faculty member was asked to select all of the features that were used in a typical quarter. The total percentage score ranged from 0 to 100. The total points represented the percentage of all features that were used. A higher total score therefore reflects a higher capacity of utilizing Blackboard. Out of the 26 most common features in Blackboard used for this study, 10 of them were related to the design of instructional features, 10 of them were related to the design of interactive features, and 6 of them were related to the design of visual features.

The independent variables (the predictors) were faculty members' pedagogical perspective on e-learning, faculty members' perceptions of the designs of instructional features, interactive features and visual features respectively. Faculty members' pedagogical perspective on e-learning was measured by a 19-item Likert scale. The total points for the independent variables in this scale ranged from 19 to 95. Faculty members' perceptions of the different aspects of design were measured by using a 21-item Likert scale. Items accessing each of the design aspects were put together in one section but in random order so as to achieve a more natural response from participants on the design of Blackboard in general. However, when doing data analysis, the total score for each independent variable (the perception of each of the design aspects) was computed

separately. Due to the NU category in this scale, the averaged score for each of the independent variables is computed. The total possible averaged score ranged from 1 to 5 for each of the subscales. It is worth noting that since *JavaScript* was embedded in the web survey to control missing data, there should not be any missing value for these variables.

Hypotheses

In order to answer the above research questions, the following null hypotheses and alternative hypotheses were proposed for this study:

Null Hypotheses

H_{01}: There is no significant overall regression between a faculty member's perception of LMS and his or her perception of the design of instructional features, interactive features, and visual features respectively within the selected LMS.

H_{02}: There is no significant overall regression between a faculty member's capacity of utilizing the selected LMS and his or her pedagogical perspective on e-learning, perceptions of the designs of instructional features, interactive features and visual features of the selected LMS.

Alternative Hypotheses

H_{A1}: At least one of the variables (the design of instructional features, the design of interactive features, and the design of visual features) accounts for a faculty member's perception of LMS.

H_{A2}: At least one of the variables (pedagogical perspective on e-learning, perceptions of the designs of instructional features, perceptions of the design of interactive features and perceptions of the design of visual features) accounts for a faculty member's capacity of utilizing the selected LMS.

The Statistical Analysis Procedures

Part One: Descriptive Statistics

Descriptive statistics provides the researcher an overall view of the distribution of data. Below is a list of tasks the researcher went through before doing inferential analysis for the data.

1. Missing value: Since missing values in this study were controlled by a JavaScript program embedded in the online questionnaire. Whenever a participant skipped or missed an item, the JavaScript program recorded the specific item that was not filled, and a reminder provided to the participant to complete all items before the *submit* button will work. This way of controlling missing values may not be a preferred way for some participants. The researcher noted this as a limitation of this study.
2. Filter: The researcher used filter in SPSS to exclude unusable cases.
3. Outliers and extreme values: It is important to examine outliers because they can cause a regression model to be biased and affect the values of the estimated regression coefficients. The researcher was able to get an initial idea of outliers through looking at box-plot, stem-and-leaf, normal *Q-Q* plot and

detrended normal Q-Q plot. However, the researcher did not know whether the outliers were significant until inferential statistical tests such as Cook's distance was executed through SPSS. Cook's distance greater than one was a concern.

4. Mean and standard deviation: These are important values that provide the researcher an idea of the distribution of the data.
5. Scatter-plot: For the multiple regression questions, a scatter-plot was helpful in identifying the type of relationship and in getting a rough idea on the strength of the relationship between the variables.
6. Correlation matrices: For multiple regression, correlation matrices provided an overall view of the correlation between each independent variable (the predictor) and the dependent variable.
7. Normality: Normality of data was identified through histogram with normality curve although the researcher was not able to know whether any skewed distribution was significant enough to be a concern.

Part Two: Inferential Analysis

A multiple regression analysis was ran using SPSS to compute the following important values.

1. The regression coefficient, *B*: The regression coefficient indicates which predictor is the best predictor.
2. R^2: With the value of R^2, the researcher is able to know the percentage of total variance accounted for by each predictor.

3. *F* value: The *F* value assesses the model and indicates whether or not the null hypothesis can be rejected. If *F* is greater than the critical value, it means that it is significant. A significant *F* value means that the relationship is linear and the set of independent variables significantly predicts the dependent variable. A higher *F* value indicates a better model if the *F* value of both models indicate statistical significance.
4. *p* value: If the *p* value is less than the alpha level (.05 for this study), then the null hypothesis should be rejected.
5. Adjusted R-squared ((R^2_{adj}, also called shrinkage): This value indicates the loss of predictive power or shrinkage, and is used to do cross validation of the model. It tests how much a model fits into another different set of data.

Examinations of the Assumptions

The researcher examined the following assumptions to ensure that the assumptions for multiple regression analysis were not violated.

1. Independence: This assumption is met when each outcome variable is collected from separate participant.
2. Homoscedasticity and Linearity: To check these assumption, plot the graph of *Regression Standardized Predicted Value* (**ZPRED*) against *Regression Standardized Residual* (**ZRESID*) and if all the points are randomly and evenly dispersed throughout the plot and about a horizontal line of zero, it indicates that the assumptions of linearity and homoscedasticity have been met.

3. Normal distribution can be examined through Normal *Q-Q* plot or normality test such as Shapiro-Wilk when $N < 50$, and Kolmogorov-Smirnov when $N > 50$.
4. Multicollinearity: Multicollinearity exists when there is a strong correlation between two or more predictors in a regression model. Multicollinearity may pose a threat to the validity of multiple regression analysis because it limits the size of *R* which makes it difficult to assess the individual importance of a predictor. Multicollinearity would also increase the variances of the regression coefficient resulting in an unstable predictor equation. This assumption can be examined first by scanning correlation matrices of all of the predictor variables to see if high correlations (.80 or .90) exist. Next, the value of *VIF* (variance inflation factor) which indicates whether a predictor has a strong linear relationship with the other predictors. VIF should be below 10. Myers (1990) suggests that a value of 10 is a value of concern. A tolerance statistic (1/*VIF*) value below .10 indicates a serious problem.
5. Normally distributed errors: This assumption can be examined by looking at Normal *P-P* plot of *Regression Standardized Residual*. If all points appear to lie on the line of normality then the assumption has been met.

CHAPTER FOUR: FINDINGS

The purpose of this study is to understand the way in which faculty members perceived and used Blackboard in higher institutions. The information gathered was used to investigate specific research questions described below.

1. Is there a relationship between faculty's perception of Blackboard and faculty's perception of the design of interactive features, visual features, and instructional features respectively within Blackboard? If such a relationship exists, to what extent does each predictor (the design of interactive features, visual features, and instructional features respectively) account for a faculty's perception of Blackboard?
2. Is there a relationship between faculty's capacity of utilizing Blackboard and faculty's pedagogical perspective on e-learning, the perceptions of the designs of interactive features, visual features, and instructional features of Blackboard? If a relationship exists between capacity of use and any of the four predictors (pedagogical perspectives on e-learning, perception of the designs of interactive features, visual features and instructional features respectively), to what extent does each predictor account for a faculty member's capacity of utilizing Blackboard?

Multiple regression analysis was used to answer the research questions. The data were analyzed with the help of the Statistical Package for the Social Sciences (SPSS), version 16.0 for Windows.

A total of 154 faculty members responded to the web survey, with 129 of them indicating experience with Blackboard, 24 of them having no experience with Blackboard, and one who had never heard of Blackboard. The response rate was 12.75%. Although the response rate was low, it met the desired sample size of 117.

Data Collection Procedure

The first invitation for voluntary participation was sent on February 15, 2008, to the electronic list of 1208 email addresses requested from the Academic Technology department of the large mid-Western university. A follow-up email was sent on February 24, 2008. For confidentiality reasons, there was no embedded programming implemented in the web survey to trace participants who responded, and this means that for each follow-up, all 1208 faculty members received the invitation again. The statement, “If you have responded, please disregard this message” was included in each follow-up to inform faculty members that only one response is required. There were 131 responses a week after the first follow-up email was sent. The figure looks like the desired sample size of 117 was met. A closer observation indicated that out of the 131 respondents, 25 had no experience with Blackboard. It was also the purpose of this web survey to gain knowledge on the group who does not use Blackboard, for this could be important information that can contribute to the unanswered portion of the study. When excluding the 25 respondents who had no experience with Blackboard, there were 106 responses to be used as data for the specific research questions, not meeting the desired sample size. Therefore a second follow-up was sent on March 3, 2008, as a last invitation. After the second follow-up, a total of 154 responses were achieved, of which 129 had Blackboard

experience and 25 had none. The entire administration of the web survey took about three weeks.

Data Screening

There were a total of five different scales for this study, with four of them using the Likert or Likert-type scales and one of them using the check-all-that-apply type of scale. The four Likert scales are the Perception of Blackboard scale, the Perception of Blackboard's Design scale, the Pedagogical Perspective on E-Learning scale and the scale on the degree of usefulness for the features of Blackboard. With these four scales, JavaScript was implemented in the program to control missing data, so missing data was not a problem for the data received from these scales. When a respondent skipped an item or items, a pop up window will appear when the next button was click, requiring them to respond to the items that were skipped before proceeding to the next section of the survey.

The check-all-that-apply scale was used to collect data on the usage of Blackboard features, and no *Javascript* was implemented to control for missing data because it was valid for participants to leave all boxes unchecked. For instance, a participant who has used Blackboard before may not be using it to teach classes, and hence will not be able to respond to the capacity of use in the typical quarter the survey asked for. There were 5 participants who left all boxes unchecked. In looking at the cases individually, there is an indication that these participants did not perceived any of the Blackboard features to be useful, or may not have used the features. They may have

explored Blackboard but not used it as a tool for their teaching. So it seemed valid to include these five participants in the analysis.

Due to a technical problem in the embedded programming of the web survey, certain items of the demographic information did not have JavaScript implemented to control for missing data. Since these items were background information that do not affect the validity of the data for the research questions, the missing data for demographic information will be reported with *did not indicate* category.

Besides the use of *JavaScript* to control missing data, eye-balling technique was also used to screen for duplicate entry. One obvious duplicate entry was found and eliminated. This could be due to the respondent clicking the *submit* button twice. The duplicate entry was eliminated to achieve a total valid entry of 154 as reported earlier.

Descriptive Analysis

Demographic information included experience with Blackboard, seminar taken on Blackboard, teaching status (full or part time), type of employment (tenured, tenure track, non-tenure-track, and other), teaching experiences by number of years, the number of classes taught per typical quarter, the method of conducting the class (face-to-face, hybrid, or online), and the other types of LMS that they had used. One hundred and fifty-four valid responses were returned and analyzed using SPSS. The analysis of demographic information was based on all 154 respondents, including respondents who had experience using Blackboard and respondents who had no experience with Blackboard. The two multiple regression analyses were based on the 129 respondents who indicated that they had experience with Blackboard. Table 6 to Table 15 present

summaries of the background information. Since there was only one respondent who indicated to have never heard of Blackboard, the demographic information of that category is omitted. Thus Table 6 to Table 15 only present information for 153 respondents.

Table 6

Demographic Information: Number Who Have Taken a Blackboard Seminar

Taken Blackboard Seminar	Blackboard Experience		
	Yes	No	Total
Yes	52 (40.31%)	3 (.13%)	55 (35.71%)
No	77 (59.69%)	20 (83.33%)	98 (63.64%)
Did not indicate	0	1 (.04%)	1 (.65%)
Total	129 (100%)	24 (100%)	154 (100%)

Table 7

Demographic Information: Years of Experience with Blackboard

Category	Number by Group (N=129)*	
Years of experience with Blackboard	Blackboard Experience	
	Number	%
One year or less	13	10.08
Two to four years	44	34.11
Five or more years	45	34.88
Did not indicate	27	20.93
Total	129	100

** Only the group with Blackboard experience is included in this table.*

Table 8

Demographic Information: Number of Respondents by College

College	Blackboard Experience		
	Yes	No	Total
College of Arts and Science	50 (38.76%)	12 (50%)	62 (40.26%)
College of Business	10 (7.75%)	2 (8.33%)	12 (7.79%)
College of Communication	15 (11.63%)	2 (8.33%)	17 (11.04%)
College of Education	11 (8.53%)	1 (4.17%)	12 (7.79%)
College of Engineering and Technology	10 (7.75%)	2 (8.33%)	12 (7.79%)
College of Fine Arts	8 (6.20%)	4 (16.67%)	13 (8.44%)
College of Health and Human Services	19 (14.73%)	1 (4.17%)	20 (12.99%)
College of Osteopathic Medicine	5 (3.88%)	0	5 (3.25%)
Other	1 (.78%)	0	1 (.65%)
Total	129 (100%)	24 (100%)	154 (100%)

Table 9

Demographic Information: Number of Respondents by Teaching Status

Teaching Status	Blackboard Experience		
	Yes	No	Total
Full Time	112 (86.82%)	22 (91.67%)	135 (87.66%)
Part Time	17 (13.18%)	2 (8.33%)	19 (12.34%)
Total	129 (100%)	24 (100%)	154 (100%)

Table 10

Demographic Information: Number of Respondents by Employment Status

Employment Status	Blackboard Experience		
	Yes	No	Total
Tenured	53 (41.09%)	11 (45.83%)	65 (87.66%)
Tenure-track	33 (25.58%)	4 (16.67%)	37 (12.34%)
Non-tenure-track	31 (24.03%)	7 (29.17%)	38 (100%)
Other	12 (9.30%)	2 (8.33%)	14 (100%)
Total	129 (100%)	24 (100%)	154 (100%)

Table 11

Demographic Information: Number of Respondents by Years of Teaching Experience

Teaching Experience	Blackboard Experience		
	Yes	No	Total
< 2 years	7 (5.43%)	0	7 (4.54%)
2 - 4 years	22 (17.05%)	4 (16.67%)	26 (16.88%)
5 - 7 years	11 (8.53%)	2 (8.33%)	13 (8.44%)
8 - 10 years	20 (15.50%)	2 (8.33%)	22 (14.29%)
11 - 15 years	19 (14.73%)	7 (29.17%)	27 (17.53%)
16 - 20 years	13 (10.08%)	3 (12.50%)	16 (10.39%)
21 - 30 years	16 (12.40%)	2 (8.33%)	18 (11.69%)
> 30 years	14 (10.85%)	2 (8.33%)	16 (10.39%)
Did not indicate	7 (5.43%)	2 (8.33%)	9 (5.84%)
Total	129 (100%)	24 (100%)	154 (100%)

Table 12

Demographic Information: Number of Courses Taughtin a Typical Quarter

Courses Taught	Blackboard Experience		
	Yes	No	Total
One	29 (22.48%)	9 (37.50%)	38 (24.68%)
Two	70 (54.26%)	9 (37.50%)	79 (51.30%)
Three	24 (18.60%)	6 (25.00%)	31 (20.13%)
Did not indicate	6 (4.65%)	0	6 (3.90%)
Total	129 (100%)	24 (100%)	154 (100%)

Table 13

Demographic Information: Number of Face-to-Face Courses Taught in a Typical Quarter

Face-to-Face Courses Taught	Blackboard Experience		
	Yes	No	Total
None	9 (6.98%)	1 (4.17%)	10 (6.49%)
One	33 (25.58%)	8 (33.33%)	41 (26.62%)
Two	65 (50.39%)	9 (37.50%)	74 (48.05%)
Three	19 (14.73%)	5 (20.83%)	25 (16.23%)
Did not indicate	3 (2.33%)	1 (4.17%)	4 (2.60%)
Total	129 (100%)	24 (100%)	154 (100%)

Table 14

Demographic Information: Number of Hybrid Courses Taught in a Typical Quarter

Hybrid Courses Taught	Blackboard Experience		
	Yes	No	Total
None	69 (53.49%)	15 (62.5%)	85 (55.19%)
One	25 (19.38%)	7 (29.17%)	32 (20.78%)
Two	25 (19.38%)	1 (4.17%)	26 (16.88%)
Three	8 (6.20%)	1 (4.17%)	9 (5.84%)
Did not indicate	2 (1.55%)	0	2 (1.30%)
Total	129 (100%)	24 (100%)	154 (100%)

Table 15

Demographic Information: Number of Online Courses Taught in a Typical Quarter

Online Courses Taught	Blackboard Experience		
	Yes	No	Total
None	114 (88.37%)	24	139 (90.26%)
One	11 (8.53%)	0	11 (7.14%)
Two	4 (3.10%)	0	4 (2.60%)
Total	129 (100%)	24 (100%)	154 (100%)

The demographic information indicated that 83.8% of the respondents have used or are currently using Blackboard and 15.6% have not used Blackboard. For instance, one faculty member indicated in an email communication to the researcher after submitting the online survey that, “I have been professionally trained to use blackboard but I prefer not to use it. It may be useful to other teachers and other course material but for me it is not” (personal communication, February 15, 2008). Some faculty members indicated in the open-ended questions that they were aware of Blackboard or have attended Blackboard seminar yet have chosen not to use Blackboard as a tool for teaching. Evidence from the open-ended questions will be provided and discussed later. This information may indicate that faculty members who have used or are using Blackboard have a higher tendency to respond to the survey, since the letter of consent indicated that

the focus of the survey is on Blackboard. The information should not be generalized to draw a conclusion about the proportion of faculty population who have used or are using Blackboard in the mid-Western university. The percentage of respondents who have taken a Blackboard seminar is 35.7% and those who have not taken any Blackboard seminar is 63.6%. It was also clear from the information gathered that 69% of the respondents have at least two years of experience using Blackboard.

Respondents were asked to indicate the total number of courses they taught during a typical quarter. They were also requested to indicate the number of courses they conducted using predominantly face-to-face methods, predominantly hybrid, and predominantly online respectively. The respondents reported that they taught more courses using the face-to-face method (140) than using the hybrid method (67) or online (15). This information is relevant because if an instructor who sees students face-to-face in class may not require as much electronic communication as an instructor who teaches a course predominantly online. With such consideration, there could be a situation in which an instructor who teaches a course using face-to-face methods may not spend time exploring those features with purposes that can be easily fulfilled within the physical classroom. Although there are also situations where an instructor may use online communications, such as chat, virtual classroom, or discussion board, outside a physical class session to improve interactions among students in a physical classroom, one cannot rule out those situations where the use of the LMS is minimized, such as that described above.

Of the 129 respondents who had Blackboard experience, 19 indicated that they had used other types of LMS or software before to assist them in their teaching. Only a handful of LMS were mentioned: WebCT and Moodle were the two most popular, LON-CAPA was the next most popular, followed by SAKAI, Desire 2 Learn, ANGEL Learning, WileyPLUS, OnCourse, as well as other localized teaching tools, such as Carmen system at Ohio State University and ICON at University of Iowa.

Of the 25 respondents who had no Blackboard experience, 6 indicated that they had used other types of LMS, such as LON-CAPA, which was used by 5 out of the 25 respondents. There were others who used localized LMS developed by an individual college; book publisher's course management system; PHP based class management system; as well as the use of available Internet technology to design their own course materials for students.

Overall Scores on the Perception of Blackboard Scale

The Perception of Blackboard scale consists of 10 Likert-scale items with 5 as *strongly agree* and 1 as *strongly disagree*. The highest possible score for this scale is 50 and lowest being 5. The 5th, 6th, 7th, 8th and 9th item are negative items, therefore, the scores on these items were reversed. There were 129 respondents with Blackboard experience, out of the total 154 respondents. Thus, only the 129 respondents were requested to respond to the Perception of Blackboard scale. The overall mean and standard deviation of the Perception of Blackboard scale were 35.70 and 6.94, respectively. Table 16 presents the means and standard deviations of the scores by college. The value of skewness was -.53, which indicated that the overall perception of

Blackboard was positive. Figure 1 illustrates the distribution of the scores on the Perception of Blackboard scale.

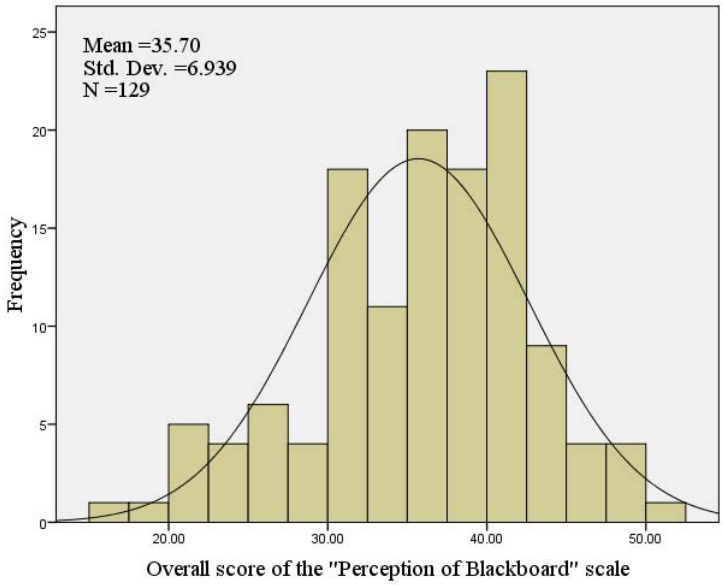


Figure 1. The distribution of scores on the Perception of Blackboard scale.

Table 16

Scores of the "Perception of Blackboard" Scale by College

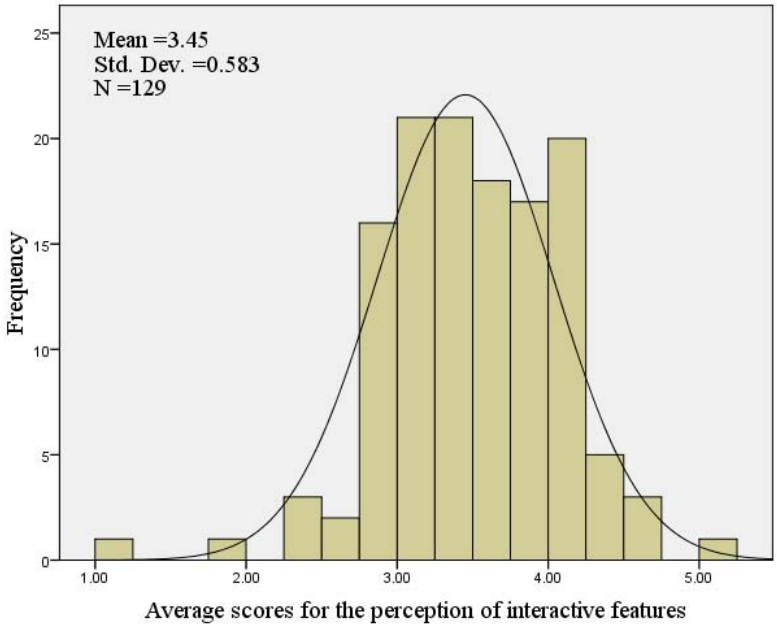
College (N)	*M*	*SD*
College of Arts and Sciences (50)	35.08	7.35
College of Business (10)	32.30	8.22
College of Communication (15)	35.53	6.22
College of Education (11)	40.82	5.36
College of Engineering and Technology (10)	36.50	6.84
College of Fine Arts (8)	36.50	4.90
College of Health and Human Services (19)	35.00	6.44
College of Osteopathic Medicine (5)	36.80	8.26
Other (1)	40.00	_

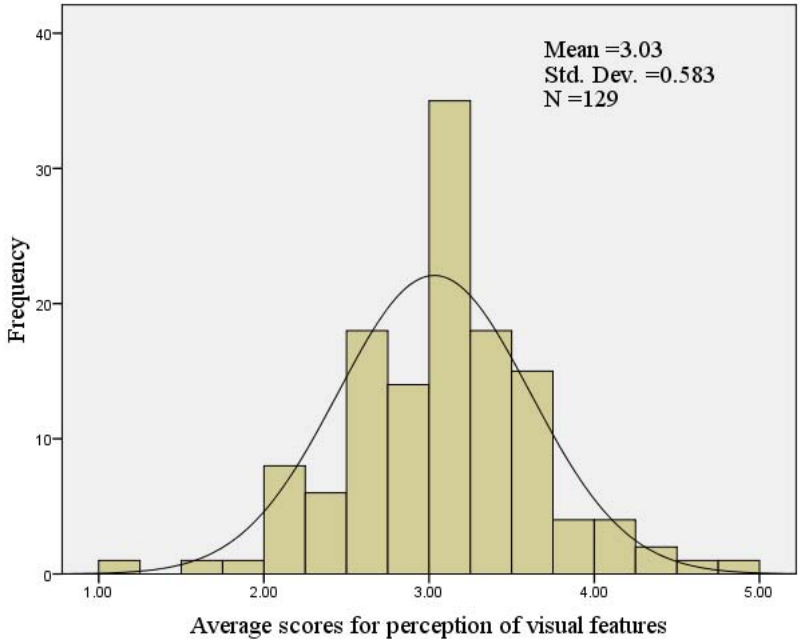
Overall Scores on the Perception of Blackboard's Design Scale

The Perception of Blackboard's Design scale consists of three subscales measuring three different aspects of Blackboard's design, namely, the design of interactive features, the design of visual features and the design of instructional features. It is a 21 Likert-scale items with 5 as strongly agreed and 1 as strongly disagreed. A NU (Never Used) category was added beside the regular 5-point Likert scale so that any respondent who had never used a specific feature could indicate so by selecting the NU

choice. The NU choice was assigned a value 0. Due to the addition of the NU category, computation of an overall score becomes problematic. A solution was applied by computing the averaged score for the variables being measured, as described earlier in chapter three. Therefore, the highest possible averaged score for the overall scale and all the subscales is 5 and the lowest is 1.

The 1st, 2nd, 4th, 5th, 10th, 11th, 13th, 14th, 15th, 18th and the 21st item of the Perception of Blackboard's Design scale are negative items; therefore, the scores on these items were reversed. The means and standard deviations of the Perception of Blackboard's Design subscales were 3.45 and .58 (interactive features), 3.03 and 5.83 (visual features) and 3.51 and .53 (instructional features) respectively. The value of skewness was -.51 (interactive features), -.11 (visual features), and -.53 (instructional features) respectively, which indicated that there was a slight skewing towards higher scores for the interactive and the instructional features, but the distribution of the scores for visual features was fairly close to normal. Figure 2 illustrates the distribution of averaged scores for each subscale on the Perception of Blackboard's Design.


Mean =3.45
Std. Dev. =0.583
N =129
Frequency
25
20
15
10
5
0
1.00
2.00
3.00
4.00
5.00
Average scores for the perception of interactive features


Mean =3.03
Std. Dev. =0.583
N =129
Frequency
40
30
20
10
0
1.00
2.00
3.00
4.00
5.00
Average scores for perception of visual features

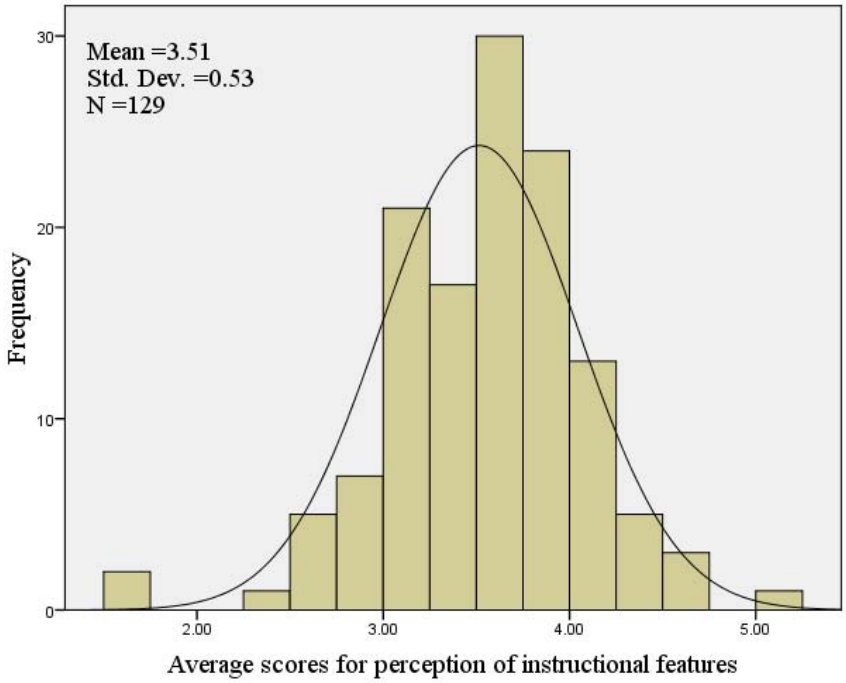


Figure 2. The distribution of averaged scores for each of the Perception of Blackboard's Design subscales.

Overall Scores on the Pedagogical Perspectives on E-Learning Scale

The Pedagogical Perspectives on E-Learning scale consists of 19 Likert-scale items with 5 as *strongly agree* and 1 as *strongly disagree*. The highest possible score for this scale is 95 and lowest being 19. All items are positive items; therefore, the scores on these items do not need to be reversed. All 154 respondents were requested to respond to this scale. Of the 154 respondents, 129 had experience with Blackboard, 24 had no

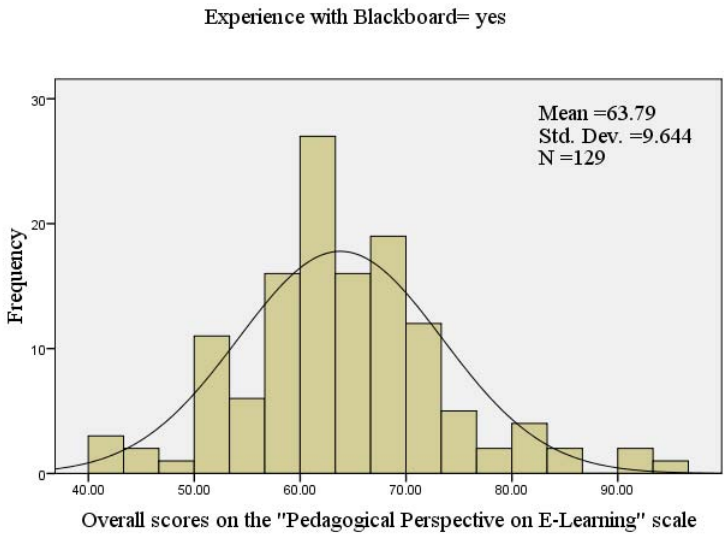
experience with Blackboard and 1 respondent had never heard of Blackboard. Table 17 presents the means and standard deviations of the scores by group.

Table 17

Scores of the "Pedagogical Perspective of E-Learning" Scale by Group

Experience with Blackboard	*M*	*SD*
Yes	63.79	9.64
No	61.25	10.69

The value of skewness was .38 for the group with Blackboard experience and .26 for the group with no Blackboard experience, which indicates that the distributions of scores for both groups were fairly normal. Figure 3 illustrates the distribution of the overall scores for each group.



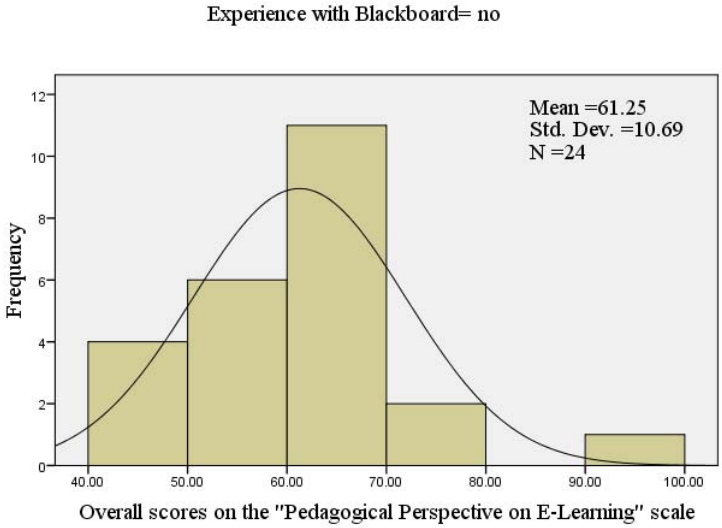


Figure 3. The distributions of the overall scores for the Pedagogical Perspective on E-Learning scale by group.

Results on the Capacity of Use Section

Overall Scores on the Capacity of Use Scale

The Capacity of Use scale is a check-all-that-apply scale that consists of 26 items with a value 1 assigned to an item that was checked and 0 to an item that was unchecked. Each of the 26 items represents one common feature of Blackboard; thus the overall score represents the total number of features used by each respondent. In order to make the variable quantitative and continuous, the percentage was computed for each respondent based on the total number of features checked. For instance, if the total number of features checked is 21, then the percentage of use will be 80.77%. The highest possible score for this scale is 100 and lowest being 0. Out of these 26 features, 10 were classified as interactive features in this study, 6 classified as visual features, and another 10 classified as instructional features. The overall mean and standard deviation of the Capacity of Use scale were 47.47 and 21.31 respectively. The mean score indicated that on the average, less than 50% of the 26 common features of Blackboard listed in this study were used. The value of skewness was -.210, which indicated that the distribution of the overall scores of the respondents was fairly normal. Figure 4 illustrates the distribution of the overall scores for each group.

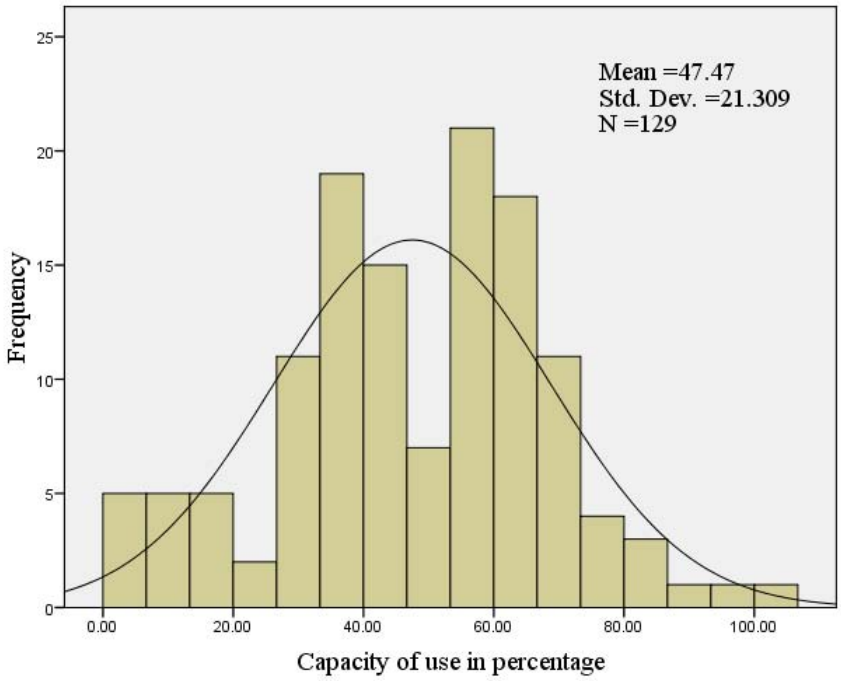


Figure 4. The distribution of the overall scores for the Capacity of Use scale.

Table 18 presents the list of 26 features and the corresponding total number and percentage of respondents who had used a particular feature during a typical quarter. The five most commonly used features and five least commonly used features are listed below.

Five most commonly used features:

1. Course documents (88.4%)
2. Email (86.8%)
3. Announcements (85.3%)
4. Files upload (83%)

5. Organization of content into folders (80.6%)

Five least commonly used features:

1. The virtual classroom (4.7%)
2. Syllabus builder (7%)
3. The chat feature (13.2%)
4. Visual representation of a course using Quick View (the original menu design) and Detail View (a course map) (14.7%)
5. Survey manager (16.3%)

Table 18

Capacity of use

Features	Number (N = 129)	Percentage
Interactive Features		
Upload a file (22nd item)	107	82.9
Add assignments (19th item)	89	69.0
Create an external link (8th item)	88	68.2
Archive or export a course (12th item)	75	58.1
Import or export grades (2nd item)	74	57.4
Manage a discussion forum (10th item)	56	43.4
Use the digital dropbox (9th item)	49	38.0
Check the status of assignments assigned to students (20th)	32	24.8
Use the chat feature (4th item)	17	13.2
Use the virtual classroom feature (26th item)	6	4.7
Visual Features		
Organize content into folders (3rd item)	104	80.6
Customize course menu buttons by types, shapes and colors (18th item)	43	33.3

Table 18 (continued)

Capacity of use

Features	Number (N = 129)	Percentage
Visual Features		
Use course menu navigation style (25th item)	35	27.1
Use formatting tools such as font style, font colors, font format, and layout of page (24th item)	34	26.4
Change the course banner (23rd item)	29	22.5
Look at the visual representation of a course using Quick View and Detail View (5th item)	19	14.7
Instructional Features		
Add, edit, or delete course documents (17th item)	114	88.4
Email a member or the entire group (13th item)	112	86.8
Add, edit, or delete announcements (11th item)	110	85.3
Send messages to a member or the entire group (15th item)	97	75.2
Use the gradebook (1st item)	94	72.9
Add, edit, or delete staff information (14th item)	77	59.7
Use a user management feature (7th item)	70	54.3
Use the test manager (16th item)	31	24.0
Use the survey manager (21st item)	21	16.3
Use syllabus builder (6th item)	9	7.0

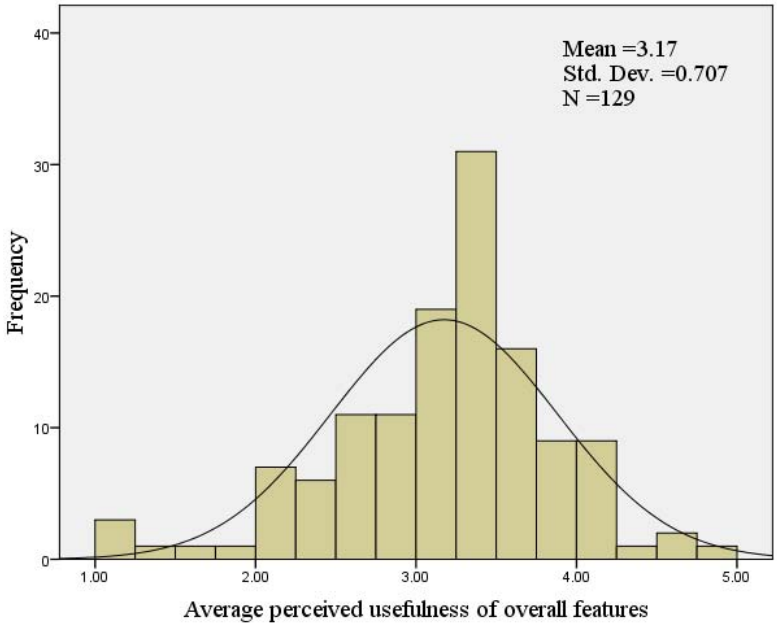
The overall mean and standard deviation for the capacity of use for the interactive features were 45.97 and 22.48; for visual features were 34.11 and 28.93; and for instructional features were 56.98 and 23.07. The overall means indicated that on the average, a higher percentage of the instructional features were used; whereas, less than 50% of both the interactive features and the visual features were used.

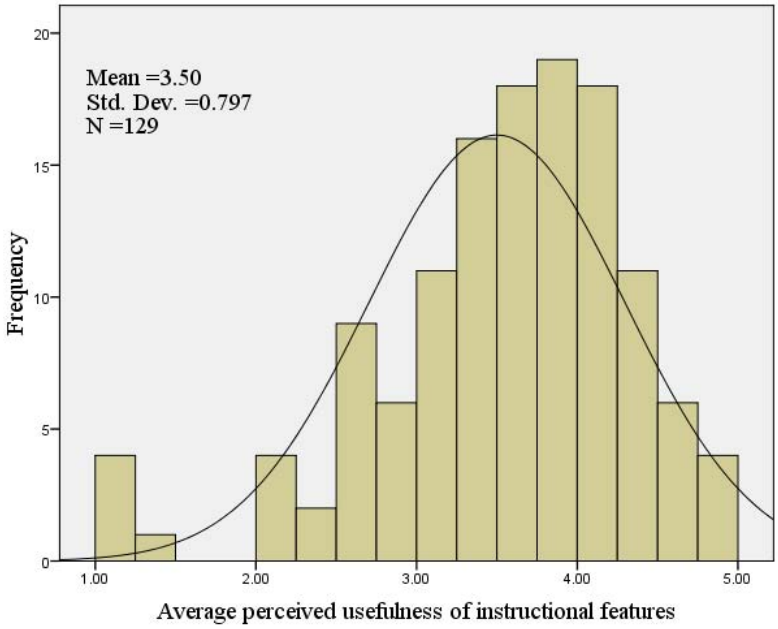
Overall Scores on the "Degree of Usefulness" Scale

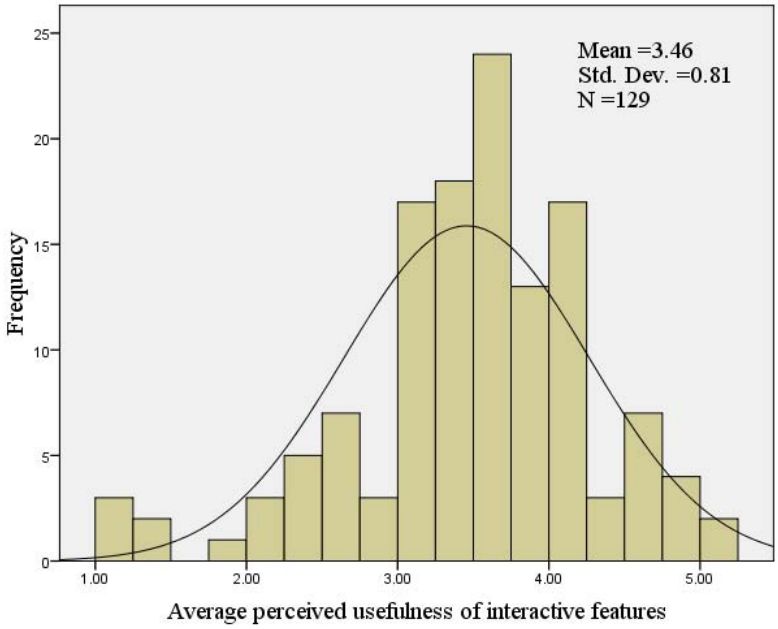
The Degree of Usefulness scale consists of 26 Likert-scale items with 5 as *most useful* and 1 as *least useful*. Each of the 26 items represents a common feature of Blackboard; thus the overall score indicates the degree of usefulness of the overall features of Blackboard, represented by the 26 most common features selected for this study, as perceived by the respondents. Out of these 26 features, 10 were classified as interactive features in this study, 6 classified as visual features, and another 10 classified as instructional features. A NA (Not Applicable) category was added beside the regular 5-point Likert scale so that any respondent who had never used a specific feature could indicate so by selecting the NA choice. The NA choice was assigned a value 0. A description of the computation of averaged score was described in chapter three.

The mean and standard deviation of the Degree of Usefulness scale were 3.18 and .71 respectively. The mean score indicated that on the average, the respondents perceived the 26 common features of Blackboard as moderately useful. The value of skewness was -.73, which indicated that the distribution of the averaged scores was slightly skewed towards the higher averaged scores. Further comparison among the three different groups

of features, classified in this study as interactive, visual and instructional, indicated that instructional and interactive features were perceived as more useful by the respondents and visual features less useful. The value of skewness for instructional features, interactive features and visual features were -1.02, -.79, and .59 respectively. Figure 5 illustrates the distribution of the averaged scores for the perceived usefulness of the overall features and by group.




Mean =3.50
Std. Dev. =0.797
N =129
Frequency
0
5
10
15
20
1.00
2.00
3.00
4.00
5.00
Average perceived usefulness of instructional features


Mean =3.46
Std. Dev. =0.81
N =129
Frequency
0
5
10
15
20
25
1.00
2.00
3.00
4.00
5.00
Average perceived usefulness of interactive features

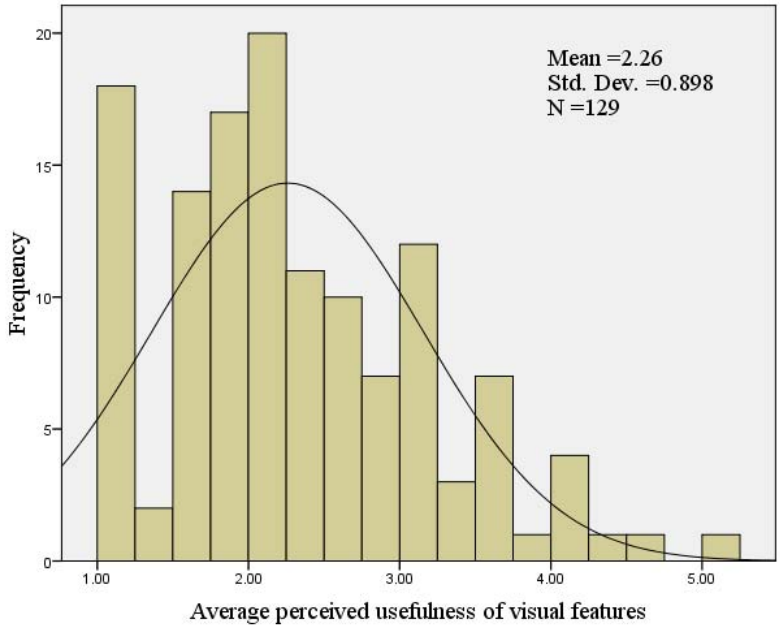


Figure 5. The distribution of the averaged scores for the Degree of Usefulness scale.

The five most useful features and their averaged scores were presented below.

1. Email (4.41)
2. Course documents (4.31)
3. Upload file (4.15)
4. Announcement (4.15)
5. Send messages within Blackboard (4.07)

The five least useful features and their averaged scores were presented below.

1. Test manager (1.43)
2. Check status of assignment (1.33)

3. Chat (0.78)
4. Syllabus builder (0.69)
5. Virtual classroom (0.57)

Reliabilities and Factor Analyses of the Scales

All four of the scales used in this study were developed by the researcher. In order to ensure the validity and reliability of these scales for the purpose of cross administration to other samples, internal consistency estimates of reliability and factor analysis were examined. Two types of internal consistency estimates, split-half reliability and coefficient alpha, were used here to estimate the reliability coefficient. The split-half coefficients assess reliability by examining consistency between two halves of a scale. The coefficient alpha, on the other hand, assesses reliability by examining consistency among items. A greater consistency in responses among items gives a higher coefficient alpha.

Exploratory factor analysis was used to define dimensions underlying each of the scales. This knowledge was used as a guideline to examine if the sets of items or scales reflect the corresponding constructs designed in this study. In other words, it helps to examine whether the sets of items or scales are good indicators of the corresponding construct or constructs. The factor analysis used in this study was conducted in two stages: factor extraction and factor rotation. Principal component analysis was used in the first stage to extract major factors underlying in the measured variables. An initial decision was made on the number of factors to extract based on an eigenvalue, which is the amount of variance of the variables accounted for by a factor (Green & Salkind, 2002,

p. 301). In the first stage of factor analysis, Kaiser's (1960) eigenvalue-greater-than-one-criterion and Cattell's (1966) proposal of the use of *scree* graph to help determine the number of principal components or factors to retain (as cited in Dunteman, 1989, p. 22). The second stage of factor analysis involved factor rotation, in other word, major factors extracted in the first stage was manipulated statistically to make the factors more interpretable. At the second stage, a final decision was made about the number of underlying factors. A variance maximizing (varimax) rotation, an orthogonal rotation procedure that yields uncorrelated factors, was used to do the factor rotation.

Internal Consistency of the Perceptions of Blackboard Scale

Two internal consistency estimates of reliability were examined for the Perceptions of Blackboard scale, namely, coefficient alpha and a split-half coefficient expressed as a Spearman-Brown corrected correlation. The coefficient alpha achieved was .87. The 10-item scale was then split into odd and even items to conduct the split-half reliability analysis, which achieved a split-half coefficient of .86. Both values indicated satisfactory reliability in the Perceptions of Blackboard scale.

Factor Analysis of the Perceptions of Blackboard Scale

Exploratory factor analysis was conducted on the 10-item Likert scale using principal components to do data reduction. Both Kaiser's eigenvalue-greater-than-one criterion and Catell's scree graph were used to determine the appropriate number of components to retain. A scree graph is a plot that shows the eigenvalues of successive factors, from large to small. In this way, the relative importance of each factor becomes apparent. A scree plot has a characteristic shape described by Field (2000) as "a sharp

decent in the curve followed by a tailing off" (436). Cattell (1966) suggested that the cut-off point for selecting factors should be at the bending of the curve. All factors with eigenvalues in the sharp descent part of the plot before the eiguevalues start to level off should be retained (Green & Salkind, 2002, p. 301). According to Green and Salkind (2002), the criterion based on Catell's scree graph yielded accurate results more frequently than Kaiser's eigenvalue-greater-than-one criterion (p. 301). Catell's scree plot was used as a final guideline to determine the number of factors to retain.

When using Kaiser's eigenvalue-greater-than-one criterion as a guideline, there were two major underlying factors (or components). The eigenvalues of the two factors were 4.67 and 1.15, and they accounted for 46.68% and 11.48% of the total variance, respectively. A further examination using the scree graph, as shown in Figure 6, indicated that one major factor was sufficient to define the underlying dimensionality of the measured variables. Thus one factor was retained after the stage two factor rotations using the varimax rotation method. After rotation, the extraction sums of squared loadings showed that the factor accounted for 40.98% of the total variance. This result was consistent with the single dimensionality of the Perception of Blackboard scale used in this study, although with this single factor, there was still 59.02% of the variance left unexplained.

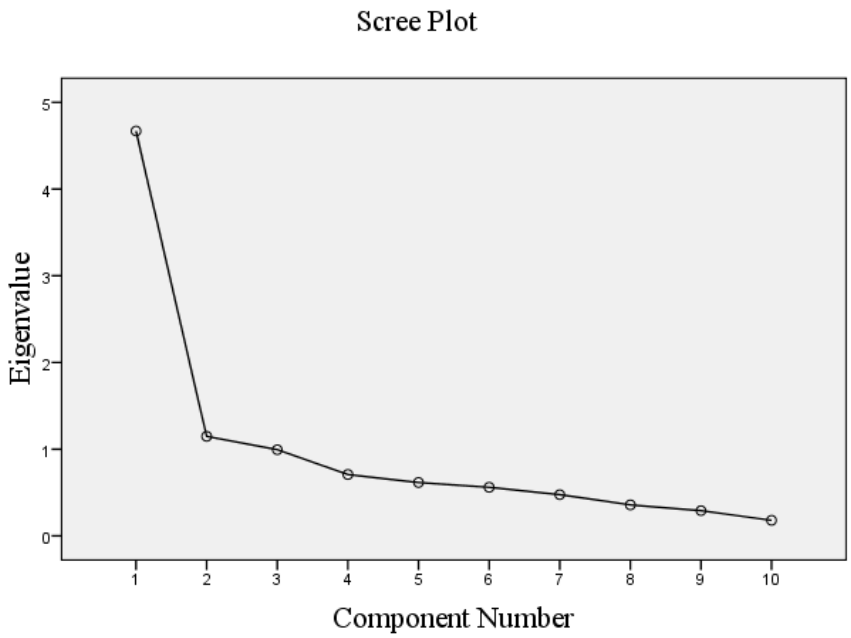


Figure 6. Scree plot of the Perception of Blackboard scale.

Internal Consistency of the Perception of Blackboard's Design Scale

The Perception of Blackboard's Design scale is a 21-item Likert scale with three embedded subscales—the interactive features scale, the visual features scale and the instructional features scale. The coefficient alpha was computed on each of the subscales, but the split-half reliability was conducted on the entire scale because the respondents did the survey as one scale, not three subscales. Due to the NU category in this scale, specific items indicated by any respondent as NU were temporary controlled as missing data before conducting the analysis. When assessing the internal consistency estimates of

reliability using split-half coefficient, items were split in such a way to ensure that each half consists of half of the set of items representing each subscale. The split-half coefficients expressed as Spearman-Brown coefficient was .77, which indicates a fairly satisfactory reliability. When conducting the internal consistency reliability estimates of coefficient alpha, each subscale was assessed independently because the coefficient alpha assesses reliability by examining consistency among items. The coefficient alpha was .47 for interactive features design, .62 for visual features design, and .41 for instructional features design. The coefficient alpha was .77 when the analysis was conducted with all 21 items. The coefficient alpha for subscales were not satisfactory and this could be due to the limited number of items for each of the subscales.

Factor Analysis of the Perception of Blackboard's Design Scale

Exploratory factor analysis was conducted on the 21-item Likert scale using principal components to conduct data reduction. Both Kaiser's eigenvalue-greater-than-one criterion and Catell's scree graph were used to determine the appropriate number of components to retain. With Kaiser's eigenvalue-greater-than-one criterion as guideline, seven factors were found. The first two factors had eigenvalues 4.29 and 3.07 respectively and accounted for 20.44% and 14.64% of the total variances. The remaining five factors have eigenvalues 1.46, 1.36, 1.19, 1.10, and 1.00 respectively and each accounted for 6.94%, 6.47%, 5.65%, 5.25%, and 4.77% of the total variances. Varimax rotation procedure was conducted to extract two factors suggested by the scree plot. After rotation, the extraction sums of squared loadings showed that the two factors accounted for 15.58% and 13% of the total variances, respectively. The result is not consistent with

the construction of the scale, which was trying to examine three dimensions of Blackboard's design. The set of items was only sufficient to explain 28.58% of the total variance, which left 71.42% of the variance unexplained.

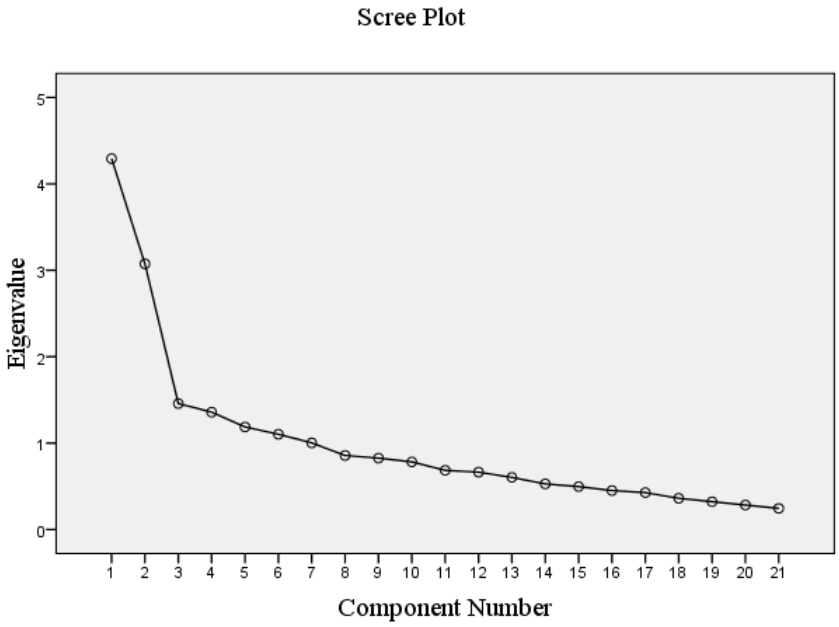


Figure 7. Scree plot of the Perception of Blackboard's Design scale.

Internal Consistency of the Pedagogical Perspective on E-Learning Scale

The Pedagogical Perspective on E-Learning is a 19-item Likert scale. The two internal consistency estimates of reliability—coefficient alpha and a split-half coefficient—were examined. The coefficient alpha achieved was .88. The 19-item scale was then split into odd and even items to conduct the split-half reliability analysis, which

achieved a split-half coefficient of .90. Both values indicated satisfactory reliability in the Pedagogical Perspective on E-Learning scale.

Factor Analysis of the Pedagogical Perspective on E-Learning Scale

Exploratory factor analysis was conducted on the 19-item Likert scale using principal components to do data reduction. Both Kaiser's eigenvalue-greater-than-one criterion and Catell's scree graph were used again to determine the appropriate number of components to retain. With Kaiser's eigenvalue-greater-than-one criterion as a guideline, five factors were found. The first factor had the highest eigenvalue of 5.99 and it accounted for 31.54% of the total variance. The remaining four factors had eigenvalues of 1.74, 1.34, 1.16, and 1.09 and each accounted for 9.15%, 7.07%, 6.11%, and 5.76% of the total variance. Varimax rotation procedure was conducted to extract a single factor suggested by the scree plot. After rotation, the extraction sums of squared loadings showed that the one major factor accounted for 27.83% of the total variance. The result is consistent with the construction of the scale, which was based upon one major construct—peadgogical perspective on E-Learning—with four dependent components that converged to the one construct.

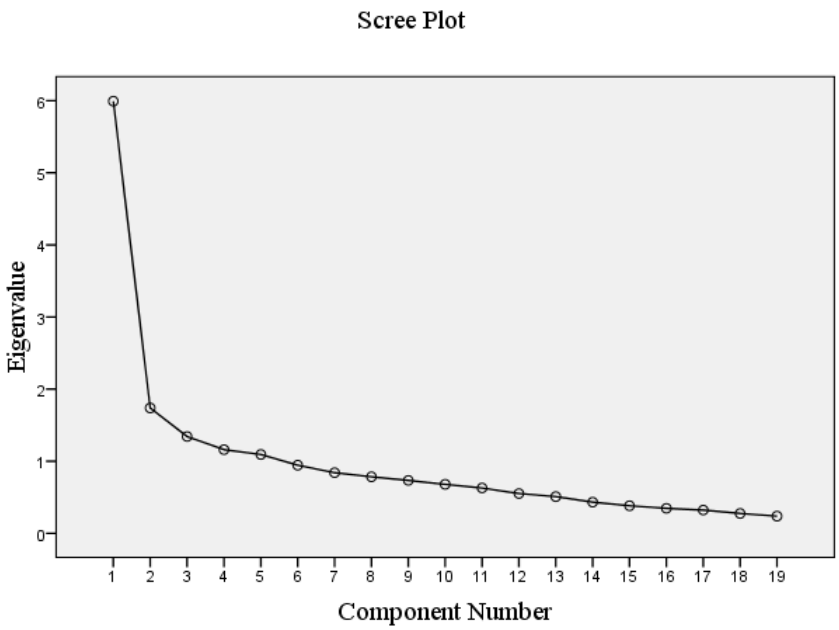


Figure 8. Scree plot of the Pedagogical Perspective on E-Learning scale.

Internal Consistency of the Degree of Usefulness Scale

The Degree of Usefulness scale is a 26-item Likert scale. Two internal consistency estimates of reliability—coefficient alpha and a split-half coefficient—were examined. Due to the NA category in this scale, specific items indicated by any respondent as NA were temporary controlled as missing data before conducting the analysis. The coefficient alpha achieved was .91. The 26-item scale was then split into two groups by selecting the first half and then the second half of the scale to conduct the split-half reliability analysis. A split-half coefficient of .88 was achieved. Both the

coefficient alpha and the split-half coefficient indicated satisfactory reliability for the Degree of Usefulness scale.

Factor Analysis of the Degree of Usefulness Scale

Exploratory factor analysis was conducted on the 26-item Likert scale using principal components to do data reduction. Both Kaiser's eigenvalue-greater-than-one criterion and Catell's scree graph were used again to determine the appropriate number of components to retain. With Kaiser's eigenvalue-greater-than-one criterion as a guideline, six factors were found. The first two factors had the highest eigenvalues of 8.15 and 2.84 and they accounted for 31.35% and 10.92% of the total variance, respectively. The remaining four factors had eigenvalues 1.92, 1.66, 1.32, and 1.07 and each accounted for 7.37%, 6.39%, 5.08%, and 4.13% of the total variance. Varimax rotation procedure was conducted to extract a single factor suggested by the scree plot. After rotation, the extraction sums of squared loadings showed that the one major factor accounted for 28.65% of the total variance. The result is consistent with the construction of the scale, which was based upon one major construct—the degree of usefulness of Blackboard's features.

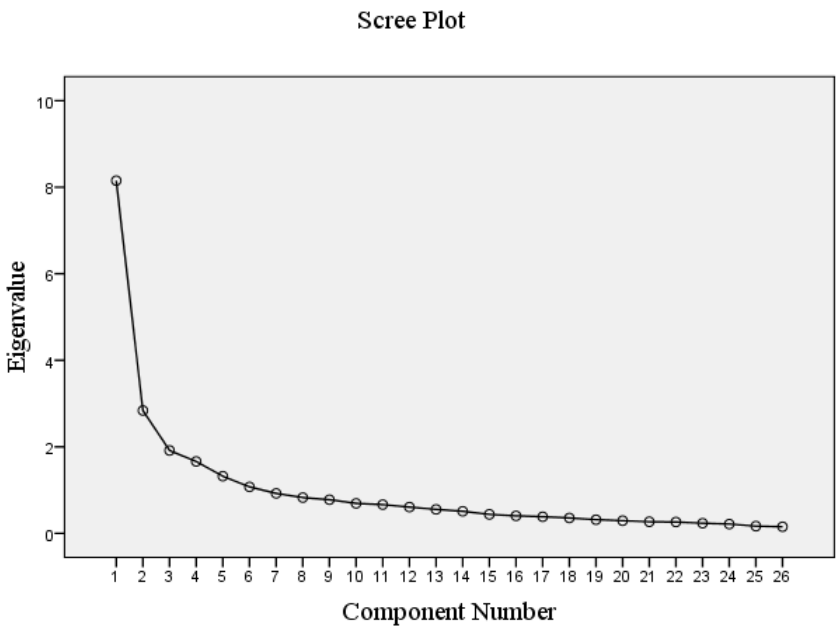


Figure 9. Scree plot of the Degree of Usefulness scale.

Multiple Regression Analysis: Research Question 1

A multiple regression analysis was conducted on the data collected to answer the first research question:

> Is there a relationship between faculty's perception of Blackboard and faculty's perception of the design of interactive features, visual features, and instructional features respectively within Blackboard? If such a relationship exists, to what extent does each predictor (the design of interactive features, visual features, and instructional features respectively) account for a faculty's perception of Blackboard?

The analysis is able to evaluate whether the independent variables (perception of the design of interactive features, perception of the design of visual features, and perception of the design of instructional features) are significant predictors of the criterion variable (Perception of Blackboard).

Assessment of Regression Model

The performance of an assessment on the regression model is an important step before the execution of any multiple regression analysis. An assessment of regression model can be conducted by simply asking two questions. First, is the model a good fit of the observed data? Second, can the model be reliable for cross administration to other samples? In other words, the first question would assess if the model were affected by a small number of influential cases; and the second question would first assess if the necessary underlying assumptions for regression have been met, followed by cross-

validation, that is, the assessment of the accuracy of the model across different samples. Without information of the above, any regression analysis will not be meaningful.

The Diagnosis of Outliers and Influential Cases

Field (2000) states that "An outlier is a case that differs substantially from the main trend of the data. . . . Outliers can cause your model to be biased because they affect the values of the estimated coefficients" (p. 122). An influential case, on the other hand, is a case that has the potential to exert excessive influence over the parameters of the model. The assessment of outliers can be performed by using the value of standardized residuals as a guideline. According to Field (2000), in a normally distributed sample, 95% of standardized residuals should have an absolute value of 2, and 99% of standardized residuals should have an absolute value of 3. Any standardized residual with an absolute value greater than 3 is a cause for concern. In this case, there is a sample of 129 cases, it is therefore reasonable to expect about 6 cases (5%) to have standardized residuals outside of absolute value 2. From the casewise diagnostics achieved from SPSS output, there were 3 cases with standardized residuals outside an absolute value 2, and of these, 1 case (1%) lies outside an absolute value 2.5.

The assessment of influential cases can be performed by examining Cook's distance, which indicates the overall influence of a case on a model. A Cook's distance with a value greater than 1 may be a cause for concern. In the event that outliers or influential cases are present, it would be worthwhile to run two different regression analyses, one with the inclusion of the outliers or influential case, and the other with the exclusion of the same case. This will help one examine the influence of a particular case

on the parameter of the model. In this case, none of the cases had Cook's distance above 1, which implies that none of the cases could be considered as having excessive influence on the parameter of the model.

Examination of Assumptions

An examination of assumptions is important because if any assumption were not met, drawing accurate conclusions would become problematic. In order to ensure a regression equation with unbiased coefficients and parameters, all assumptions have to be met. There are multiple assumptions for using multiple regression as a statistical method in a research design. Some of these assumptions can be checked directly against the result of descriptive statistics while others need further statistical testing to verify. The outcome variable (overall score of the Perception of Blackboard scale) met the assumption of an outcome variable that is quantitative, continuous and unbounded. The outcome variable is quantitative because it is measured at the interval level using the Likert scale. It is a continuous variable because it makes sense to calculate a mean; and it is unbounded because no constraints are made to the variability of the outcome (the minimum possible score is 10, and the maximum is 50, the data collected ranged from 17 to 50). All the predictors are also quantitative because they are all measured at the interval level using a Likert scale. The assumptions of the non-zero variance in predictors were met: The variances for the predictors were .34 (interactive features), .34 (visual features) and .28 (instructional features) respectively. Since each value of the outcome variable came from a separate subject, the assumption of independence value among subjects was also met.

Assumptions that required further statistical testing for verification include the assumptions of no perfect multicollinearity between predictors, homoscedasticity, linearity, and normally distributed errors. Although observing the correlation between the predictors may provide an idea of any possibility of multicollinearity, it is the value for Variance Inflation Facor (VIF) that gives the statistical estimate of whether or not multicollinearity exists between the predictors. Although there were some moderate correlations among predictors (r = .53, .54, .55), the average value of VIF (1.62) is well below 10, which indicated that multicollinearity is not a problem for this model. The assumption of homoscedasticity and linearity can be examined through the graph of standardized residuals (*ZRESID) plotted against standardized predicted values (*ZPRED) as shown in Figure 10. In this case the assumption has been met because the points are randomly and evenly dispersed throughout the plot. The assumption of normally distributed errors means that the differences between the model and the observed data are most frequently zero, or close to zero, and that a difference much greater than zero would be rare. This assumption can be examined through the Normal P-P plot of regression standardized residual as shown in Figure 11. In this case this assumption had been met because most of all the observed residuals, represented by the points, lie on the straight line which represents a normal distribution.

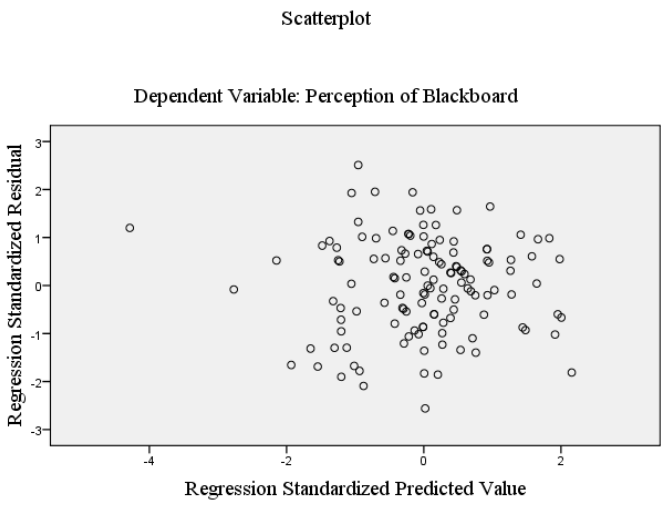


Figure 10. The graph of standardized residuals (*ZRESID) against regression standardized predicted value (*ZPRED).

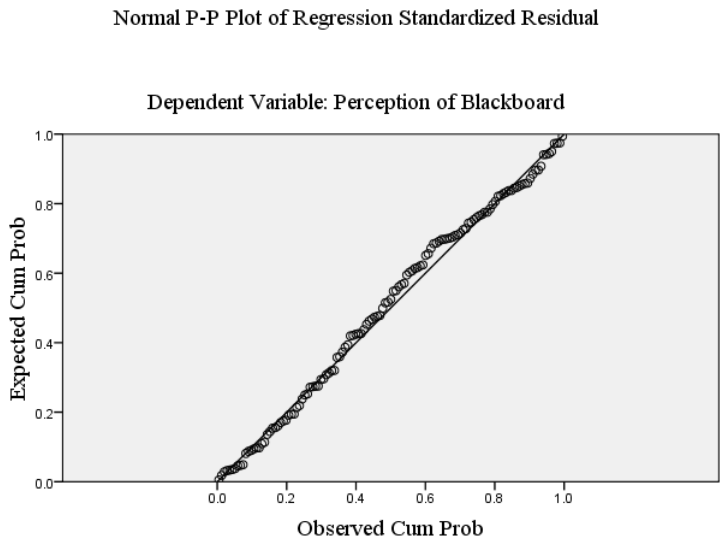


Figure 11. The above Normal P-P plot shows a good normal distribution of the regression standardized residuals.

Method of Regression

Although past research has emphasized the nature of interactivity and visual designs as two important and necessary aspects for creating a more natural and effective e-learning platform (Cantoni, Cellario, & Porta, 2003), there is no specific indicator of the design of interactive and visual features as predictors of a good e-learning platform as perceived by instructors. There has been research that indicated visual appeal of website material as one factor that highly affects students' perception of instructional quality of online and web-based courses (Kidd, 2005), but it did not indicate whether the same factor could be used as a predictor of faculty members' perceptions of e-learning instruction. Since there were not enough research studies to suggest an hierarchical order of importance for the independent variables used in this study, the researcher made the choice to use forced entry (or known as Enter in SPSS) to generate the regression model. In this method, all independent variables were entered into the model simultaneously.

Model Statistics

Descriptives

The correlation matrix provides a rough idea of the relationships between the predictors and the criterion variable, as well as the relationship between each of the predictors. The values of Pearson correlations (as presented in Table 19) show the relationships between each pair of independent variables. The correlations between each predictor were almost equal, at $r_{interactive-visual}$ = .54, $r_{instructional-visual}$ = .53, and $r_{instructional-interactive}$ = .55 with p = .000 for all r. Despite the significance of the correlations,

the correlations were not substantial ($r > .9$) enough to cause collinearity between predictors. Of all the predictors, the perception of design of instructional features correlates best with the criterion variable ($r = .73$, $p = .000$), followed by the perception of design of interactive features ($r = .63$, $p = .000$), and then the perception of design of visual features ($r = .60$, $p = .000$). At this point, the information is sufficient to say that the three independent variables each had a positive relationship with the outcome variable. To know whether they are good predictors, a look at the model summary is required.

Table 19

Pearson Correlations between Independent Variables

	Perception of Blackboard	Perception of the design of interactive features	Perception of the design of visual features	Perception of the design of instructional features
Perception of Blackboard	1.00			
Perception of the design of interactive features	.63	1.00		
Perception of the design of visual features	.60	.54	1.00	
Perception of the design of instructional features	.73	.55	.53	1.00

Summary of Model

The multiple correlation coefficients between the predictors and the outcome variable were represented by the value *R*, which was .80 in this sample. The squared multiple correlation, also known as the coefficient of determination, represented by R^2 was .64. R^2 is the proportion of variance in the dependent variable which can be predicted from the independent variables. The R^2 value indicated that the linear combination of all the independent variables accounted for approximately 64% of the variance of the perception of Blackboard. The *F* value tells whether the independent variables reliably predict the dependent variable. In this case, the *F* value is significant, $F(3, 125) = 73.55$, $p = .000$. Therefore the linear combination of the independent variables can be used to predict the dependent variable, the perception of Blackboard. It is noteworthy that the significance of the *F* value was an overall significance assessment. It does not provide information on the ability of any particular independent variable to predict the dependent variable. The model parameters, such as the coefficients and the part or partial correlations between each predictor and the criterion, will indicate the relative importance of each predictor in the prediction.

Model Parameters

The individual contribution of each predictor to the model can be examined from the coefficients and the part and partial correlations of each predictor to the model. Table 20 presents the table of coefficients. The *t* value indicated whether a predictor was making significant contribution to the model. In this model, all predictors were making a significant contribution. However, the perception of instructional features made a

relatively higher contribution than the other two predictors because it had a higher *t* value. Therefore, the perception of instructional features was considered the most important predictor. The next important predictor was the perceptions of the design of interactive features, and the least important was perceptions of the design of visual features. The coefficients of the regression model is presented in Table 20.

Table 20

Coefficients of the Regression Model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-4.391	2.730		-1.609	.110
	Perception of the design of interactive features	3.000	.821	.252	3.655	.000
	Perception of the design of visual features	2.481	.807	.208	3.074	.003
	Perception of the design of instructional features	6.322	.897	.483	7.045	.000

Model		95% Confidence Interval for B		Correlations			Collinearity Statistics	
		Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-9.793	1.011					
	Perception of the design of interactive features	1.375	4.624	.632	.311	.197	.609	1.643
	Perception of the design of visual features	.884	4.078	.601	.265	.165	.630	1.587
	Perception of the design of instructional features	4.546	8.098	.733	.533	.379	.616	1.623

a. Dependent Variable: Perception of Blackboard

The value β (beta) tells the relationship between the criterion variable and each predictor. A positive value implies a positive relationship between the predictor and the criterion. In other words, a person who has a better perception of the design of interactive features, or a better perception of the design of visual features, or a better perception of the design of instructional features, or a combination of these, will tend to have a better perception of Blackboard.

The relative importance of each predictor can also be examined from the part correlation. A part correlation is the unique correlation of each predictor with the criterion variable, partialling out the effects of all other predictors in the model from the predictor but not the criterion variable. The perception of the design of instructional features had the highest part correlation (.379) with the criterion variable, followed by interactive features (.197) and visual features (.165). Thus the perception of instructional features is relatively more important than the other two predictors.

The *shrinkage*, or loss of predictive power when the model is used in another sample, can be examined through the adjusted R^2 generated by SPSS. In this case, the R^2_{adj} was .63, which is about 1% difference from the value of R^2.

Multiple Regression Analysis: Research Question 2

A multiple regression analysis was conducted to answer the second research question:

> Is there a relationship between faculty's capacity of utilizing Blackboard and faculty's pedagogical perspective on e-learning, the perceptions of the designs of interactive features, visual features, and instructional features of Blackboard? If a

relationship exists between capacity of use and any of the four predictors (pedagogical perspectives on e-learning, perception of the designs of interactive features, visual features and instructional features respectively), to what extent does each predictor account for a faculty member's capacity of utilizing Blackboard?

The analysis will evaluate whether the independent variables (pedagogical perspective on e-learning, perceptions of the designs of interactive features, visual features, and instructional features) are significant predictors of the criterion variable (capacity of use).

Assessment of Regression Model

The multiple regression procedure for Research Question 2 will be performed similarly to that of Research Question 1, in which the examinations of outliers and influential cases and the evaluations of assumptions will be examined prior to the performance of further analysis.

The Diagnosis of Outliers and Influential Cases

The assessment of outliers was performed by using the value of standardized residuals as a guideline. From the casewise diagnostics achieved from SPSS output, there were 5 cases with standardized residuals outside an absolute value 2. None of the cases lies outside an absolute value 2.5. According to Field (2000), in a normally distributed sample, 95% of standardized residuals should have an absolute value of 2, and 99% of standardized residuals should have an absolute value of 3. Any standardized residual with an absolute value greater than 3 is a cause for concern. In this case, there is a sample of 129 cases, it is therefore reasonable to expect about 6 cases (5%) to have standardized

residuals outside of absolute value 2. Therefore, it is reasonable to consider the regression model as a good representation of the sample data.

The assessment of influential cases was performed by examining Cook's distance, which indicates the overall influence of a case on a model. None of the cases had Cook's distance above 1, which implies that none of the cases could be considered as having excessive influence on the parameter of the model.

Examinations of Assumptions

The fulfillment of assumptions is almost an assurance for drawing accurate conclusions about a model. In order to ensure a regression equation with unbiased coefficients and parameters, all assumptions have to be met. Some assumptions can be checked directly against the result of descriptive statistics while others need further statistical testing to verify. The outcome variable (overall score of the Capacity of Use scale) met the assumption of an outcome variable that is quantitative, continuous and unbounded. Although the outcome variable is measured as a categorical scale (unchecked is assigned 0 and checked is assigned 1), the conversion into a percentage made it a quantitative and continuous variable. It is unbounded because no constraints were made to the variability of the outcome: the minimum possible score is 0, and the maximum is 100, and the data collected ranged from 0 to 100. The assumptions of the non-zero variance in predictors were met: The variances for the predictors were 93.01 (pedagogical perspective), .34 (interactive features), .34 (visual features) and .28 (instructional features) respectively. Since each value of the outcome variable came from a separate subject, the assumption of independence of values among subjects was also met.

Other assumptions such as multicollinearity between predictors, homoscedasticity, linearity, and normally distributed errors were evaluated through statistical testing. The value for Variance Inflation Facor (VIF) gave the statistical estimate of multicollinearity between the predictors. One may also get a sense of the possibility of multicollinearity through an observation of the correlation between the predictors. But one will not be able to know the significance of the correlations, that means, whether it is influential to the regression, by simply looking at the correlations. Although there were some moderate correlations among predictors, the average value of VIF (1.49) was well below 10, which indicated that multicollinearity is not a problem for this model. The assumption of homoscedasticity and linearity can be examined through the graph of standardized residuals (*ZRESID) plotted against standardized predicted values (*ZPRED) as shown in Figure 12. In this case the assumption has been met because the points are randomly and evenly dispersed throughout the plot. The assumption of normally distributed errors means that the differences between the model and the observed data are most frequently zero, or close to zero, and that a difference much greater than zero would be rare. This assumption can be examined through the Normal P-P plot of regression standardized residual. In this case the assumption had been met because most of all the observed residuals, represented by the points, lie on the straight line which represents a normal distribution.

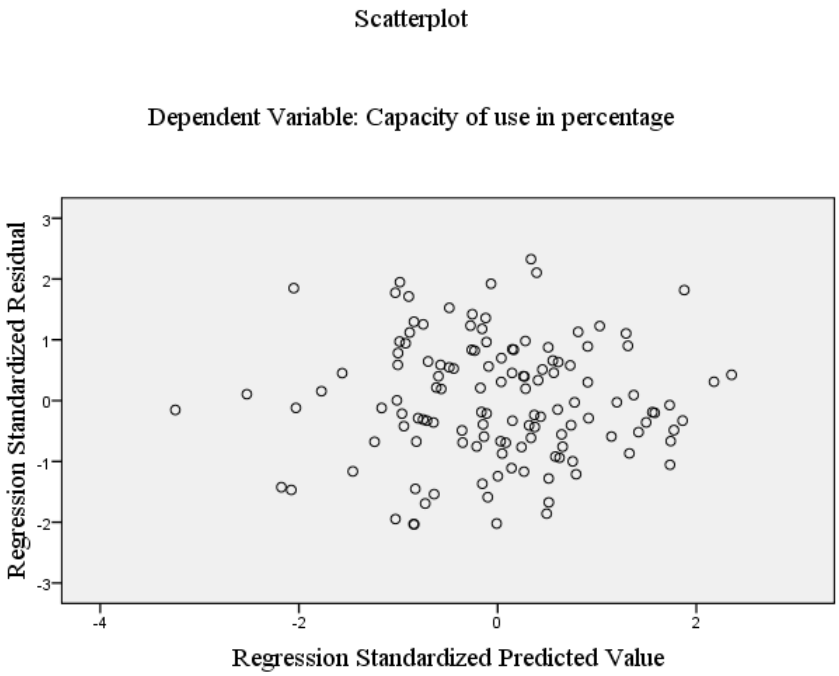


Figure 12. The graph of standardized residuals (*ZRESID) against regression standardized predicted value (*ZPRED).

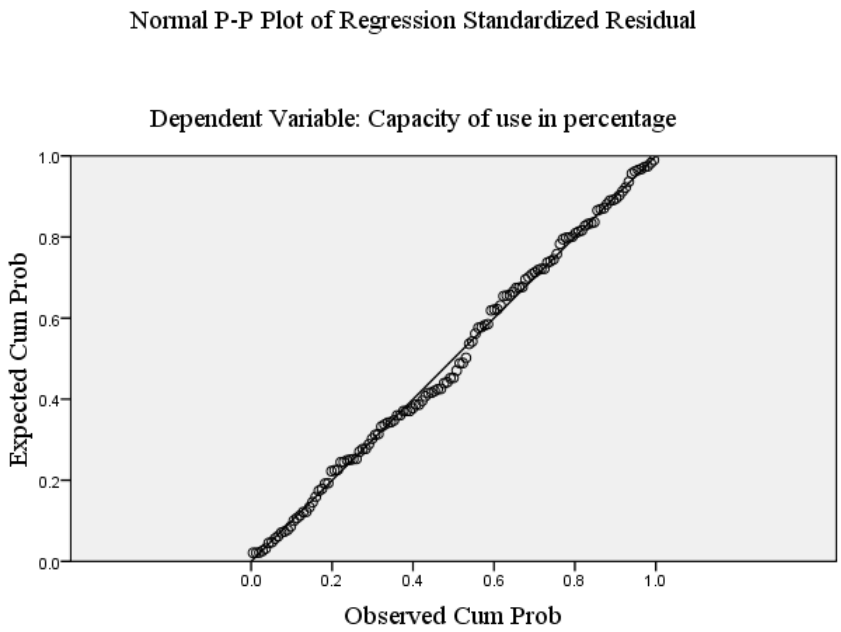


Figure 13. The above Normal P-P plot shows a good normal distribution of the regression standardized residuals.

Method of Regression

Since there were no past research studies to suggest a hierarchical order of importance for the independent variables used in this study, the researcher made the choice to use forced entry (or known as Enter in SPSS) to generate the regression model. In this method, all independent variables were entered into the model simultaneously.

Model Statistics

Descriptives

The correlation matrix provides a rough idea of the relationships between the predictors and the criterion variable, as well as the relationship between each of the

predictors. The values of the Pearson correlations (as presented in Table 21) show the relationships between each pair of independent variables. The highest correlation happened between the perception of the design of instructional features and the perception of the design of interactive features (r = .55). The correlation among the three predictors that concerned perceptions of the designs of Blackboard features were almost equal, at r = .54, .53, .55, with p = .000 for all r. Despite the significance of some of the correlations between predictors, the correlations were not substantial (r > .9) enough to cause collinearity. Of all the predictors, only pedagogical perspective on e-learning had a significant correlation with the criterion variable (r = .34, p = .000), the other three independent variables did not demonstrate any correlation with the criterion variable (r = .25, .23, and .11, p < 0.001). However, if p < .05, the two independent variables—the perceptions of the design of visual features and the perception of the design of instructional features—would be significant. At this point, the information is sufficient to say that the perception of the design of interactive features would not qualify to be a predictor due to its insignificant correlation with the criterion variable even when p < .001. Since the correlations between the two independent variables—the perceptions of the design of visual features and the perception of the design of instructional features—were considered not as significant as the pedagogical perspective of e-learning, therefore, even if they have shared variance with the criterion variable, their contributions would be limited. To gain further knowledge on whether they are good predictors, a look at the model summary is required.

Table 21

Pearson Correlations between Independent Variables

	Capacity of use	Perception of interactive features	Perception of visual features	Perception of instructional features	Pedagogical perspective on e-learning
Capacity of use	1.00				
Perception of interactive features	.11	1.00			
Perception of visual features	.25*	.54**	1.00		
Perception of instructional features	.23*	.55**	.53**	1.00	
Pedagogical perspective on e-learning	.34**	.03	.03	.16*	1.00

*$p < .05$, **$p < .001$

Summary of Model

The multiple correlation coefficients between the predictors and the outcome variable were represented by the value *R*, which was .42 in this sample. The squared multiple correlation, also known as the coefficient of determination, represented by R^2, was .18. The R^2 value indicated that the linear combination of the independent variables accounted for approximately 18% of the variance in capacity of use. The *F* value tells whether the independent variables predict the dependent variable. In this case, the *F*

value is significant, $F(4, 124) = 6.67$, $p = .000$. Therefore the linear combination of the independent variables can be used to predict the dependent variable, the capacity of utilizing Blackboard. Since the significance of the *F* value was only an overall significance assessment, it does not provide information on the ability of any particular independent variable to predict the dependent variable. The model parameters will provide information on the relative importance of each predictor, and indicate whether each of the contributions was considered significant.

Model Parameters

The individual contribution of each predictor to the model can be examined from the coefficients and the part and partial correlations of each predictor to the model. Table 22 presents the table of coefficients.

Table 22

Coefficients of the Regression Model

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-26.715	16.297		-1.639	.104
Perception of the design of interactive features	-2.912	3.822	-.080	-.762	.448
Perception of the design of visual features	8.152	3.757	.223	2.170	.032
Perception of the design of instructional features	4.301	4.237	.107	1.015	.312
Pedagogical Perspective on eLearning	.696	.183	.315	3.808	.000

Model	95% Confidence Interval for B		Correlations			Collinearity Statistics	
	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
(Constant)	-58.972	5.542					
Perception of the design of interactive features	-10.477	4.653	.110	-.068	-.062	.607	1.647
Perception of the design of visual features	.716	15.588	.247	.191	.177	.629	1.589
Perception of the design of instructional features	-4.084	12.687	.231	.091	.083	.598	1.672
Pedagogical Perspective on eLearning	.334	1.058	.337	.324	.310	.969	1.032

a. Dependent Variable: Capacity of use in percentage

The *t* value indicated whether a predictor was making significant contribution to the model. For this model, two out of the four predictors were making a significant contribution. The two significant predictors are the perception of the design of visual features ($t(124) = 2.17$, $p < .05$) and pedagogical perspective of e-learning($t(124) = 3.81$,

$p < .05$). The perception of the design of interactive features and the perception of the design of instructional features were not significant. With the two significant predictors, the pedagogical perspective of e-learning has a higher value of *t*, hence it was making more contribution to the variability of capacity of use. The values β (beta) of the two significant predictors were positive, indicated a positive relationship between these predictors and the criterion. In order words, this model indicated that an instructor will use more features of Blackboard if he or she has a more positive pedagogical perspective of e-learning, or a better perception of the design of visual features, or a combination of both.

The pedagogical perspective on e-learning has the highest part correlation with capacity of use, partialling out the effects of all other predictors in the model from the predictor but not capacity of use. The perception of the design of visual features has the second largest part correlation, and this is consistent with the result demonstrated in the *t* value, indicating that the pedagogical perspective of e-learning is a relatively more important predictor than the perception of the design of visual features.

The adjusted R^2 (R^2_{adj}) indicates the *shrinkage*, or loss of predictive power when the model is used in another population. In this case, the R^2_{adj} was .15, which is about 15.25% difference from the value of R^2 . According to Field (2000), R^2 tells how much of the variance in the dependent variable is accounted for by the regression model from the sample used in the study; the R^2_{adj} tells how much variance in the dependent variable would be accounted for if the model had been derived from the population from which the sample was taken (p. 130).

Supplemental Analysis 1: Open-Ended Questions

The descriptive statistics and multiple regression analysis provide useful information and answers to the research questions based on the quantitative data collected. However, there may be aspects that cannot be explained comprehensively using quantitative data alone. Therefore, in this study several open-ended questions were included, whereby respondents were free to respond in any way they chose. The responses to the open-ended questions may be an informative source to look for further clues which can be significant either for the present study or for further research.

There were two versions of the open-ended questions in the web survey. One version was for those respondents who had experience using Blackboard and the other for those respondents who indicated that they had no experience with Blackboard or had never heard of Blackboard. For the respondents who had experience with Blackboard, three questions were asked, as described below. The open-ended questions for respondents who had no experience with Blackboard will be discussed later.

The open-ended questions for respondents who had experience with Blackboard were

1. Please share your views on why you choose to use Blackboard.
2. Please describe specific features in Blackboard that you are not satisfied with or write down changes you wish to see in current Blackboard system.
3. Looking to the future, what do you hope Blackboard could do for education?

The open-ended responses were analyzed according to the themes or concepts that emerged from the data. The analysis process was inductive rather than deductive. Unlike

closed-ended questions where analysis begins with a hypothesis, a hypothesis was often generated from the open-ended data. Kidder (1981) described induction as a process that works from the bottom up, beginning with data and developing theoretical categories, concepts and propositions from the data (as cited in Hecht, 1993, p. 3). The purpose of the open-ended questions used in this study were multiple: first, to gather more information on how Blackboard was actually used by faculty members, in case the closed-ended questions did not cover all of the dimensions; next, to gather information on why faculty members chose to or chose not to use Blackboard; third, to understand the expectations faculty members had with Blackboard or other Learning Management System, what they expect the system should do or could do to facilitate teaching. It was expected that the responses to the open-ended questions would help the researcher gain insights about the above concerns so that improvements can be made for any follow-up research studies on this subject.

Responses

Table 23 presents the percentage of responses from respondents who indicated they had experiences with Blackboard.

Table 23

Percentage of Responses to the Open-Ended Questions from Those with Blackboard Experiences

	Responses (N = 129)	
Open-ended question	Comments provided	No comments made
1	69.8 % (90)	30.2% (39)
2	60.5% (78)	39.5% (51)
3	43.4% (56)	56.6% (73)

Of the 129 respondents who had experience with Blackboard, 69.8% provided comments about why they chose or have chosen not to use Blackboard,; 60.5% described features that they wished to see changed in Blackboard, or the changes they wished would be made in Blackboard; and 43% of the respondents described what they hoped Blackboard could do for education.

Coding, Sorting and Categorization

The technique of coding was applied to the written responses to look for keywords that expressed major concepts or ideas. The researcher first downloaded all comments for all three questions to a word processing file, and then analyzed them question-by-question. All responses with the word *NA* or *no comments* were removed. The remaining responses were read through carefully and then keywords were derived to represent recurring major concepts or ideas. Each keyword was color coded and put next to each response that contained the particular concept or idea represented by the keyword.

Any response could have had more than one keyword because it could represent multiple major concepts or ideas.

Six major concepts or ideas were found for open-ended question one in which respondents shared their views on why they had chosen to use Blackboard: Information distribution, availability, functionality, conveniences, communications and organization. After these color-coded keywords were attached to the responses, the *find* function in the word precessor was used to count the number of instances a certain keyword appeared. After conducting the counting and sorting procedure on the 90 responses, the keyword *information distribution* was found to appear 31 times, *availability* appeared 19 times, *convenience* appeared 22 times, *communications* appeared 21 times and *organization* appeared 10 times. These keywords in their essences provided the reasons behind faculty members' choice to use Blackboard.

Four major issues were found for open-ended question two when respondents were asked to describe specific features in Blackboard that they were not satisfied with or wrote down changes they wished to see in the current Blackboard system: Limitations of Blackboard, lack of sophistication, customization, and lack of efficiency. These keywords were attached to relevant responses and the *find* function was again used to count the number of instances these keywords appeared. The counting and sorting process yielded the following results: the keyword *limitations of Blackboard* was found to appear in 19 instances; the keyword *lack of sophistication* was found in 27 instances; the keyword *customization* was found in 12 instances; and the keyword *lack of efficiency* was found in 18 instances. It is noteworthy that some of these keywords were interdependent. For

instances, the issues of limitations arose often due to the lack of sophistication in the interface design, which in turn led to a lack of efficiency. Moreover, the issue of limitations was sometimes related to a lack of customization. Therefore it is important not to look at these issues as mutually exclusive.

In open-ended question three, participants were asked what they hope Blackboard could do for the future of education. Many respondents described that Blackboard is only a tool, a mechanism that will not make good education happen. They emphasized the major roles of instructors and students in fostering good education. Recognizing this important aspect pointed out by many faculty members, four major concepts were derived that served as circumstantial conditions to facilitate the achievement of the above goals. These concepts were to have Blackboard continue to serve its current role as a teaching aid, to include more sophisticated interface design in future versions of Blackboard, to have more interactive features, and to include pedagogical considerations in its design.

Categorization for Responses on Open-Ended Question One

Information Distribution

Most faculty members see the distribution of information as one main function of Blackboard. One faculty described Blackboard as a “great tool for distributing information,” another says Blackboard was useful in making information available, which served to “replace photocopying,” such that class materials can be put online in one place for students to access conveniently. Faculty members do not have to spend time anymore doing printing or handing out hard copy class materials, saving time for both

faculty members and students, saving money for the university and saving energy for all. One faculty member wrote, “Frankly, I use Blackboard in order to cut down on school expense involved in producing handouts and as a convenient mechanism for making course documents available to my students.” Distributing documents on Blackboard can enhance learning, as evident in the statement made by another faculty member, “I upload partial lecture notes so that students can have copies of all images and text outlines to bring to class with them to facilitate better note taking.”

In a broader sense, distributing information also includes posting announcements to a group of people, posting materials for group sharing, setting up a forum for discussion, or even sharing of works among students. These are some statements from faculty that indicated these aspects: “Blackboard allows me a forum to post class content, assignments, announcements, and have online discussions;” “An ongoing record of syllabus, class lectures, student assignments, upcoming events, sharing of student papers and projects,” and “I use Blackboard primarily as a source of information for my students. I post announcements about homework, course documents like the syllabus and study guides for exams, and their grades.”

Features in Blackboard that were related to distribution of information discussed here were managing a discussion forum, adding announcements, sending email and messages to an entire group, adding course documents, adding assignments, and uploading of files. A juxtaposition of these features with the five most commonly used features—course documents, email, announcements, file uploading, and organization of content into folders—presented earlier in the discussion of the *capacity of use* scale

yielded a meaningful result. Four of these features were in both of the findings, they were: the adding of documents, using email, making announcement and uploading of file. Considering also that the keyword *distribution of information* appeared the most frequently in the coding, which demonstrated consistency with the most commonly used features deduced from our quantitative data.

It is worth noting that although most faculty members find the feature to upload course materials useful and convenient, there was a minority group that held a different opinion. For instance, one faculty member stated, ". . . I have used the course document feature. It was time consuming." Another faculty member found that putting course materials online did not motivate students to read them.

> I find that my students are actually less frequent in reading things I post on Blackboard than they were when I handed them to them, and of course there are always problems about whether they can open the files, whether they have the right software loaded onto their computer. It's all fine, but I'm truly not persuaded that it's much of an advantage.

Availability

Availability is a pre-condition for usage to happen. Therefore it may seem to be an aspect too natural to consider important. Nevertheless, availability also implies universality. If something is made available for a long time and many people have adopted it, it becomes quite universal. Availability may also imply convenience. If something is made available, it saves people time to set it up. One faculty member wrote, "I use blackboard because it is available throughout the university and now the students

have become very comfortable with it as it is used by many faculty." This statement presents the situation where availability could encourage a tool to become more common. Another faculty member indicated that, "It is the one supported by [name of mid-Western university] which makes it very convenient."

The keyword *availability* was found 19 times in all the responses for open-ended question one. Most of the instances have availability with an implication of convenience, a positive connotation, but there were also cases in which a negative connotation was implied. For instance, comments such as "it is the only easy option," "it is about all that is available," "it is the only web course tool with which I am familiar and the universities I have taught at have available," "because it is the only option available to [name of mid-Western university] faculty," "college adopted it for use in our curriculums," "Because it's the only game in town ... other than setting up the entire environment myself on my oak account," and "I use it because that is what [name of mid-Western university] supports." These comments seemed to imply a "no alternative" type of message. Faculty members need the support of the university, college, department, and students in teaching, it would therefore be natural to think that faculty members had a higher tendency to use something that the university already supported and made available.

Convenience

There were 22 instances when the keyword *convenience* was attached to a response. When something is described as being convenient, it usually implies conservation of energy. For instance, a convenience store is often right beside a gas station, so that after filling the tank with gas, a customer is able to buy miscellaneous

stuff needed on-the-go without having to stop by a grocery store. When working on a computer desktop, folders are a convenient way to locate files, especially if they are put right on the *desktop*. Folders and icons save users time and energy to search through the entire hard drive. In a similar manner, many faculty members described Blackboard as being convenient. One faculty member described Blackboard as a place where students are able to download course materials, especially if they missed a class: “A place where students who have missed class can conveniently obtain course materials.” Another faculty member viewed Blackboard as a packaged tool, something ready to use, as opposed to a self-designed website for a class: “Students are familiar with it. It's marginally easier than doing my own website from scratch.”

The responses provided evidence that most faculty members considered the gradebook feature, the posting of class materials, and the email feature to be most convenient. Some of them mentioned the convenience of being able to link to web resources from Blackboard. For those faculty members whose teaching involved the use of images, they are able to put them online so that students were able to look at them before or after classes. By posting digitized journal articles online, or by linking to online journals, students were able to download them to read on the screen, so that printing became a choice, not an absolute requirement. One faculty member described the convenience of being able to upload files and use them for the entire quarter: “I can easily make the course documents available to students. It is easy to upload files whenever I want to and maintain the files for the quarter.” One faculty member started using Blackboard because of the gradebook feature: “I started [using Blackboard] because of

the gradebook tool so that students could easily keep track of their grades." One faculty member described the advantages of being able to upload extra course materials for students.

> Provide class handouts in paperless fashion. Allow students to view assignments with extra details than might be on syllabus. Ease of emailing students. I like being able to post extra external links that I encourage, but not always require, them to look.

A few faculty members described the efficiency and conservation of paper accompanied by the use of Blackboard. One of them expressed:

> The library encouraged me to post texts on Blackboard rather than through reserve, and once I figured out how to do it I discovered it to be easier than what I'd been doing. I am this quarter using it for regular questions and observations for the class rather than having people keep a journal—that way I can read their comments day by day rather than only when they turn in notebooks and it saves paper.

Another described:

> It allows me to put images online for review in my courses, and make available digitized articles to the students, who otherwise would have to photocopy them at considerable expense.

Features in the *Capacity of Use* scale discussed earlier that may provide convenience include: the gradebook, the feature to import or export grades, the feature to organize content into folders, the quick view and detail view, the feature to create an

external link, the announcement feature, the feature to archive a course, the email and message sending features, and the features to add documents and assignments. Of these, the gradebook, the features to add documents and assignments, the feature to create an external link and the email feature were mentioned the most. Based on the findings of the quantitative data, the features to add documents and assignments, and the email feature were three of the most common five features discussed earlier. The gradebook was used by 72.9% of the respondents and the feature to add external links was used by 68.2% of the respondents.

It is noteworthy that although the gradebook seems to be a popular feature, and was regarded by many faculty members as a convenient feature to use, there were other faculty members who held the opposite viewpoint. Ironically, the gradebook was regarded by the latter group as being cumbersome. A more detailed discussion on the shortcomings of features will be presented in the discussion of responses on open-ended question two.

Communication

Communication is one of the most important goals in teaching. Without communication, information could not be shared successfully and effectively. There were faculty members who used Blackboard mainly to facilitate communication with students, especially when the class is large and where the opportunity for individual face-to-face interaction may be compromised: “I teach large classes 110 and Blackboard helps me keep connected to all students.” Other faculty members described using the discussion forum within Blackboard as a way to enhance communication and interaction among

students, “It is easy to use, it provides a different environment for learning to meet multiple learner needs, it provides for student interaction that may not occur in a large classroom.” Email is a convenient tool that also provides communication beyond the physical limitation of traditional classroom. A faculty member indicated, “[Blackboard] facilitates communication, distribution of resources and provides venue for interaction discussion among learners.” With all materials and tools being in one cyber location, a faculty member expressed that “It [Blackboard] allows me to provide immediate feedback to students.” It was in such a way that Blackboard enhanced communication between faculty and students. Beside communication tools like email and discussion forum, the mode of communication may also be extended to include file sharing. Blackboard provides convenient of file sharing which is a way to enable communication among students through looking at each other’s works.

While cyber communication may be seen by many as a benefit to teaching and learning, some faculty expressed a different opinion. For instance, one faculty member said that she would rather have face-to-face interaction: “It may be good for other courses but to me it is just one more way to allow students to be remote to each other when communicating. I think they need more direct interaction and to develop skills pertaining to this kind of communication.” Another faculty member indicated that cyber interaction is different from face-to-face interaction.

> . . . interaction is a problem. How the vast majority of instructional technology people define 'interaction' is 2 or more people typing or texting messages to one another. This is NOT interaction, even in its most basic form. True interaction is

the face-to-face discussion of a topic in a small group setting. This can even take place in a very large lecture setting.

Organization

The keyword organization was attached to 10 of the responses. These responses indicated that Blackboard is a good organizational tool for courses. One of them expressed, “It helps me organize the course content;” another said that Blackboard helped a faculty member “organizes information in one place.” Another faculty member regarded Blackboard as an “excellent organizational tool.” When class materials and information were all in one place, faculty members felt that the course was better managed: “It really helps me manage a course better and keep the students informed.”

The above were major concepts derived from the responses to question one, beside these major concepts, there were a few other viewpoints expressed by small groups, which include the adjustment to student’s mode of learning, the different ways of conducting a class (face-to-face, hybrid, or online), the security measure in which Blackboard was integrated with the administrative system, and the centralized management in some colleges. A few faculty members felt that they used Blackboard in order to fit student’s mode of learning, or simply because students were comfortable with it and it helps them learn in that way. One faculty member wrote, “No other choice if you mean why I use Blackboard. Why I use an LMS is to better fit student modes of learning—they’re far more likely to do reading assignments, drills, and listening assignments if they're online rather than on reserve.” Another faculty member expressed that, “Because the students expect to see on-line things... if they don't have on-line, they

can't pull their heads out of their facebooked, ipodded, electronically modified worldview to see that face-to-face is actual interaction."

Since Blackboard was integrated with the administrative system of the mid-Western university chosen for this study, therefore, faculty members were able to conveniently access a complete list of students who registered for the class. They do not have to set up the list one-by-one although they could add or delete a user through the user management features. One faculty member indicated that it was such a convenience to access the gradebook for a class of 400 students, even when the class was conducted using a face-to-face method: "I teach a 400 person class and the gradebook feature is necessary to teach that class. I like the e-mail and announcement feature, but many of the other communication tools are not necessary for me. My class is a FtF class." The different ways of conducting a class also affect the way Blackboard was used. For an online course, Blackboard became a requirement if no other LMS or self-designed course website was the alternatives: "I developed an online program in 2000 so it was absolutely necessary." The integration of Blackboard with the university's administrative system also means that a secure login was in place. Some faculty members who were concerned about public accessibility to the materials they put online find this a plus: "It allows grades and materials to be posted in a secure manner;" and ". . . I write detailed solution sets to all of my homework assignments and exams. I post these on Blackboard for my students, because I don't want them publicly accessible. . . ."

Some colleges within the university had their own system, whereby Blackboard was mandated and a central unit was set up to manage course materials for faculty

members, so that faculty members would be able to save time and energy uploading these materials, and be more focus on instructional issues. In such a way, it reduced faculty members' work load on the administrative tasks in teaching. One faculty member described, "Use of Blackboard was a collegewide decision to disseminate materials and announcements and lecture power points. This information is managed by others within the college;" another faculty member indicated that, "[Blackboard was] mandated by the [name of college]. All course content is uploaded for the students and faculty by the Blackboard manager."

Categorization for Responses on Open-Ended Question Two

Of the 78 faculty members who responded to open-ended question two, only 6 of them indicated they were happy with Blackboard and satisfied with its current features. The other 72 of them expressed dissatisfaction with the features they used and suggested changes they wished to see.

Limitations of Blackboard

The issues of limitations were raised by faculty members on three levels: first, when there were tasks that could not be accomplished by the features they used; second, when other systems they had used were able to accomplish tasks that Blackboard could not accomplish; third, when faculty members were dissatisfied with the level of sophistication of the features they used. The last issue was raised the most frequently.

The chat feature is one of the least commonly used features from the findings of the quantitative data discussed earlier. Faculty members who had used it commented that the feature needed improvements: "The chat features, when I have used them, seem

antiquated;" "Chat feature is not very good. Does not remind for messages;" and "I have not been able to get chat or virtual classroom to function properly." There were comments on the addition of more sophisticated features that Blackboard did not currently have, such as wikis and blogs. Faculty members who had used other systems provided comparison of why they thought Blackboard was limited in its applications. A few faculty members compared Blackboard to LON-CAPA that was a system used widely by faculty members from a specific department. One faculty member described, "Use LON-CAPA for the vast majority of my courses because Blackboard does not have the depth or the sophistication needed for Physics problems. LON-CAPA has most of the other features of Blackboard from discussions chats on-line quizzes dropboxes etc;" another faculty member expressed the wish to have Blackboard with the ability to write the types of problems LON-CAPA was able to handle. It was evident from these comments that Blackboard may not be suitable for certain disciplines when more sophisticated features are required for presentation of information.

Some faculty members commented that the structure of Blackboard was too rigid, structured, and hierarchical. The rigidity and hierarchical structure of Blackboard led to the issue of inefficiency, which will be discussed in more detail later. One faculty member expressed that the structure of Blackboard demands a certain type of teaching approach or pedagogy.

> Blackboard is the most structured and least friendly to both user and faculty. It is designed specifically for traditional f2f classes. For those using a more constructivist approach to learning, it gets in the way. I much prefer the use of

> custom designed systems combining a dedicated website, discussion forums such as domino, and web 2.0 tools.

Another expressed that the linearity in the structure of Blackboard had indirectly limited creativity in one's approach to teaching:

> A non-linear and self-structured learning environment needs non-linear and self-structured learning tools. Blackboard provides a hierarchical and linear model of course structuration that allows for no creativity beyond their pre-selected categories for instructors. For instance, how do you do a speech in a virtual environment? How do you do instant polls? You can't.

The third level of limitation issues involved a lack of sophisticated interface and design in Blackboard, which will be discussed in the next point.

Lack of Sophistication

When an interface is described as sophisticated, it often implies the capability to do more complex and streamlined tasks. A sophisticated interface is often more developed and has the ability to accept customization. These were aspects that most faculty felt were not present in the interface of Blackboard. The feature that was used frequently, such as the gradebook, was the one mentioned the most. Most faculty members commented that the gradebook is a convenient feature but cumbersome because of its lack of sophistication—it could accomplish only simple and straightforward tasks, and became problematic when a slight degree of complexity was needed. One faculty described, "The gradebook stinks; as soon as you do anything slightly off the beaten path, you get in trouble. Imagine having 6 quizzes and counting the best 5. Outta luck.

Secondarily, I sometimes have custom assignments for my students. It's not so good in BlackBoard.” Due to the limitations of the gradebook, some faculty members used it solely for the sake of providing students the convenience of access to grades, but continued to use Microsoft Excel to keep records of grades and do computation.

> The gradebook is easy to use, but cannot handle all the calculations I need. Thus I must download my Blackboard to Excel, make my calculations there, then manually enter grade totals on-line. I'd like to see the Blackboard gradebook function more like a spreadsheet.

A number of faculty members commented that the gradebook was able to handle calculations correctly when assignments were unweighted, and that problems began to surface when assignments were weighted: “. . . Gradebook: Does not calculate correctly when assignments are weighted . . .” This could be a severe problem considering that students’ overall performances depend on the aggregation of points from assignments. The lack of sophistication was also demonstrated in the limitation in user control and the lack of interoperability of Blackboard with other software programs such as Microsoft Excel. One faculty member described the frustration of not being able to understand how the computation was done in the gradebook:

> The Blackboard gradebook is very very very strange. Make that very very very very strange. It does not give the user any freedom to design spreadsheet calculations. It does do its own spreadsheet calculations, but they are not well-designed and, more importantly, they are not fully explained.

Another expressed the lack of sophistication in the visual aspect of the gradebook:

> The gradebook is awful for adding in grades especially in large classes. It is easy to lose track because the grade that is entered is very far from the name and the light versus darken of each row is not sufficient to make it contrast.

The issue of a lack of interoperability was also seen in the use of Blackboard with other browsers. One faculty member commented, “I'd also like a more seamless integration of Blackboard with different web browsers and operating systems.” Another faculty member hoped to see a better integration of Blackboard with a word processing program, “Really need an easier interface between a word processing program and the exam feature. It is entirely too time consuming to load an exam in the current Blackboard system.”

Many faculty members also expressed frustrations in the number of mouse clicks that they had to go through to accomplish a simple task: “there should be a way to upload files to send to students' Dropboxes without so much clicking click Browse, click Submit, click OK, etc.” Such frustration was related to the hierarchical structure of Blackboard and the poor interface design, which led to the issue of inefficiency to be discussed next.

Lack of Efficiency

When a task can be accomplish effectively, without waste of time, energy and money, it would often be described as being efficient. On the contrary, a task that requires going through unnecessary steps or process in order to accomplish the job would often be described as being inefficient. The frustration of having to go through multiple ‘click oks’ in Blackboard to accomplish a task was a scenario that illustrated a lack of efficiency: “The simplest of tasks require 4 to 5 mouse clicks instead of just 1 or 2.”

Faculty pointed out that Blackboard simply had too many simple tasks that required too much clicking to accomplish. For instance, one faculty member described the hope to see an improvement in the way in which one is required to go through a simple task like uploading a file: “a way to access the files folders themselves so don't have to go through the cumbersome number of clicks that Blackboard requires to upload anything.” The cumbersomeness of the gradebook feature, beside what was described earlier as a lack of a sophisticated interface, was intensified by its lack of efficiency having to go through an unnecessary number of clicks just for entering a grade. One of the faculty members commented that, “It requires too much clicking to enter grades and it doesn't allow for a formula for calculating letter grades. I have to export to a spreadsheet.” Another faculty member suggested that, “Blackboard seems to have an inordinate amount of steps to complete simple actions with multiple confirmation steps and screens.” In a way, all this ‘clicking’ indirectly made the interfaces not user friendly; this is how a faculty member put it, “I do think BB [Blackboard] user interface is clunky and not user friendly. To delete test banks or change points on tests it often takes 3 clicks and you have to do it one at a time. I have over 200 obsolete tests from test banks because it would take hours to delete them.”

It seemed that clicking was not the only example of the lack of efficiency. A handful of faculty members described the awkward and cumbersome process one was required to go through for a simple task of organizing files, a task quite similar to organizing files on a computer desktop. On a computer desktop, one can simply drag and drop a group of files from one place to another, or delete a whole group of files

altogether. Yet the *Learning System* of Blackboard Academic Suite version 6.3, a version used by the faculty members involved in this study, did not have the level of sophistication that most common software already had. As one faculty member described, “It would be helpful to be able to upload multiple documents at a time and be able to move things from folder to folder without having to delete and re-upload the contents of the folder one at a time to the new location.” The lack of efficiency had discouraged faculty members from using Blackboard, as one faculty member explained, “Many of the other features I have tried out but they do not provide much gain in relation to the time it takes to use them effectively.” At this point, it would not be difficult to see that the lack of efficiency in Blackboard was partly due to the *step-by-step* type of interface, the embedded hierarchical structure, as well as the length of time required to complete a simple task. For instance, one faculty member described that the drop box “need[s] to be able to handle submitted work as a batch delete, download, upload more than one file at a time.”

The lack of a sophisticated interface is another part of the reason for inefficiency as discussed earlier. Many features, such as the gradebook described earlier would work only if the computation was straightforward. A similar problem was observed by other faculty members with other features such as the test management feature, “Test management is cumbersome unless only the most basic objective type tests are used;” the audio and visual feature, “it crashes the browser frequently when you view videos from the links.” Another respondent suggested, “Faster way to upload multiple images at once; way to add audio to test questions directly rather than only a link;” and for the survey

manager, “Importing exams is impossible. Having to key in every question from an exam that is already in electronic format is ridiculous. Grading assignments in the dropbox is also very cumbersome,” and “I tried the test manager once years ago but it was not flexible enough, especially for open-ended questions.” The survey manager was limited for certain question types that required audio-visual materials, as one faculty member pointed out, “I would also welcome a category of test question that would allow recognition of pictures of architecture or ancient objects.”

Customization

Blackboard was described by some faculty members to be structured and organized. Would these characteristics be compromises of something more important? One faculty member pointed out:

> I would like to see Blackboard become more customizable. The structure is a bit too rigid and the user interface allows too little information to be viewed at once. It is certainly very organized, and I recognize that the structure supports this strong point. Nevertheless, I think there should be ways for students and teachers to interact more quickly with all the information in a particular course.

Customization can reduce the unnecessary steps and get down to the nitty-gritty of the task. This is the wish expressed by many faculty members. One of them said he would like to see more user control, “I would like to create a ‘front page’ for each course I teach, with pictures, links, pathways to discussion groups.” Another faculty member wrote about the importance of customization for uniqueness, “Needs more opportunity to make your course look unique and to design a better interface;” yet another wrote, “I

need to be able easily and simply lay out webpages, in order to arrange text, images, and videos in a manner which makes sense to me and my students." Customization was also desirable in other areas such as the survey manager and the dropbox feature. Faculty member of a particular discipline described the limitations encountered when designing questions for online quizzes, "There is no category of questions for online quizzes that allow Latin and Greek teachers to set up exercises for declensions or conjugations in Blackboard." Another faculty member wished to see more customization on the dropbox feature, "I would like for more customization on the dropbox feature. It lacks a sort function, and should function more like an email inbox, where messages can be sorted and stored in different folders."

Categorization for Responses on Open-Ended Question Three

In open-ended question three, participants were asked what they hoped Blackboard could do for the future of education. Many respondents described that Blackboard is only a tool, a mechanism that will not make good education happen. They emphasized on the major roles of instructors and students in making good education happen. One faculty member emphasized that "Only teachers and students can do anything for education. Blackboard is just a mechanism." Another faculty member maintained, "Blackboard can only help facilitate education—it is a tool to be used, not a solution." While recognizing this important aspect pointed out by many faculty members, four major theme emerged that served as circumstantial conditions to facilitate the achievement of the above goals. These themes were to have Blackboard continue to serve its current role as a teaching aid, to include more sophisticated interface design in future

versions of Blackboard, to have more interactive features, and to include pedagogical considerations in its design.

Teaching Aids

In open-ended question three, the respondents were asked what they hoped Blackboard could do for education in the future. There were positive and negative perspectives on what Blackboard could really do. On the positive end, some respondents saw Blackboard as a platform that facilitates teaching, enhances communication, improves interaction between faculty and students, as well as among students. A faculty member wrote:

> Blackboard needs to be a tool for teachers and students to share information as easily as possible and as efficiently as possible outside the classroom. In this way, Blackboard can allow teachers the flexibility to experiment with teaching strategies and to improve over time their ability to interact with and engage students in the learning process.

Another faculty member expressed that Blackboard is only a mechanism that offers different possibilities to facilitate teaching and learning, “Like all learning technology, Blackboard offers several OPTIONS for e-learning whose use finally depends on both the instructor and the students.” Yet another wrote, “I continue to rely heavily on Bb6 [Blackboard version 6] and WWW because they make the teaching learning process easier for me as a professor, not because I believe they improve student mastery of objectives.” There was yet another group of faculty members who regarded Blackboard as a tool with lots of rigidity and inflexibilities, and was incapable of doing anything

beyond distribution of information. One faculty member described, “I do not believe platforms like blackboard will have much utility beyond mass distributions of materials and information.”

More Sophisticated Interface Design

Another group of respondents were optimistic about Blackboard, hoping to see changes like having a more sophisticated user interface, more customization, and the capability to handle a wider range of file formats, such as video, audio, and webinars, without crashing the system. One faculty member expressed the wish to have more user controls, more sophistication and customization while remaining versatile, “Make it simpler but allow various options that the teacher can add on. Assume that people want it first as a course webpage and then allow options for what to add to that webpage.” Another said, “Make the interface a bit more streamlined. I shouldn't have to complete 4 or 5 steps to update one record.”

The Addition of Interactive Features

The addition of new features was also mentioned, “Full use of blogs and wikis social networking and more project management project tracking capabilities;” and “I think podcasting and more customizability and video interactive features would be great.”

Pedagogical Considerations

A faculty member felt that Blackboard takes too much time in the administration of a course, “Supplement the physical processes involved in course administration. Give more time to the instructor for prep and research.” The pedagogical perspectives were

indicated by some faculty members. One faculty member maintained that, “It [Blackboard] is just a tool—hopefully it will enable good pedagogy—it cannot create good pedagogy.” Others expressed their concerns that Blackboard might become an obstacle for certain approaches to teaching: “I would advise those with a constructivist philosophy to not use it.” Another wrote

> I am not at all persuaded that technology by itself can do much for education. It may replace some old technology from time to time, digital responses rather than paper, but I don't see that it can be significant in terms of teaching and learning except in making the students feel that the professor is up to date.

The comments provided by faculty members seemed to indicate that the current Blackboard designers had not given much thought to the issue of pedagogy. On the contrary, its linear and hierarchical structure seemed to be an obstacle for the implementation of certain pedagogical approaches, as one faculty member claimed, “Blackboard is the most structured and least friendly to both user and faculty. It is designed specifically for traditional f2f classes. For those using a more constructivist approach to learning, it gets in the way.”

Supplemental Analysis 2: Faculty Group with No Blackboard Experience

The responses of those who had no experience with Blackboard were also analyzed to ensure that no important information was overlooked in this study. Respondents who had no experiences with Blackboard were asked four open-ended questions: First, whether they had considered using Blackboard in their teaching, and to provide their reasons for choosing or not choosing Blackboard; second, they were asked

to indicate the different types of Internet technology they had used in teaching, such as electronic mail, Internet forum, Internet Relay Chat, instant messaging, wikis, blogs, YouTube, or their own websites; next, the respondents will be requested to indicate any other types of LMS they had used in their teaching; and then finally, they were requested to provide what they would hope for Blackboard to do in the future for education.

Twenty-four of the 25 respondents had used email in their teaching, 3 had used Internet forum, 6 had used wikis in their teaching, 1 had used blogs, 7 had used YouTube, and 12 had used their own websites in teaching. Six of the respondents indicated that they had used another LMS, such as LON-CAPA, which was used by 5 out of the 25 respondents. One faculty member described, “I coordinate and use the LMS LON-CAPA, an open-source system developed at Michigan State. It has strong assessment types, good feedback and the ability to seamlessly share resources between institutions. . . .” Another described that LON-CAPA was used more for taking quizzes and working on assignments rather than in teaching a course, “In Physics we are using a different on-line homework system CAPA more suitable for quantitative answers and feedback. We are using it only for homework and for reading quizzes, not for teaching.” There were others who used localized LMS developed by an individual college; a book publisher’s course management system; or a PHP-based class management system; others used available Internet technology to design their own course materials for students.

Interestingly, the reasons that many faculty members did not choose to use Blackboard had many overlaps with the negative feedback provided by the faculty members who had used Blackboard. For instance, one faculty member indicated, “I

prefer using a website I design because it is more flexible. The only plus I saw in Blackboard was the gradebook. But it is a terrible system too slow and not flexible at all so I gave up using blackboard." The statement provided evidence that Blackboard was inflexible and inefficient. Another faculty member felt that "[Blackboard] duplicates functions adequately served by e-mail, class web sites, and face-to-face discussion." The lack of sophistication in interface design and the limitations of Blackboard in general simply could not meet the need of some disciplines, as one faculty member stated, "[Blackboard] did not have the ability to allow submissions and electronic evaluation of complex computer codes which I assigned for homework;" and another faculty member from another discipline claimed, "It was not sensitive to the visual results in graphic design." Moreover, when faculty members did not see improvement in any aspects of teaching and students' learning after using Blackboard, they would refrain from using it because the amount of time spend in preparation of course materials through Blackboard and its return simply did not match up. This was a case for one faculty member, who indicated:

> My classses have about 20 students in them. I looked into Blackboard for grading and communication and found that what I already did was not improved by Blackboard. I really tried to find a way to use Blackboard during my tutorial, but found it didn't improve communication or grading. Also I believe you can't put video or other teaching tools on the thing.

It was evident from this faculty member's comment that the insufficiency of Blackboard has discouraged him or her from using it.

Supplemental Analysis 3: Experience with Other LMS

Of the 129 respondents who had Blackboard experience, 19 indicated that they had experiences with other types of LMS or software. A handful of LMS were mentioned: WebCT and Moodle were the two most popular, LON-CAPA was the next most popular, followed by SAKAI, Desire 2 Learn, ANGEL Learning, WileyPLUS, OnCourse, and other localized teaching tools, such as Carmen system at Ohio State University and ICON at University of Iowa. These 19 respondents who had experiences with other LMS were further observed to see if there was other demographic information to discriminate them. Of these 19 respondents, 11 came from College of Arts and Science, 2 of each from College of Communication, College of Education, and College of Health and Human Services respectively, and 1 of each from College of Business and College of Fine Arts respectively.

Most of the information was comparatively consistent with the overall result from the entire group of 129 respondents. For instance, only 2 out of the 19 indicated teaching online courses; 10 indicated using hybrid method to teach a class and 18 of them taught face-to-face courses. Twelve of them have more than 2 years of Blackboard experiences and only 8 of them taken Blackboard seminar. Some observations that could be significant were that 10 out of the 19 respondents indicated the use of other LMS either in other universities they had taught before, or that the colleges they belonged to at the large Midwestern university employed other regional course management system from open sources or through book publishers. The overall perception of Blackboard was positive with a mean of 32.10 and standard deviation 6.34. The pedagogical perspective on e-

learning was indicated to be supportive, with mean of 65.63 and standard deviation 9.83. The capacity of use was low (41.30%) and this was again consistent with the overall result for the entire group. It was interesting to see that of these 19 respondents, the instructional features were used the most (M = 51.05, SD = 24.24), followed by interactive features (M = 38.95, SD = 24.47), and then visual features (M = 28.95, SD = 29.31).

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

Summary of the Purpose of Study

This purpose of this study is multiple. First, to gain more knowledge on the way in which e-learning technology is used in higher educational institutions; and to understand some of the problems investigated by past research studies. Second, to gain empirical data on the way in which a specific e-learning technology, Blackboard, is used in a large mid-Western university; and to see if the results collected from the empirical data were consistent with what previous literature had found out. Third, to answer some of the questions left unanswered by previous research studies and hopefully fill in some gaps to assist in future research studies.

Summary of the Research Problems

Past research (Collis & Peters, 2000; Surry, 2000) has indicated a high degree of access of innovative technology within higher education, as well as a high degree of receptiveness to the adoption of e-learning technologies within higher institutions (Bates, 1999; Souleles, 2005). Nonetheless, some research (Collis & Peters, 2000; Surry, 2000) has found that faculty utilization of innovative technology in teaching was not at a satisfactory level. The present study recognized the discrepancies between the attitude towards innovative technology and the utilization of the technology cited in these studies. Another report addressed another potential problem in the use of technology, namely that educational technology has been used mainly as an administrative tool in teaching without the integration of pedagogy (OECD, 2005; Dalsgaard, 2006). Educational technology without education is still just technology—like a form without its content

(Schindelka, 2003c). This study explored the possible problems in the design of the technology and the way in which the users, in this case, faculty members, used, interacted with, or adapted the technology. The understanding gained through this study of the use of LMS by faculty will help answer the discrepancies between high access and low use of the innovative technology and contribute to the design of better LMS.

Summary of the Investigation Process

Innovative technology is an umbrella term. To narrow down the scope for an effective investigation into the research problem, this study focused on one of the most commonly used e-learning technologies—Blackboard—in the current education scenario. Blackboard is one of the most commonly use commercial Learning Management Systems globally. Two specific research questions guided the investigation. The first research question investigated the relationship between faculty members' perception of Blackboard and their perception of Blackboard's design. The second research question was designed to find the relationship between faculty members' capacity of use of Blackboard and their pedagogical perspective of e-learning, as well as the perceptions of Blackboard's design. To make it more specific, the 21 most common features of Blackboard were selected and subdivided into three groups—instructional features, interactive features, and visual features, so that the design and capacity of use of each group could be further analyzed.

Research Question 1 asked: Is there a relationship between faculty's perception of Blackboard and faculty's perception of the design of interactive features, visual features, and instructional features respectively within Blackboard? If such a relationship exists, to

what extent does each predictor (the design of interactive features, visual features, and instructional features respectively) account for a faculty's perception of Blackboard?

Research Question 2 asked: Is there a relationship between faculty's capacity of utilizing Blackboard and faculty's pedagogical perspective on e-learning, the perceptions of the designs of interactive features, visual features, and instructional features of Blackboard? If a relationship exists between capacity of use and any of the four predictors (pedagogical perspectives on e-learning, perception of the designs of interactive features, visual features and instructional features respectively), to what extent does each predictor account for a faculty member's capacity of utilizing Blackboard?

Empirical data were collected to answer the research questions. Four Likert scales and one check-all-that-apply type of scale were designed to collect quantitative data and a few open-ended questions were developed to collect qualitative data. The quantitative data were collected by using the scales designed by the researcher. The responses collected from the open-ended questions served to supplement what was gathered from the closed-ended questions and to address issues that were not measured by the closed-ended questions.

The web survey was sent to 1208 faculty members with two follow-ups. One hundred and fifty-four faculty members responded to the survey, which yielded a response rate of 12.75%, and met the desired sample size of 117. Of the 154 respondents, 129 respondents indicated that they had experience with Blackboard, 24 respondents indicated that they had no experience Blackboard, and 1 respondent had never heard of Blackboard. To answer the two research questions, the quantitative data of the 129

respondents was analyzed using multiple regression analysis, with assistance from SPSS version 16.0. The qualitative data from the 129 respondents was used to gather more information on how Blackboard was actually used by faculty members and to understand the expectations, satisfactions and/or dissatisfactions faculty members had with Blackboard. Both the quantitative and the qualitative data of the other 25 respondents who had no experiences with Blackboard were analyzed separately.

Summary of Reliability and Factor Analysis of the Scales

The reliability of the Perceptions of Blackboard scale, as measured by the coefficient alpha, was .87. The split-half reliability analysis yielded a coefficient of .86. Both values indicated satisfactory reliability. The factor analysis indicated that one major factor was sufficient to define the underlying dimensionality of the measured variables. After rotation, the extraction sums of squared loadings showed that the factor accounted for 40.98% of the total variance. This result was consistent with the single dimensionality of the Perception of Blackboard scale.

The coefficient alpha was .47 for the subscale measuring interactive features design, .62 for visual features design, and .41 for instructional features design. The coefficient alpha was .77 when analysis was conducted with all 21 items. The split-half coefficient expressed as Spearman-Brown coefficient was .77, which indicated a fairly satisfactory reliability. With Kaiser’s eigenvalue-greater-than-one criterion as a guideline, the factor analysis found seven factors. After varimax rotation, the extraction sums of squared loadings showed that two factors accounted for 15.58% and 13% of the total

variance, respectively. The result is not consistent with the construction of the scale, which was hypothesized to have three dimensions.

For the Pedagogical Perspective on E-Learning scale, the coefficient alpha was .88, and the split-half reliability coefficient was .90. Both values indicated satisfactory reliability. Five factors were found from the initial factor analysis. After varimax rotation, the extraction sums of squared loadings showed that one major factor accounted for 27.83% of the total variance. This result is consistent with the construction of the scale, which was based upon one major construct—peadgogical perspective on e-learning—with four dependent components that converged to the one construct.

For the Degree of Usefulness scale, the coefficient alpha was .91, and the split-half reliability coefficient was .88. The factor analysis found six major factors. After varimax rotation, the extraction sums of squared loadings showed that the one major factor accounted for 28.65% of the total variance. The result is consistent with the construction of the scale, which was based upon one major construct—the degree of usefulness of Blackboard's features.

Summary of Findings

Multiple Regression Analyses of Quantitative Data

The multiple regression analysis for Research Question 1 demonstrated a significant positive relationship between the perceptions of Blackboard and the perceptions of the designs of the instructional features, interactive features, and the visual features of Blackboard. In other words, a person who has a better perception of the design of interactive features, or a better perception of the design of visual features, or a better

perception of the design of instructional features, or a combination of these, will tend to have a better perception of Blackboard. In statistical terms, the regression model was significant with all predictors, $R = .80$, $R^2 = .64$, $R^2_{adj} = .63$, , $F(3, 125) = 73.55$, $p < .001$. The linear combination of the independent variables can be used to predict the dependent variable, the perception of Blackboard. The R^2 value indicated that the linear combination of the independent variables accounted for approximately 64% of the variance of the perceptions of Blackboard. Although all predictors were making a significant contribution, the perception of instructional features was making the most contribution, and therefore was considered the most important predictor. The next important predictor was perception of interactive features, and the least important was the visual features. The adjusted R^2, $R^2_{adj,}$ was .63, which indicated that there would be a 1% loss of predictive power when using the model in another sample.

The multiple regression analysis for Research Question 2 demonstrated a significant positive relationship between capacity of use with two out of the four predictors. The two significant predictors were the perception of the design of visual features ($t(124) = 2.17$, $p < .05$) and pedagogical perspective of e-learning($t(124) = 3.81$, $p < .05$). The perception of the design of interactive features and the perception of the design of instructional features were not significant. In other words, this model indicated that a person will use more features of Blackboard if they have a more positive pedagogical perspective of e-learning, or a better perception of the design of visual features, or a combination of both. In statistical terms, the regression model was significant with two out of four predictors, $R = .42$, $R^2 = .18$, $R^2_{adj} = .15$, $F(4, 124) = 6.67$, $p = .000$. The linear combination of two

out of the four independent variables can be used to predict the dependent variable, capacity of use. The R^2 value indicated that the linear combination of the independent variables accounted for approximately 18% of the variance of capacity of use. In terms of contribution of predictors to the model, pedagogical perspective of e-learning is a better predictor than the perception of the design of visual features. The R^2_{adj} was .15, indicating that there would be about 15% loss of predictive power when used in another sample.

Results of Coding, Sorting and Categorization of Qualitative Data

The respondents who had experiences with Blackboard were presented with three open-ended questions. First, they were asked to share their views on why they choose to use Blackboard; next, they were asked to describe specific features in Blackboard that they were not satisfied with; and finally, they were asked to state what they hoped Blackboard could do for the future of education.

Six major concepts or ideas were found for open-ended question one: Information distribution, availability, functionality, convenience, communications and organization. These keywords in their essences provided the reasons behind faculty members' choice to use Blackboard. Four major issues were found for open-ended question two: Limitations, lack of sophistication, customization, and lack of efficiency. These keywords were interdependent, such that the issue of limitations arose often due to the lack of sophistication in the interface design, which in turn led to a lack of efficiency. The limitations were sometimes related to a lack of customization. In the responses to open-ended question three, many respondents described Blackboard as only a tool, a mechanism that cannot make good education happen. They emphasized the major roles

of instructors and students in making good education happen. Recognizing this important aspect pointed out by many faculty members, four major themes emerged that served as circumstantial conditions to facilitate the achievement of the above goals. These themes were to have Blackboard continue to serve its current role as a teaching aid, to include a more sophisticated interface design in future versions of Blackboard, to include more interactive features, and to consider pedagogy in its design.

The respondents who had no experience with Blackboard were asked four questions: Firstly, whether they had considered using Blackboard in their teaching, and why or why not; secondly, they were asked to indicate the different types of Internet technology they had used in teaching, such as electronic mail, Internet forum, Internet Relay Chat, instant messaging, wikis, blogs, YouTube, or their own websites; next, the respondents were requested to indicate any other types of LMS they had used in their teaching; and finally, they were asked what they hoped Blackboard could do for the future of education. Many of the reasons for not using Blackboard overlapped with the negative feedback provided by the faculty members who had used Blackboard. These reasons included that Blackboard was not flexible; Blackboard was inefficient; there was a lack of sophistication in the interface design and the limitations of Blackboard in general simply could not meet the need of some disciplines. Moreover, when faculty members did not see improvement in aspects of teaching and students' learning after using Blackboard, they would refrain from using it because the amount of time spend in preparation of course materials through Blackboard and its return simply did not match up.

Conclusions

Was Blackboard not Fully Utilized?

The descriptive analysis of the quantitative data indicated that 69% of the respondents have at least two years of experience using Blackboard; of which, 50% had more than five years of experiences using Blackboard. Yet, the overall mean score for capacity of use scale was 47.47 with standard deviation 21.31, which indicated that on the average, less than 50% of the 26 common features of Blackboard listed in this study were used by faculty members who were considered experienced users of Blackboard. A closer examination revealed that the most commonly used features were course documents (88.4%), email (86.8%), announcements (85.3%), uploading files (83%), and organization of content into folders (80.6%). The least commonly used features were the virtual classroom (4.7%), syllabus builder (7%), chat (13.2%), visual representation of a course using Quick View and Detail View (14.7%), and survey manager (16.3%). This finding was consistent with the study done by Heaton-Shrestha, Gipps, Edirisingha, and Linsey (2007), in which the announcements and course documents were reported as the most used features in Blackboard, while the virtual classroom was one of the least used, as well as the discussion board.

In the open-ended questions, the gradebook was a feature that was mentioned the most for its usefulness yet awkward interface design. This is consistent with some of the findings from Woods, Baker and Hooper's (2004) study which indicated that most faculty members used Blackboard primarily for administrative course management such as making course documents available to students and managing student grades. In the

open-ended questions, distribution of information was one reason mentioned by many faculty members as a reason to use Blackboard. The features that were related to this function were managing a discussion forum, adding announcements, sending email and messages to the entire group, adding course documents, adding assignments, and uploading files. These features were again consistent with the studies of Heaton-Shrestha, Gipps, Edirisingha, and Linsey (2007) and Woods, Baker and Hooper (2004).

Woods, Baker and Hooper classified features such as course documents and the gradebook as administrative course management features, and they indicated that faculty members made little use of Blackboard for instructional purposes. Using Woods, Baker and Hooper's classification as a guideline, the researcher could infer that the faculty members of the mid-Western university in this study were using Blackboard mainly for administration of courses. Other commonly used features such as email, announcements, uploading of files and organization of content into folders were all administrative in nature. As a matter of fact, two faculty members in one college reported that "All course content is uploaded for the students and faculty by the Blackboard manager;" and that "Courses are not designed by individual instructors and Blackboard tasks are managed in a central location." These statements indicated that there were colleges who used Blackboard as an administrative tool, instead of an instructional tool. When asked about what they hoped Blackboard could do for future education, one faculty member suggested for Blackboard to "supplement the physical processes involved in course administration. Give more time to the instructor for prep and research," which again

indicated that the administration of courses is one of the main functions many expect in Blackboard.

One of the problems that this study attempted to address was the discrepancy between high access to e-learning technology and low utilization of e-learning technology. Surry (2000) commented that the use of the new technology in most institutions is mostly restricted to administrative tasks or for data management, and that the effort to integrate the new technology into the classroom is less than satisfactory. The discussion above provides evidence that although Blackboard might be quite commonly used, it might not have been utilized to its full potential. Similarly, the responses from the open-ended questions provided evidence that most faculty members treated Blackboard as a tool for course administration tasks.

Perception of Blackboard and Its Design

The overall mean of the Perception of Blackboard scale was 35.70, with a standard deviation 6.94. The value of skewness was -.53, the median was 37.0, the range was between 17 and 50, indicating that the overall perception of Blackboard was positive. At this point, one may speculate whether or not the overall perception of Blackboard was due to the limited LMS most faculty members were exposed to. In other words, since only 19 faculty members indicated experiences with other LMS, Blackboard may be the only LMS most faculty members are familiar with or have used.

The perception of the design of instructional features was the most important predictor of the perception of Blackboard, followed by the design of interactive features and then the design of the visual features. This indicated that the design of instructional

features was probably regarded as more important than the other two features, or may be more commonly used. Based on the result of the overall means of capacity of use for each group of features, a higher percentage of instructional features were used (*M* = 56.98, *SD* = 23.07); whereas, less than 50% of interactive features (*M* = 45.97, *SD* = 22.48) or visual features (*M* = 34.11, *SD* = 28.93) were used. All ten features that were classified as instructional features were *administrative course management* features if using Woods, Baker and Hooper's term.

The results indicated a scenario in which faculty members had a positive perception of Blackboard because they were using it primarily as an administrative tool to manage courses, to provide them a convenient way to distribute information, to communicate with students, and as a place for organization of course materials. In the open-ended responses, many faculty regarded Blackboard as having a linear and hierarchical structure, which was both an advantage and a drawback. Weller (2006) described some characteristics of a commercial VLE (or LMS), and Blackboard has just about all of these characteristics, which include content focused; no strong pedagogy; based around a teacher-centered-classroom model; support for a number of average tools, but not the best ones; does not feature a particular tool; operates on a lowest common denominator approach; does not meet the needs of different subject areas; and difficult to exchange content between commercial LMSs, despite claims to interoperability. Weller indicated that these were what made commercial LMS popular but were also the drawbacks. Many of these drawbacks or characteristics were pointed out by faculty members in the open-ended questions. This is probably what made Blackboard popular

because, as Weller explained, it contains tools and features suitable for integration with current education practice, without requiring a drastic change in terms of teaching style or educational practices. Dalsgaard (2006) claimed that LMS are suitable only for management of administrative tasks related to teaching, such as management of student enrolment, examinations, assignments, course descriptions, lesson plans, messages, syllabi, and basic course materials among others. Now the next question is, should Blackboard continue as a tool for administration of courses, or should it be improved so that it can be utilized more effectively to meet instructional goals?

Sophistication in Interface Design and Pedagogical Considerations

The quantitative analysis for Research Question 2 indicated that capacity of use can be predicted by one's pedagogical perspective in e-learning and one's perception of the design of visual features. Cantoni, Cellario, and Porta (2003) emphasized the nature of interactivity and visual designs as two important and necessary aspects for creating a more natural and effective e-learning platform. In the responses to the open-ended questions, the lack of sophistication in the interface design of many features was a problem to many faculty members. One who commented on the visual aspect stated, "The visual layout of Blackboard is cluttered, unappealing and repetitive." There were also comments on the visual elements being not user-friendly, "Hard to alter font display—such as text color, font within text boxes;" or visually torturing, "For a period of time, the navigation icons were awfully small." The mean of capacity of use indicated that less than 50% of the features were used, this could be due to the dissatisfaction with the features indicated by many faculty members, and the lack of more interactive

features, reflected mainly in the responses on open-ended questions. Cantoni, Cellario, and Porta (2003) emphasized the visual component of the e-learning experience as a significant feature for effective content development and delivery. Therefore the lack of sophisticated visual interface and the awkward design of these features could negatively impact capacity of use: “I have no idea how to make the changes to the ‘look’ of the Blackboard; the features to type in special characters or styles italics for example don't work for me and are frustrating.” Cantoni, Cellario, and Porta (2003) associated the usability issues concerned in technology with the issues of learnability, such that when someone has a negative experience with an e-learning tool, it would usually affect their perception of the e-learning experience, which in turn, leads to inadequate understanding, biases and prejudice that become an obstacle to achieving the goals within the e-environment. One respondent gave an example: “The only plus I saw in Blackboard was the gradebook. But it is a terrible system, too slow and not flexible at all, so I gave up using blackboard.” The frustrations of using the visual interface could very possibly lead to a decline in the level of use for certain features.

The increase in the sophistication of interface design was much desired by faculty members as evident in the responses on the open-ended questions. Features such as the gradebook, dropbox, test manager, the process of uploading files, management of users, chat feature, formatting tools, communication tools, the overall structure and the overall visual design were among those features and aspects that faculty members thought required more sophisticated interfaces. Govindasamy (2001), although not doing a study on Blackboard directly, commented on the drawbacks often seen in a general LMS. The

writer described, “there is a serious mismatch between the abundance of features in LMS and the lack or total absence of explanation on the pedagogy underlying the inclusion of these tools” (Section 2, ¶ 2). Govindasamy viewed such discrepancy as a reason for many features and tools of LMS left unused by instructors, resulting in a waste of resources (Section 2, ¶ 3). Quite similar to that described by Govindasamy, Blackboard could be having too many features with unsophisticated designs, resulting in a LMS that was considered to be insufficient and inefficient. For instance, most faculty members who used the gradebook complained about its lack of sophistication. They kept an Excel gradebook along with the gradebook in Blackboard, doubling the job for a single task.

The higher score for pedagogical perspective on e-learning represents a more supportive attitude towards a pedagogical approach that includes the following elements: a constructivist approach; a supportive view of web technology in e-learning; a preference for an e-learning system that promotes learner-centered activity, interactivity, social interaction; a supportive view of the emphasis of contexts in learning; and an instructor who invests time and effort in using different types of new technology. The distribution of the overall score for pedagogical perspectives on e-learning has an insignificant skewing to the left, indicating that almost half the faculty members supported an interactive learner-centered perspective on e-learning (M = 63.79, SD = 9.64). Since one’s capacity of use of Blackboard can be predicted predominantly by one’s pedagogical perspective on e-learning, faculty members’ lower level of support for an interactive learner-centered perspective could explain why they use fewer than 50% of the overall features of Blackboard included in this study. In 2005, the OECD report

indicated that many universities all over the world use a Learning Management System (LMS) merely for administrative purposes, and that LMS have had very little impact on pedagogy (as cited in Dalsgaard, 2006). The current result indicated a similar scenario, whereby less than half of those who had experiences with Blackboard indicated a supportive attitude towards a pedagogical perspective on e-learning.

The responses gathered from the open-ended questions provided more insight on the pedagogical perspective of faculty members with regard to Blackboard. A handful of faculty members do not think Blackboard could add much pedagogical value to e-learning. For instance, Blackboard was regarded primarily as a tool for mass distribution of course materials, “I do not believe platforms like blackboard will have much utility beyond mass distributions of materials and information.” Most faculty members were supportive of face-to-face instruction and regarded Blackboard as a mere supportive online system. When faculty members were asked to comment about what they hoped Blackboard could do for the future of education, one faculty member expressed, “I may be a Luddite, but I believe the main future of education is face-to-face, with online support. Blackboard's not too bad there;” another indicated that “What it already does---supplement, not replace, face-to-face teaching.” Blackboard was to some faculty members not more than a technical tool for administration of courses, and they did not regard Blackboard as capable of more than that. One faculty was content with having Blackboard “continue to serve and improve as a technological vehicle for the learning process;” another faculty indicated that “I guess I don't think that broadly about Blackboard.”

At this point the question boiled down to: What is the purpose of Blackboard as perceived by faculty members at large? The evidence from this study indicates that faculty perceive Blackboard as an LMS intended primarily for course management purposes. The name *Blackboard* suggests a kinship or association with the blackboard used in a traditional classroom. The developers could have intended to choose a name associated with the traditional classroom, since as Weller (2006) suggested, most commercial LMS such as Blackboard were based "around a teacher-classroom model" in order to "operate on a lowest common denominator approach" (p. 99). The fact that most commercial LMS, such as Blackboard, have no strong pedagogy (Weller, 2006, p. 99), carries an implication that Blackboard was not intended to support a particular pedagogical approach. It is perhaps intended solely as a learning *management* system for the *management* of course content, as indicated by the responses of this study.

Can Web 2.0 be Supported in Blackboard?

Could Blackboard incorporate Web 2.0 tools into its current structure? While some faculty desire many of the more innovative features, such as blogs, wikis, discussion forums like domino, and other Web 2.0 tools, the underlying structure and pedagogical considerations might first require a transformation. Aside from Blackboard being regarded as nothing more than an administrative tool, it was at the same time regarded as "designed specifically for traditional face-to-face classes" as one faculty member expressed,

> Blackboard is the most structured and least friendly to both user and faculty. It is designed specifically for traditional f2f classes. For those using a more

constructivist approach to learning, it gets in the way. I much prefer the use of custom designed systems combining a dedicated website, discussion forums such as domino, and web 2.0 tools.

It is evident from the analysis and discussions in this study that the current stage of Blackboard is insufficient and inefficient as perceived by many faculty members. It is worth noting that universities worldwide are paying a large sum of money purchasing Blackboard licenses each year. Many faculty members in the mid-Western university chosen for this study used Blackboard primarily as a tool for administration of courses. Being the most popular commercial LMS used internationally, there is an urgency to reevaluate the return on investment with this product. The current study indicated also that faculty members hoped to see a LMS with more interactivity and with more sophisticated features. The researcher believes that at this point it would be relevant to look into the potential of Web 2.0 technology as suggested by O'Reilly and the VLE 2.0 as suggested by Weller for a possible design of a better e-learning environment.

Limitations of Research

During the implementation of this research study, the researcher attempted in all aspects to follow as closely and as accurately as possible the research design and methodology described in Chapter 3. However, some aspects were beyond the control of the researcher, and these are limitations that the researcher would like to address.

1. The low response rate may have affected the results of the research questions. A higher response rate may yield slightly different results.

2. The data indicated that a total of 140 face-to-face courses were conducted by faculty members who responded to this survey, while only 15 online courses were conducted by the entire faculty group that responded to this survey. The big difference between the two types of courses may have skewed the results. The difference may indicate that the target population for this research study was a group who either did not have an opportunity to do online teaching, or that they were pedagogically geared more towards the face-to-face method of instruction. Although there were 67 hybrid courses conducted by the entire faculty group, this number is still less than 50% of the total number of face-to-face courses being conducted.
3. Since there was no embedded program to identify the respondents (for confidentiality purposes), there could be a possibility that a faculty member have mistakenly responded to the survey more than once when the researcher sent out follow-up emails. This would imply that the actual response rate may be even lower.
4. There were some outliers observed while doing data screening. The validity of the data was evaluated to be reasonable responses and the outliers were retained. These outliers could indicate that of the entire group of faculty members who responded, there may be minority subgroups that held different perceptions from the majority. The perceptions of these minority subgroups may be significant information and should be addressed in future research.

5. Since the web survey was based on the good will of the respondents to respond, this imposed another limitation to the research. The web survey may have been sent out during a time when some faculty members were out for conferences or busy preparing for mid-term examinations, and thus unable to respond to the web survey.
6. Web surveys always have a limitation that those who are disinclined to the use of the web may be disinclined in responding to the web survey.
7. The Perception of Blackboard's Design scale and Degree of Usefulness scale were two scales that contained overlapping factors. It seemed that factor analysis and scree plot used in this study were not sensitive enough to identify factors that overlapped. The researcher may attempt the use of Horn's test of principal components/factors (Parallel Analysis) for further analysis beyond this study.

Recommendations for Future Research

Both the quantitative and qualitative data collected in this study provided a basis for some recommendations for future research studies, described below.

1. The data collected indicated that 63.64% of faculty members who responded to the survey have not taken any Blackboard seminar. The data also indicated that even for those with more than five years of experiences using Blackboard, fewer than 50% of the 26 features included in this study were used. It would be reasonable to consider more professional training for faculty members on a regular basis, and to further examine if professional training brought about a

higher capacity of Blackboard use. Professional training could also help faculty members to learn more sophisticated features of Blackboard. In this way, not only the current version of Blackboard can be utilized to its full potential, but challenges can be presented to Blackboard Inc for further improvement in its LMS framework when greater demands on the sophistication of features surfaced through more usage.

2. Due to the results of the factor analysis for the three subscales of the Perceptions of Blackboard's Design section, the researcher recommends redesigning the scale using different components that can better classify the features into independent components. The current scales demonstrate correlations, although not substantially significant, and dependency, which cause confusion when trying to analyze and interpret each design aspect. It may be a good idea to interview current participants regarding the way in which they view these features and the way in which they would classify them as users.
3. There were some outliers in the data collected. The researcher decided to retain these data because they were observed to be reasonable responses. It is recommended to look into these respondents who were outliers in this study because the perception of this minority group may address aspects not covered by the responses of the majority. A qualitative focused group study may be an approach to gather such information.

4. There were 19 respondents in the group with Blackboard experiences and 6 respondents in the group with no Blackboard experiences who had experiences with other LMS. It would be interesting to find out in a future study whether their other experiences influenced their decision to use or chosen not to use Blackboard, and to find out whether or not it affected their perceptions of Blackboard and their capacity of use.
5. Since 63.64% of the respondents had not taken a Blackboard seminar, a future study is recommended to find out whether or not engagement in a Blackboard seminar affects the respondents' capacity of Blackboard use.
6. The researcher gained much insight through the responses collected from the open-ended questions, and the information filled in gaps not explained by the data collected through the questionnaire. It is recommended for a future study to do a qualitative study with in-depth interviews focusing on how faculty members perceive they would have to adapt their pedagogical methods when using an LMS for e-learning. If adaptation is required, would they choose to compromise their teaching pedagogy or give up using e-learning technology?
7. Due to the low utilization of Blackboard features in this study, the researcher recommends conducting a future study in which the Blackboard user environment is controlled, such that a group of faculty members would be recruited to use a selected list of features for a specific period of time, focusing on exploring the potentials and limitations of all the features in combinations, and the participants would be encouraged to integrate

pedagogical considerations into using these features for instructional purposes rather than administrative course management. The research study, if conducted successfully, should provide insights on whether Blackboard's potential as an e-learning platform for purposes beyond the administration of courses.

8. In this study faculty members identified specific types of features that they wish to see added in the design of Blackboard. It would be interesting to interview them and list the different features that different faculty members wish to see in Blackboard. A study can also be designed to see if these features could be streamlined to a few categories. The nature and characteristics that faculty members wish to see happen in these features can also be explored. In this way, the survey data will be more useful in understanding how faculty members perceived the future of VLE, and see if that is consistent with what the literature has recorded.
9. Another recommendation is to develop a prototype using the data collected in Recommendation 8 with the use of new technologies, and with the help of technical professionals. The prototype would be implemented in a real life environment to collect empirical data for further analysis.
10. Since the LMS used in this study, namely Blackboard, is a commercial LMS with no strong pedagogy, it is recommended to conduct a similar study using an LMS with a different pedagogical perspective, such as Moodle, to see how the results differ from the current study.

REFERENCES

Anderson, J. W. (2003). Faculty perspectives of the Blackboard course delivery system. *The Annual Meeting of the Mid-South Educational Research Association* (Biloxi, MS, November 5-7, 2003).

Andrews, D. H., & Goodson, L. A. (1980). A comparative analysis of models of instructional design. *Journal of Instructional Development, 3*(4), 2-16.

Anglin, G. J. (1995). *Instructional technology: Past, present, and future.* Englewood, CO: Libraries Unlimited, Inc.

Astleitner, H., & Leutner, D. (2000, Summer). Designing instructional technology from an emotional perspective. *Journal of Research on Computing in Education, 32*(4), 497-510.

Barker, P. (2002). On being an online tutor. *Innovations in Education and Teaching International, 39*(1), 3-13.

Bates, A. W. (1999). *Managing technological change.* San Francisco: Jossey-Bass.

Bennett, S., & Marsh, D. (2002). Are we expecting online tutors to run before they can walk? *Innovations in Education and Teaching International, 39*(1), 14-20.

Blackboard Launches Content Management, E-Portfolio System, *T.H.E. Journal*, November 1, 2003. Retrieved July 25, 2007, from http://www.thejournal.com/articles/16510.

Blackboard Nears Launch of Content Management Enterprise Solution. (2003, December). *Electronic Education Report, 10*(17), 7.

Entonado, F. B. & Díaz, L .A. (2006). A training proposal for e-learning teachers. *European Journal of Open, Distance and E-Learning, 2006*(II). Retrieved June 18, 2007, from http://www.eurodl.org/materials/contrib/2006/Blazquez_and_Alonso.htm.

Borja, R. (2005). Makers of online systems merge. *Education Week, 25*(9), 8.

Cantoni, V., Cellario, M., & Porta, M. (2003, October). Perspectives and challenges in e-learning: Towards natural interaction paradigms. *Journal of Visual Languages and Computing, 15*(2004), 333-345.

Cardoso, V., & Bidarra, J. (2007, March). Open and distance learning: Does it (still) matter? *European Journal of Open, Distance and E-Learning, 2007*(I). Retrieved June 21, 2007, from http://www.eurodl.org/materials/contrib/2007/Cardoso_Bidarra.htm.

Cates, W. M. (1993, Jan-Feb). Instructional technology: The design debate. *Clearing House*, *66*(3), 133-135.

Chen, L. (1997, July-August). Distance delivery systems in terms of pedagogical considerations: A reevaluation. *Educational Technology*, *37*(4), 34-37.

Cobb, T. (1997). Cognitive efficiency: Toward a revised theory of media. *Educational Technology Research and Development*, *45*(4), 21-35.

Collis, B., & Peters, O. (2000). Influences on the educational use of the WWW, email and videoconferencing. *Innovations in Education and Training International, 37*(2), 108-119.

Comeaux, P., & McKenna-Byington, E. (2003). Computer-mediated communication in online and conventional classrooms: Some implications for instructional design and professional development programmes. *Innovations in Education and Teaching International, 40*(4), 348-355.

Conole, C., Oliver, M., & Isroff, K. (2004). Addressing methodological issues in e-learning research. In S. Banks, P. Goodyear, V. Hodgson, C. Jones, V. Lally, D. McConnell & C. Steeples (Eds.), *Proceedings of the Fourth International Conference on Networked Learning*, 92-97. Lancaster: Lancaster University & University of Sheffield.

Dalsgaard, C. (2006). Social software: E-Learning beyond learning management systems. *European Journal of Open, Distance and E-Learning, 2006*(II). Retrieved June 18, 2007, from *http://www.eurodl.org/materials/contrib/2006/Christian_Dalsgaard.htm*.

Dick, W. (1995, July-August). Instructional design and creativity: A response to the critics. *Educational Technology*, 5-11.

Dick, W. (1995, September-October). Response to Gordon Rowland on "Instructional design and creativity." *Educational Technology*, *35*(5), 23-24.

Downes, S. 2005. E-learning 2.0. *eLearn* 2005, *10* (Oct. 2005), 1.

Dunteman, G. H. (1989). *Principal components analysis*. Sage Publication Inc.

Dwyer, F. M. (1978). *Strategies for improving visual learning*. State College, PA: Learning Services.

*e*School News. (Oct. 1, 2006). *Patent fight hits eLearning: Blackboard lawsuit irks competitors, schools.* Retrieved April 24, 2008, from http://www.eschoolnews.com/news/top-news/index.cfm?i=41328&page=1

Evans, T., & Nation, D. (1998). Research and staff development in open and distance education. *Staff Development in Open and Flexible Learning* (pp. 45-53). London: Routledge.

Field, A. (2000). *Discovering statistics using SPSS for Windows*. London: Sage Publications.

Gentry, C. G. (1995). Educational technology: A question of meaning. In G.J. Anglin (Ed.), *Instructional technology: Past, present, and future*. Englewood, CO: Libraries Unlimited.

Goleman, D. (1995). *Emotional intelligence.* New York: Bantam.

Govindasamy, T. (2001). Successful implementation of e-learning: Pedagogical considerations. *The Internet and Higher Education, 4*(3-4), 287-299.

Green, S. B., & Salkind, N. J. (2002). *Using SPSS for Windows and Macintosh*. Prentice Hall.

Gropper, G. L. (1983). A behavioral approach to instructional prescription. In C. M. Reigeluth (Ed.). *Instructional-design theories and models*. Hilldale, NJ: Erlbaum.

Halawi, L. and McCarthy, R. (2007). Measuring faculty perceptions of blackboard using the technology acceptance model. *Issues in Information Systems, 8*(2), 160-165.

Hannafin, M. J., & Land, S. M. (1997). The foundations and assumptions of student-centered learning environments. *Instructional Science, 25*(3), 167-202.

Harasim, L. (1995). *Learning networks: A field guide to teaching and learning online*. MIT Press.

Heaton-Shrestha, C., Gipps, C., Edirisingha, P., & Linsey, T. (2007). Learning and e-learning in HE: The relationship between student learning style and VLE use', *Research Papers in Education, 22*(4), 443 – 464.

Hecht, J. B. (1993). Coding responses to open-ended survey items using a software-driven conceptual mapping scheme. *Paper Presented at the Annual Meeting of the American Educational Research Association.* Atlanta, GA, April 12-16, 1993.

Hodes, C. L. (1994, March). Processing visual information: Implications of the dual code theory. *Journal of Instructional Psychology, 21*(1), 36-44.

Jackson, P. W. (1992). Conceptions of curriculum and curriculum specialists. In Philip W. Jackson, *Handbook of research on curriculum* (pp.3-40). New York: Macmillan Publishing Company.

Jacobs, G. (1998, February). Evaluating courseware: Some critical questions. *Innovations Education and Training International, 35*(1), 3-8.

Jefferies, P., Grodzinsky, F., & Griffin, J. (Oct, 2003). Advantages and problems in using information communication technologies to support the teaching of a multi-institutional computer ethics course. *Journal of Educational Media, 28*(2/3), 191-202.

Jones, M. G., Farquhar, J. D., & Surry, D. W. (1995, July-August). Using metacognitive theories to design user interfaces for computer-based learning. *Educational Technology*, 12-21.

Kidd, T. (2005, October). Key aspects affecting students' perception regarding the instructional quality of online and web based courses. *International Journal of Instructional Technology and Distance Education, 2*(10). Retrieved June 1, 2006, from http://www.itdl.org/Journal/Oct_05/article05.htm.

Lai, S. (2000). Influence of audio-visual representations on learning abstract concepts. *International Journal of Instructional Media*, *27*(2), 199-207.

Learning by Design. (2003). In *Learningpost*, July 27, 2003. Retrieved August 24, 2003, from http://www.elearningpost.com/features/archives/001996.asp

Lim, C. P. (2001, March). A holistic approach towards the use of an integrated online delivery and management system. *Journal of Educational Media*, *26*(1), 19-33.

MacKnight, C. (1998). Electronic learning materials: The crisis continues. *SIGCUE Outlook*, *26*(2), 16-24.

McLoughlin, C. (1997). *Visual thinking and telepedagogy*. Retrieved January 31, 2008, from http://www.ascilite.org.au/conferences/perth97/papers/Mcloughlin/Mcloughlin.html

McMahon, M. (1997, December). *Social constructivism and the World Wide Web: A paradigm for learning*. Retrieved July 18, 2005, from http://www.ascilite.org.au/conferences/perth97/papers/Mcmahon/Mcmahon.html

Meyer, J. D., Salovey, P., & Caruso, D. R. (2000). Competing models of emotional intelligence. In R.J. Sternberg (ed.) *Handbook of Human Intelligence* (2nd ed.) (pp. 396-420). Cambridge University Press.

Misanchuk, E. R., Schwier, R. A., & Boling, E. (2000). *Visual design for instructional multimedia* (CD-ROM). University of Saskatchewan Extension Division.

Molesworth, M. (2004, February). Collaboration, reflection and selective neglect: Campus-based marketing students' experiences of using a virtual learning environment. *Innovations in Education and Teaching International, 41*(1), 79-92.

Mueller, D. J. (1986). *Measuring social attitudes: A handbook for researchers and practitioners*. New York: Teachers College Press.

Murphy, K., Mahoney, S., Chen, C. Y., Mendoza-Diaz, N., & Yang, X. (2005). Constructivist model of mentoring, coaching, and facilitating online discussions. *Distance Education, 26*(3), 341–366.

Myers, R. (1990). *Classical and modern regression with applications* (2nd edition). Boston, MA: Duxbury.

O'Mahony, C. (2003). E-Learning component evolution and integration: A case study. *International Conference on Computers in Education 2004*, 694. Retrieved January 26, 2008, from http://66.102.1.104/scholar?hl=en&lr=&q=cache:YnGxTMT2uVMJ:plum.yuntech.edu.tw/icce2004/Theme3/083_OMahony.pdf+faculty+perceptions+of+LMS+or+CMS+or+VLE

O'Reilly, T. (2005). *What is Web 2.0? Design patterns and business models for the next generation of software.* Retrieved January 2, 2008, from http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html

OECD (2005). E-learning in tertiary education: Where do we stand? *Education & Skills 2005* (4), 1– 293.

Olsen, J. R., & Bass, V. B. (1982). The application of performance technology in the military: 1960-1980. *Performance and Instruction*, *21*(6), 32-36.

Open Source Course Management Systems. (2007). Retrieved October 22, 2007, from http://www.edtechpost.ca/pmwiki/pmwiki.php/EdTechPost/OpenSourceCourseManagementSystems

Perkins, D. N. (1985). The fingertip effect: How information-processing technology shapes thinking. *Educational Researcher, 14*(7), 11-17.

Reeves, B., & Nass, C. (1996). *The media equation: How people treat computers, television, and new media like real people and places*. Stanford, CA: Center for the Study of Language and Information; Cambridge, England; New York: Cambridge University Press.

Roach, R. (2006). Higher education software giants merge in multimillion-dollar deal. *Diverse: Issues in Higher Education*, *23*(3), 28.

Rowland, G. (1995). Instructional design and creativity: A response to the criticized. *Educational Technology*, *35*(5), 17-22.

Saettler, P. (1968). *A history of instructional technology.* New York: McGraw-Hill.

Salmon, G. (2004). *E-Moderating: The key to teaching and learning online*. London: Kogan Page.

Salomon, G. (1986). Information technologies: What you see is not (always) what you get. *Educational Psychologist*, *20*, 207-16.

Salter, W. J. (2002, June). How MIT's OpenCourseWare will change e-learning. *Learning Circuits*. Retrieved August 24, 2003, from http://www.learningcircuits.com/2002/june2002/salter.html

Schuller, C. F. (1986). Some historical perspectives on the instructional technology field. *Journal of Instructional Development*, *8*(3), 3-6.

Schindelka, B. R. (2001a). The challenges of defining instructional design. *Inroad eZine*, *1*(1). Retrieved August 24, 2003, from http://www.inroad.net/schindelka0401.html

Schindelka, B. R. (2001b). Who's on first? A team-based approach to online learning. *Inroad eZine*, *1*(2). Retrieved August 24, 2003, from http://www.inroad.net/schindelka0501.html

Schindelka, B. R. (2001c). Online learning: What you see is what you get—or is it? *Inroad eZine*, *1*(3). Retrieved August 24, 2003, from http://www.inroad.net/schindelka0601.html

Schindelka, B. R. (2001d). When a picture is [sometimes] worth a thousand words. *Inroad eZine*, *1*(4). Retrieved August 24, 2003, from http://www.inroad.net/schindelka0701.html

Schindelka, B. R. (2001e). If it moves, it must be better: Video and animation in online learning. *Inroad eZine*, *1*(5). Retrieved August 24, 2003, from http://www.inroad.net/schindelka1201.html

Schindelka, B. R. (2002a). Media and the mind: Psychology and online learning (Part one of two). *Inroad eZine, 2*(1). Retrieved August 24, 2003, from http://www.inroad.net/schindelka0102.html

Schindelka, B. R. (2002b). Epistemology of instructional design: I know, therefore I design. *Inroad eZine, 2*(2). Retrieved August 24, 2003, from http://www.inroad.net/schindelka0802.html

Schindelka, B. R. (2002c). Instructional design models and processes: Reinventing the wheel? *Inroad eZine, 2*(3). Retrieved August 24, 2003, from http://www.inroad.net/schindelka1102.html

Schindelka, B. R. (2002d). The design & development process: Follow the yellow brick road. *Inroad eZine, 2*(4). Retrieved August 24, 2003, from http://www.inroad.net/schindelka1202.html

Schindelka, B. R. (2003a). The design team—together through the years. *Inroad eZine, 2*(5). Retrieved August 24, 2003, from http://www.inroad.net/schindelka0203.html

Schindelka, B. R. (2003b). A framework of constructivist instructional design: Shiny, happy design. *Inroad eZine, 3*(1). Retrieved August 24, 2003, from http://www.inroad.net/schindelka0403.html

Schindelka, B. R. (2003c). The designer as learner. *Inroad eZine, 3*(2). Retrieved August 24, 2003, from http://www.inroad.net/schindelka0603.html

Seels, B., & Glasgow, Z. (1998). *Making instructional decisions* (2nd Ed.). Upper Saddle River, NJ: Simon & Schuster.

Shih, J. (2004). A pedagogical design strategy for effective technology-based learning: iLearn model. *International Journal of Instructional Technology and Distance Education, 1*(8). Retrieved June 1, 2006, from http://www.itdl.org/Journal/Aug_04/article06.htm

Shotsberger, P. G. (2000). The human touch: Synchronous communication in web-based learning. *Educational Technology, 40*(1), *53-56.*

Shrock, S. A. (1995). A brief history of instructional development. In Gary J, Anglin, *Instructional technology: Past, present, and future* (pp. 11-19). Englewood, CO: Libraries Unlimited, Inc.

Smulders, D. (2003, March). Designing for learners, designing for users. *eLearn Magazine*. Retrieved August 24, 2003, from http://www.elearnmag.org/subpage/sub_page.cfm?section=3&list_item=11&page=1

Souleles, N. (2005, October). Retrieved from http://www.elearningartdesign.org/researc.htm

Stevens, J. (1999). *Intermediate statistics: A modern approach* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Sulaiman, J., & Dwyer, F. (2002). The effect of varied instructional text design strategies on the achievement of different educational objectives. *International Journal of Instructional Media*, *29*(2), 215-223.

Surry, D. W. (2000). Strategies for motivating higher education faculty to use technology. *Innovations in Education and Training International, 37*(2), 145-153.

Taylor, J. (1998). Using asynchronous computer-conferencing to encourage interaction in seminar discussions in: R. Hazemi, S. Hailes & S. Wilbur (Eds). *The digital university: Reinventing the academy.* New York: Springer-Verlag, 219-223.

Tergan (1998). Checklists for the evaluation of educational software: Critical review and prospects. *Innovations in Education and Training International, 35*(1), 9-20.

Tesser, M., & Richey, R.C. (1997). The role of context in learning and instructional design. *Educational Technology Research and Development, 45*(2), 85-115.

Thomas, P., Carswell, L., Price, B., & Petre, M. (1998). A holistic approach to supporting distance learning using the Internet: Transformation, not translation. *British Journal of Educational Technology, 29*(2), 149-61.

Valentine, D. (2002). Distance learning: Promises, problems, and possibilities. *Online Journal of Distance Learning Administration, V*(III). Retrieved January 28, 2008, from http://www.westga.edu/~distance/ojdla/fall53/valentine53.html

Webb, E., Jones, A., Barker, P., & Schaik, P.V. (2004, February). Using e-learning dialogues in higher education. *Innovations in Education and Teaching International, 41*(1), *93-103.*

Weller, M. (2006). VLE 2.0 and future directions in learning environments. In R. Philip, A Voerman & J. Dalziel (Eds.), *Proceedings of the First International LAMSConference 2006: Designing the Future of Learning* (pp 99-106). 6-8 December 2006, Sydney: LAMS Foundation. Retrieved January 3, 2008, from http://lamsfoundation.org/lams2006/papers.htm

Winn, W. (1997). Advantages of a theory-based curriculum in instructional technology. *Educational Technology, 37*(1), 34-41.

Woods, R., Bakerb, J. D., & Hopper, D. (2004). Hybrid structures: Faculty use and perception of web-based courseware as a supplement to face-to-face instruction. *The Internet and Higher Education, 7*(4), 281-297.

Zurita, L., & Ryberg, T. (2005). Towards a collaborative approach of introducing e-learning in higher education institutions. *How do university teachers conceive and react to transitions to e-learning, WCCE 2005 - 8th IFIP World Conference on Computers in Education.* Stellenbosch, South Africa: University of Stellenbosch.

APPENDIX A: ORIGINAL QUESTIONNAIRE

FACULTY PERCEPTIONS AND UTILIZATION OF A LEARNING MANAGEMENT SYSTEM IN HIGHER EDUCATION

A PILOT STUDY.

RESEARCHER: Chinhong Lim Chang

ADVISOR: Dr. Sandra Turn

Dear Faculty,

I am a doctoral student in the Instructional Technology Program, Educational Studies, at Ohio University in Athens, Ohio. I am currently working on my dissertation entitled "Faculty Perceptions and Utilization of a Learning Management System in Higher Education." As part of this study, I am requesting your participation in **a pilot study**. Past research has indicated that e-learning technology is not fully utilized in education despite greater degree of access within higher education institutions. Through your participation I hope to understand the way in which Blackboard, a Learning Management System (LMS), and one of the most common e-learning technologies for teaching, is perceived and used by faculty within higher education. I hope that the results of this pilot study will be useful for the design of my final survey for this dissertation. Please provide any suggestions you have for this pilot study in the section indicating "additional comments" (section VI).

I guarantee that your responses will be kept confidential. The results of the pilot study will be used as a guide to design the final survey for my dissertation. Your decision to participate in this pilot study is completely voluntary. The whole pilot study will take approximately 20 minutes of your time. Please remember to complete all of the items. In the pilot study, you will be asked for your valuable opinions and input in the following areas:

(1) Perceptions of Blackboard
(2) Perceptions of Blackboard designs
(3) Perceptions of pedagogy
(4) Capacity for using Blackboard
(5) Something about yourself
(6) Additional comments on why you choose to use or not to use Blackboard

If you have any questions regarding this study, please contact me at cl203888@ohiou.edu or my dissertation advisor Dr. Sandra Turner at turners@ohiou.edu. I would like to thank you in advance for your participation in this pilot study.

Sincerely,

Chinhong Lim Chang
Doctoral student/Researcher
Instructional Technology/Educational Studies at Ohio University
E-mail: cl203888@ohiou.edu

A Learning Management System (LMS) is one of the most common e-learning technologies for teaching used today; and Blackboard, being one of the most popular LMS, is a leading commercial system that is used worldwide in higher institutions.

Have you used Blackboard?

- O Yes
- O No
- O I have never heard of Blackboard

- If your answer to the above question is "yes," please proceed with the survey.
- If your answer to the above question is "no" or "I have never heard of Blackboard," please specify in the space below <u>any</u> technology, including other LMS beside Blackboard that you have used in your teaching, <u>and then complete Section III, V and VI of this survey.</u>

_____

I. Perceptions of Blackboard

Please read *each* statement and then *circle one* which best describes how you feel.

SA = Strongly Agree
A = Agree
N = Neutral
D = Disagree
SD = Strongly Disagree

Blackboard is user friendly.	**SA**	**A**	**N**	**D**	**SD**
Blackboard helps improve the teacher-student relationship in a course.	**SA**	**A**	**N**	**D**	**SD**
Blackboard helps make a course more successful.	**SA**	**A**	**N**	**D**	**SD**
Blackboard facilitates the way I teach.	**SA**	**A**	**N**	**D**	**SD**
I find it too time consuming to use Blackboard.	**SA**	**A**	**N**	**D**	**SD**
Blackboard is good only if you are teaching online.	**SA**	**A**	**N**	**D**	**SD**
Blackboard lacks customization.	**SA**	**A**	**N**	**D**	**SD**
I do not think using Blackboard in my teaching has helped improve overall student performance.	**SA**	**A**	**N**	**D**	**SD**
The technical aspects of Blackboard discourage me from using it more frequently.	**SA**	**A**	**N**	**D**	**SD**
Blackboard is an organized e-learning platform.	**SA**	**A**	**N**	**D**	**SD**

Please turn over for Section II →

II. Perceptions of Blackboard Designs

Please read *each* statement and then *circle one* which best describes how you feel.

SA = Strongly Agree
A = Agree
N = Neutral
D = Disagree
SD = Strongly Disagree

The synchronous collaborative tool such as chat or virtual classroom within Blackboard is not user friendly.	**SA**	**A**	**N**	**D**	**SD**
It is difficult to plan a creative course using Blackboard.	**SA**	**A**	**N**	**D**	**SD**
Blackboard is able to enrich my course content through its ability to include resources from the Internet.	**SA**	**A**	**N**	**D**	**SD**
The navigation style in Blackboard lacks interactivity.	**SA**	**A**	**N**	**D**	**SD**
There is very little I can change on the overall visual design of Blackboard.	**SA**	**A**	**N**	**D**	**SD**
The use of hyperlinks provides enrichment to course content.	**SA**	**A**	**N**	**D**	**SD**
Using Blackboard alone is not sufficient to implement the course I teach.	**SA**	**A**	**N**	**D**	**SD**
Blackboard improves my communication with students.	**SA**	**A**	**N**	**D**	**SD**
The ability to organize content into folders within Blackboard makes my teaching more organized.	**SA**	**A**	**N**	**D**	**SD**
The “Quick and Detail View” feature of Blackboard provides a clear layout of the information architecture of the course.	**SA**	**A**	**N**	**D**	**SD**

I wish I were able to customize Blackboard to suit the way I teach.	**SA**	**A**	**N**	**D**	**SD**
The most useful feature in Blackboard is its administrative function. *(Note: Administrative function includes making announcements, providing staff and course information, sending messages and emails to the group, the building of a syllabus, and the use of the gradebook.)*	**SA**	**A**	**N**	**D**	**SD**
The discussion forum takes up too much of my time.	**SA**	**A**	**N**	**D**	**SD**
The similarities between the structure of Blackboard and regular classroom teaching (e.g. use of syllabus, course materials, gradebook, survey, etc) make it easier for me to adopt it in my teaching.	**SA**	**A**	**N**	**D**	**SD**
I wish to see simulations in Blackboard associated with real-life teaching scenarios.	**SA**	**A**	**N**	**D**	**SD**
Blackboard is not suitable for certain instructional design models.	**SA**	**A**	**N**	**D**	**SD**
I wish there would be audio-visual capabilities incorporated in the interface of Blackboard.	**SA**	**A**	**N**	**D**	**SD**
The graphic interfaces (e.g. buttons, icons, or drop-down menus) in Blackboard do not help a user much in knowing the possible associations of the content it represents.	**SA**	**A**	**N**	**D**	**SD**
The digital drop box is an efficient feature.	**SA**	**A**	**N**	**D**	**SD**
I like the feature where I am able to customize menu buttons.	**SA**	**A**	**N**	**D**	**SD**
The overall visual design of Blackboard needs improvement.	**SA**	**A**	**N**	**D**	**SD**
I find the survey manager useful in learning about how much students know from the course.	**SA**	**A**	**N**	**D**	**SD**

The formatting tools (e.g. font style, font format, font colors, and layout of page) in Blackboard make teaching materials more interesting.	**SA**	**A**	**N**	**D**	**SD**
I find uploading *files* to Blackboard complicated. *(Note: files include text documents [doc, txt and pdf], graphics [gif and jpeg], video [mpeg, Quicktime, avi], audio [wav,aiff], or multimedia [shockwave Flash])*	**SA**	**A**	**N**	**D**	**SD**

Please turn over for Section III →

III. Perceptions of Pedagogy

Please read *each* statement and then *circle one* which best describes how you feel.

SA = Strongly Agree
A = Agree
N = Neutral
D = Disagree
SD = Strongly Disagree

Acquisition of knowledge requires understanding.	**SA**	**A**	**N**	**D**	**SD**
I believe a learner constructs his/her own knowledge.	**SA**	**A**	**N**	**D**	**SD**
A learner can better remember information if he/she knows how different information is interrelated.	**SA**	**A**	**N**	**D**	**SD**
Realistic context is important to learning.	**SA**	**A**	**N**	**D**	**SD**
It is better for an instructor to direct student learning.	**SA**	**A**	**N**	**D**	**SD**
A learner learns best through problem-solving.	**SA**	**A**	**N**	**D**	**SD**
Evaluation is necessary to know whether the learning objective is met.	**SA**	**A**	**N**	**D**	**SD**
Learners control learning.	**SA**	**A**	**N**	**D**	**SD**
Repetition is important to learning.	**SA**	**A**	**N**	**D**	**SD**
The role of an instructor is to teach.	**SA**	**A**	**N**	**D**	**SD**
I believe a learner learns best when new information given to him/her is built on his/her existing information.	**SA**	**A**	**N**	**D**	**SD**
The role of instructor is to coach.	**SA**	**A**	**N**	**D**	**SD**

I believe in sequential learning.	**SA**	**A**	**N**	**D**	**SD**
A learner learns faster when materials given to him/her are classified into meaningful chunks.	**SA**	**A**	**N**	**D**	**SD**
It is more effective to learn information from general to specific.	**SA**	**A**	**N**	**D**	**SD**

Please turn over for Section IV →

IV. Capacity for Using Blackboard

This section is to find out *how frequently* you use the different features in Blackboard in a particular quarter. Please think of a quarter that you would consider as "typical," recall those courses you taught in that particular quarter, and respond to the following items based on your best memory.

5 = Always
4 = Frequently
3 = Occasionally
2 = Rarely
1 = Never

Create a hyperlink	**5**	**4**	**3**	**2**	**1**
Import or export grades (e.g. upload grades from Excel or backup grades to Excel)	**5**	**4**	**3**	**2**	**1**
Organize content into folders	**5**	**4**	**3**	**2**	**1**
Use of synchronous collaborative tool such as chat or virtual classroom	**5**	**4**	**3**	**2**	**1**
Look at the visual representation of a course using Quick View (the original menu design) and Detail View (a course map)	**5**	**4**	**3**	**2**	**1**
Use syllabus builder	**5**	**4**	**3**	**2**	**1**
Use a user management feature (to list/modify, create or remove user; manage groups)	**5**	**4**	**3**	**2**	**1**
Use the gradebook (add, edit, or delete graded items, view grades, weight grades)	**5**	**4**	**3**	**2**	**1**
Use the digital drop box	**5**	**4**	**3**	**2**	**1**
Manage discussion forum (add, reply, modify, delete or archive discussion thread, and assigning discussion forum settings)	**5**	**4**	**3**	**2**	**1**

Add, edit, or delete announcements	**5**	**4**	**3**	**2**	**1**
Archive or export a course	**5**	**4**	**3**	**2**	**1**
Email a member or the entire group	**5**	**4**	**3**	**2**	**1**
Add, edit, or delete staff information	**5**	**4**	**3**	**2**	**1**
Send messages to a member or the entire group within Blackboard	**5**	**4**	**3**	**2**	**1**
Use the test manager	**5**	**4**	**3**	**2**	**1**
Add, edit, or delete course information	**5**	**4**	**3**	**2**	**1**
Customize course menu buttons by types, shapes and colors	**5**	**4**	**3**	**2**	**1**
Add Assignments (with ability to check status of completion and provide feedback,)	**5**	**4**	**3**	**2**	**1**
Use the survey manager	**5**	**4**	**3**	**2**	**1**
Upload a file *(Note: Files refer to any text documents [doc, txt and pdf], graphics [gif and jpeg], video [mpeg, Quicktime, avi], audio [wav,aiff], or multimedia [shockwave Flash])*	**5**	**4**	**3**	**2**	**1**
Change the course banner	**5**	**4**	**3**	**2**	**1**
Use formatting tools such as font style, font colors, font format, and layout of page	**5**	**4**	**3**	**2**	**1**
Use course menu navigation style (the choice between button and text)	**5**	**4**	**3**	**2**	**1**

Please turn over for Section V →

V. Something About Yourself

Please tell me something about yourself by checking one appropriate box in each item.

1. I belong to
   - ☐ College of Arts and Science
   - ☐ College of Business
   - ☐ College of Communication
   - ☐ College of Education
   - ☐ College of Engineering and Technology
   - ☐ College of Fine Arts
   - ☐ College of Health and Human Services
   - ☐ College of Osteopathic Medicine
   - ☐ University College
   - ☐ Other

2. I am
   - ☐ Full time faculty
   - ☐ Part time faculty

3. How long have you been using Blackboard?
   - ☐ more than 4 years
   - ☐ 3 – 4 years
   - ☐ 2 – 3 years
   - ☐ 1 – 2 years
   - ☐ less than 1 year
   - ☐ I have never used Blackboard

4. What is the total number of courses that you taught in the "typical" quarter you selected for this survey?
   - ☐ 1
   - ☐ 2
   - ☐ 3
   - ☐ 4 or more

5. In the typical quarter you selected for this survey, indicate the total number of classes you conducted predominantly online.
   - ☐ 0
   - ☐ 1
   - ☐ 2
   - ☐ 3
   - ☐ 4 or more

6. In the typical quarter you selected for this survey, indicate the total number of classes you conducted using hybrid method (online + face-to-face).
   - ☐ 0
   - ☐ 1
   - ☐ 2
   - ☐ 3
   - ☐ 4 or more

7. In the typical quarter you selected for this survey, indicate the total number of classes you conducted predominantly face-to-face.
   - ☐ 0
   - ☐ 1
   - ☐ 2
   - ☐ 3
   - ☐ 4 or more

Please turn over for Section VI →

VI. Additional Comments

Please share your views on why you choose to use or not to use Blackboard.

Thank you very much for your time and responses

APPENDIX B: REVISED QUESTIONNAIRE AND INFORMED CONSENT DOCUMENT

FACULTY PERCEPTIONS AND UTILIZATION OF A LEARNING MANAGEMENT SYSTEM IN HIGHER EDUCATION

RESEARCHER: Chinhong Lim Chang

ADVISOR: Dr. Sandra Turner

Dear Faculty,

I am a doctoral student in the Instructional Technology Program, Educational Studies, at Ohio University in Athens, Ohio. I am currently working on my dissertation entitled "Faculty Perceptions and Utilization of a Learning Management System in Higher Education." As part of this study, I am requesting your participation in a survey. Past research has indicated that e-learning technology is not utilized to its full potential in education despite greater degree of access within higher education institutions. Through your participation I hope to understand the way in which faculty members use e-learning technology in their teaching. Blackboard, a Learning Management System (LMS), and one of the most common e-learning technologies for teaching, is a focus in this survey. I hope to gain knowledge on the way in which faculty members perceive and use Blackboard at Ohio University. If you are not using Blackboard, I hope to learn about your perceptions on e-learning and its technology in general. Hopefully, the results of the survey will be useful for the design of future e-learning platforms and that the new designs would better align with pedagogy.

I do not know of any risks to you if you decide to participate in this survey. I guarantee that your responses will be kept confidential and no names will be attached to data used in the dissertation. The results of the survey will be used as part of a doctoral dissertation. All data will be destroyed six months after completing the dissertation. Your decision to participate in this research study is completely voluntary. You are free to participate in this research study or to withdraw at any time. Since the validity of the results depends on obtaining a high response rate, your voluntary participation is very important to the success of the study. The whole survey will take approximately 20 minutes of your time. Please remember to complete all of the items. In the survey, you will be asked for your valuable opinions and input in the following areas:

(1) Perceptions of Blackboard
(2) Perceptions of Blackboard's designs
(3) Pedagogical perspectives on e-learning
(4) Capacity of use
(5) Something about yourself
(6) Additional comments

If you have any questions regarding this study, please contact me (cl203888@ohiou.edu or cchang2667@gmail.com) or my dissertation advisor Dr. Sandra Turner (turners@ohio.edu). I would like to thank you in advance for your participation in this study. If you would like a summary of my findings, please email me. This project has been determined to be exempt by the Office of Research Compliance. If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740) 593-0664.

Sincerely,

Chinhong Lim Chang
Doctoral student/researcher
Instructional Technology/Educational Studies at Ohio University
E-mail: cl203888@ohiou.edu or cchang2667@gmail.com

A Learning Management System (LMS) is one of the most common e-learning technologies for teaching used today; and Blackboard, being one of the most popular LMS, is a leading commercial system that is used worldwide in higher institutions. (Note: LMS is also commonly known as Course Management System (CMS), or Virtual Learning Environments (VLE)).

Have you used Blackboard?

- O Yes
- O No
- O I have never heard of Blackboard

I. Perceptions of Blackboard

Please read *each* statement and then *circle one* which best describes how you feel.

SA = Strongly Agree
A = Agree
N = Neutral
D = Disagree
SD = Strongly Disagree

Blackboard is user friendly.	**SA**	**A**	**N**	**D**	**SD**
Blackboard helps improve the teacher-student relationship in a course.	**SA**	**A**	**N**	**D**	**SD**
Blackboard helps make a course more successful.	**SA**	**A**	**N**	**D**	**SD**
Blackboard facilitates the way I teach.	**SA**	**A**	**N**	**D**	**SD**
I find it too time consuming to use Blackboard.	**SA**	**A**	**N**	**D**	**SD**
Blackboard is good only if you are teaching online.	**SA**	**A**	**N**	**D**	**SD**
Blackboard lacks customization.	**SA**	**A**	**N**	**D**	**SD**
I do not think using Blackboard in my teaching has helped improve overall student performance.	**SA**	**A**	**N**	**D**	**SD**
The technical aspects of Blackboard discourage me from using it more frequently.	**SA**	**A**	**N**	**D**	**SD**
I like Blackboard because it is a structured e-learning platform.	**SA**	**A**	**N**	**D**	**SD**

Please turn over for Section II →

II. Perceptions of Blackboard's Designs

Please read *each* statement and then *circle one* which best describes how you feel.
Choose NU if you have never used a feature.

SA = Strongly Agree
A = Agree
N = Neutral
D = Disagree
SD = Strongly Disagree
NU = Never Used

The chat feature within Blackboard is not user friendly.	**SA**	**A**	**N**	**D**	**SD**	**NU**
It is difficult to plan a creative course using Blackboard.	**SA**	**A**	**N**	**D**	**SD**	**NU**
Blackboard is able to enrich my course content through its ability to include resources from the Internet.	**SA**	**A**	**N**	**D**	**SD**	**NU**
The navigation style in Blackboard lacks interactivity.	**SA**	**A**	**N**	**D**	**SD**	**NU**
There is very little I can change on the overall visual design of Blackboard.	**SA**	**A**	**N**	**D**	**SD**	**NU**
The use of external links provides enrichment to course content.	**SA**	**A**	**N**	**D**	**SD**	**NU**
Blackboard improves my communication with students.	**SA**	**A**	**N**	**D**	**SD**	**NU**
The ability to organize content into folders within Blackboard makes my teaching more organized.	**SA**	**A**	**N**	**D**	**SD**	**NU**
The "Quick and Detail View" feature of Blackboard provides a clear layout of the information architecture of the course.	**SA**	**A**	**N**	**D**	**SD**	**NU**
I am able to customize Blackboard to suit the way I teach.	**SA**	**A**	**N**	**D**	**SD**	**NU**

The discussion forum is worthwhile even though it is time consuming.	**SA**	**A**	**N**	**D**	**SD**	**NU**
The similarities between the structure of Blackboard and regular classroom teaching (e.g. use of syllabus, course materials, gradebook, survey, etc) make it easier for me to adopt it in my teaching.	**SA**	**A**	**N**	**D**	**SD**	**NU**
Blackboard is not suitable for my style of teaching.	**SA**	**A**	**N**	**D**	**SD**	**NU**
I can incorporate audio or visual materials into my Blackboard course site.	**SA**	**A**	**N**	**D**	**SD**	**NU**
The graphic interfaces (e.g. buttons, icons, or drop-down menus) in Blackboard do not help a user much in knowing the possible associations of the content it represents.	**SA**	**A**	**N**	**D**	**SD**	**NU**
I like the digital dropbox feature where students are able to submit class work and projects online.	**SA**	**A**	**N**	**D**	**SD**	**NU**
I like the feature where I am able to customize menu buttons.	**SA**	**A**	**N**	**D**	**SD**	**NU**
The overall visual design of Blackboard needs improvement.	**SA**	**A**	**N**	**D**	**SD**	**NU**
I find the survey manager useful in learning about how much students know from the course.	**SA**	**A**	**N**	**D**	**SD**	**NU**
The formatting tools (e.g. font style, font format, font colors, and layout of page) in Blackboard make teaching materials more interesting.	**SA**	**A**	**N**	**D**	**SD**	**NU**
I find uploading *files* to Blackboard complicated. *(Note: files include text documents [doc, txt and pdf], graphics [gif and jpeg], video [mpeg, Quicktime, avi], audio [wav,aiff], or multimedia [shockwave Flash])*	**SA**	**A**	**N**	**D**	**SD**	**NU**

Please turn over for Section III →

III. Pedagogical Perspectives on e-Learning

Please read *each* statement and then *circle one* which best describes how you feel.

Important note:
The term "e-learning" in this survey is used to refer to web-based and internet-based learning, as well as the use of e-learning platforms (commonly known as Learning Management System (LMS), or Course Management System (CMS), or Virtual Learning Environments (VLE) to facilitate teaching.

SA = Strongly Agree
A = Agree
N = Neutral
D = Disagree
SD = Strongly Disagree

I believe that new pedagogical approaches (as opposed to approaches use in traditional classroom) are necessary for the success of e-learning.	**SA**	**A**	**N**	**D**	**SD**
External links are valuable tools to me when conducting e-learning courses. *(Note: Some examples of external links include Wikipedia, e-journal websites, Google Scholar, open courseware, etc.)*	**SA**	**A**	**N**	**D**	**SD**
In e-learning courses, an instructor's focus should be on pedagogical strategies, not course information.	**SA**	**A**	**N**	**D**	**SD**
I am willing to spend a reasonable amount of time learning about new technology for teaching.	**SA**	**A**	**N**	**D**	**SD**
I would adjust my style of teaching when I use an e-learning platform to teach a course.	**SA**	**A**	**N**	**D**	**SD**
I would use different communication tools available on the web to improve the dynamic of interaction among learners.	**SA**	**A**	**N**	**D**	**SD**

I believe that a good e-learning environment is one that encourages social interaction among learners.	**SA**	**A**	**N**	**D**	**SD**
A successful e-learning environment is one in which learners play active roles in the design of course materials.	**SA**	**A**	**N**	**D**	**SD**
I believe that the context (virtual e-learning environment) in which e-learning occurs is central to the learning itself.	**SA**	**A**	**N**	**D**	**SD**
I prefer to teach a course entirely online if given a choice.	**SA**	**A**	**N**	**D**	**SD**
I like to use a web-based e-learning system to facilitate my teaching.	**SA**	**A**	**N**	**D**	**SD**
An e-learner learns best through problem-solving.	**SA**	**A**	**N**	**D**	**SD**
The use of discussion forum encourages brain-storming among e-learners.	**SA**	**A**	**N**	**D**	**SD**
I like to develop many of my course materials using the web technology.	**SA**	**A**	**N**	**D**	**SD**
The use of web-based resources in e-learning encourages deeper learning.	**SA**	**A**	**N**	**D**	**SD**
I think interactive course content is important in e-learning.	**SA**	**A**	**N**	**D**	**SD**
It is difficult to talk about e-learning pedagogy without talking about web technology.	**SA**	**A**	**N**	**D**	**SD**
An interface with a high degree of interactivity is important for e-learning. *(For example: The "chat" feature has a higher degree of interactivity than the "email." feature.)*	**SA**	**A**	**N**	**D**	**SD**

The role of an instructor in e-learning is to facilitate.	**SA**	**A**	**N**	**D**	**SD**

Please turn over for Section IV →

IV. Capacity of Use

Please think of a quarter that you would consider as "typical," recall those courses you taught in that particular quarter, and respond to the following items based on your best memory.

1. Please check all features in Blackboard you used in your typical quarter.

Use the gradebook (add, edit, or delete graded items, view grades, weight grades)	☐
Import or export grades (e.g. upload grades from Excel or backup grades to Excel)	☐
Organize content into folders	☐
Use the chat feature	☐
Look at the visual representation of a course using Quick View (the original menu design) and Detail View (a course map)	☐
Use syllabus builder	☐
Use a user management feature (to list/modify, create or remove user; manage groups)	☐
Create a external link	☐
Use the digital dropbox	☐
Manage a discussion forum (add, reply, modify, delete or archive discussion thread, and assign discussion forum settings)	☐
Add, edit, or delete announcements	☐
Archive or export a course	☐

Email a member or the entire group	☐
Add, edit, or delete staff information	☐
Send messages to a member or the entire group *within Blackboard*	☐
Use the test manager	☐
Add, edit, or delete course documents	☐
Customize course menu buttons by types, shapes and colors	☐
Add assignments	☐
Check the status of assignments assigned to students *(Note: This feature is within the "assignments" feature and it allows the instructor to easily see whether a student has started or completed an assignment.)*	☐
Use the survey manager	☐
Upload a file *(Note: Files refer to any text documents [doc, txt and pdf], graphics [gif and jpeg], video [mpeg, Quicktime, avi], audio [wav,aiff], or multimedia [shockwave Flash])*	☐
Change the course banner	☐
Use formatting tools such as font style, font colors, font format, and layout of page	☐
Use course menu navigation style (the choice between button and text)	☐
Use the virtual classroom feature	☐

2. Please indicate your view on the degree of usefulness for the following features within Blackboard. Choose “NA” (not applicable) if you have not used a feature.

	Most useful	→	→	→	Least Useful		NA
The gradebook (add, edit, or delete graded items, view grades, weight grades)	☐	☐	☐	☐	☐		☐
Import or export grades (e.g. upload grades from Excel or backup grades to Excel)	☐	☐	☐	☐	☐		☐
Organization of content into folders	☐	☐	☐	☐	☐		☐
The chat feature	☐	☐	☐	☐	☐		☐
Visual representation of a course using Quick View (the original menu design) and Detail View (a course map)	☐	☐	☐	☐	☐		☐
The syllabus builder	☐	☐	☐	☐	☐		☐
The user management feature (to list/modify, create or remove user; manage groups)	☐	☐	☐	☐	☐		☐
Creation of external links	☐	☐	☐	☐	☐		☐
The digital dropbox	☐	☐	☐	☐	☐		☐
The discussion forum (add, reply, modify, delete, archive discussion thread, or assigning discussion forum settings)	☐	☐	☐	☐	☐		☐
The announcement feature	☐	☐	☐	☐	☐		☐
The feature to archive or export a course	☐	☐	☐	☐	☐		☐

	Most useful	→	→	→	Least Useful		NA
The feature to email a member or the entire group	☐	☐	☐	☐	☐		☐
The staff information	☐	☐	☐	☐	☐		☐
The feature to send messages to a member or the entire group within Blackboard	☐	☐	☐	☐	☐		☐
The test manager	☐	☐	☐	☐	☐		☐
The course documents	☐	☐	☐	☐	☐		☐
The feature to customize course menu buttons by types, shapes and colors	☐	☐	☐	☐	☐		☐
The feature to add Assignments	☐	☐	☐	☐	☐		☐
The feature to check the status of assignments assigned to students *(Note: This feature is within the "assignments" feature and it allows the instructor to easily see whether a student has started or completed an assignment.)*	☐	☐	☐	☐	☐		☐
The survey manager	☐	☐	☐	☐	☐		☐
The feature to upload a file *(Note: Files refer to any text documents [doc, txt and pdf], graphics [gif and jpeg], video [mpeg, Quicktime, avi], audio [wav,aiff], or multimedia [shockwave Flash])*	☐	☐	☐	☐	☐		☐
The feature to change the course banner	☐	☐	☐	☐	☐		☐
Formatting tools such as font style, font colors, font format, and layout of page	☐	☐	☐	☐	☐		☐

	Most useful	→	→	→	Least Useful		NA
The feature to use course menu navigation style (the choice between button and text)	☐	☐	☐	☐	☐		☐
The virtual classroom	☐	☐	☐	☐	☐		☐

Please turn over for Section V →

V. Something About Yourself

Please tell me something about yourself by checking one appropriate box in each item.

1. I belong to
   - O College of Arts and Science
   - O College of Business
   - O College of Communication
   - O College of Education
   - O College of Engineering and Technology
   - O College of Fine Arts
   - O College of Health and Human Services
   - O College of Osteopathic Medicine
   - O University College
   - O Other

2. Please indicate which department you belong to: _____

3. I am a
   - ☐ Full time faculty
   - ☐ Part time faculty

4. I am a
   - ☐ tenured faculty
   - ☐ tenure-track faculty
   - ☐ non-tenure-track faculty
   - ☐ other, please specify: _____

5. Please indicate how many years you have been teaching? _____

6. What is the total number of courses, not including independent studies or thesis/dissertations, which you taught in the "typical" quarter you selected for this survey?

O 1
O 2
O 3
O 4 or more

7. In the typical quarter you selected for this survey, indicate the total number of classes you conducted predominantly face-to-face.

O 0
O 1
O 2
O 3
O 4 or more

8. In the typical quarter you selected for this survey, indicate the total number of classes you conducted using hybrid method (online + face-to-face).

O 0
O 1
O 2
O 3
O 4 or more

9. In the typical quarter you selected for this survey, indicate the total number of classes you conducted predominantly online.

O 0
O 1
O 2
O 3
O 4 or more

10. How long have you been using Blackboard? _____

11. Have you taken any professional development seminar on Blackboard?

- O Yes
- O No

12. Please briefly describe your experience with other LMS (Learning Management System) or CMS (Course Management System). If Blackboard is the only LMS/CMS you have used, simply put “NA (not applicable)”.

Please turn over for Section VI →

VI. Additional Comments (yes)

1. Please share your views on why you choose to use Blackboard.

2. Please describe specific features in Blackboard that you are not satisfied with or write down changes you wish to see in current Blackboard system.

3. Looking to the future, what do you hope Blackboard could do for education?

APPENDIX C: LETTER FROM THE INSTITUTIONAL REVIEW BOARD (IRB)

OHIO UNIVERSITY

Office of the Vice President for Research

07E188

Office of Research Compliance
Research and Technology
Center 117
Athens OH 45701-2979

T: 740.593.0664
F: 740.593.9838
www.ohiou.edu/research

A determination has been made that the following research study is exempt from IRB review because it involves:

Category 2 - research involving the use of educational tests, survey procedures, interview procedures or observation of public behavior

Project Title: Faculty Perceptions and Utilization of a Learning Management System in Higher Education

Project Director: Chinhong Lim Chang

Department: Educational Studies

Advisor: Sandra Turner

Rebecca Cale

Rebecca Cale, Associate Director, Research Compliance
Institutional Review Board

9/24/07

Date

The approval remains in effect provided the study is conducted exactly as described in your application for review. Any additions or modifications to the project must be approved by the IRB (as an amendment) prior to implementation.