

FACTORS AFFECTING FACULTY USE OF LEARNING OBJECT REPOSITORIES: AN  
EXPLORATORY STUDY OF ORANGE GROVE AND WISC-ONLINE

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The purpose of this study was to identify factors that motivate or impede faculty use of learning object repositories (LORs). The unified theory of acceptance and use of technology (UTAUT) served as the theoretical framework for this study.

Both quantitative and qualitative approaches were used in the study to explore two research questions relating to factors affecting faculty use of LORs. Research subjects were faculty and instructional staff users from two LORs: Orange Grove and Wisc-Online. This study was a two-phase design study. In Phase I, I conducted 13 interviews and analyzed data by a content analysis method. Phase II of the study was designed based on the results of Phase I. I collected data by a survey instrument from 38 respondents and analyzed the data by descriptive statistics and analysis of variance in Phase II. The results of the study indicated 22 factors as motivators for faculty use of LORs and 13 factors as barriers for faculty use of LORs.

The study is the first to identify factors affecting faculty use of LORs from actual faculty users' perspectives based on UTAUT. The study's findings contribute to understanding the reasons that faculty use or do not use LORs and provide foundations for designing strategies to increase faculty use of LORs.

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## CHAPTER 1

### INTRODUCTION

#### 1.1. General Background

Although college faculty members may not be familiar with the term “learning object” (LO), they may have already used such things in their instruction and course design. From a broad view, an LO can be in either digital or non-digital format. In the literature (Institute of Electrical and Electronics Engineers [IEEE], 2002; Laverde, Cifuentes, & Rodriguez, 2007; Palmer & Richard, 2004; Wisconsin Online Resource Center [Wisc-Online], 2007), LOs typically are understood to be in digital format. The LOs discussed in this study are only in digital format, and an LO is defined as “any digital resource that can be reused to support learning” (Wiley, 2000, p. 7). Other definitions of an LO are discussed in chapter 2. Educators have a long history of sharing and reusing learning resources in the form of textbooks, conference papers, and peer-reviewed articles; LOs can also be shared and reused (Campbell, 2003; Pras, 2001). An LO may serve as the basic building block of instructional materials, and it has the potential to contribute to the improvement of education in both online and classroom environments.

A learning object repository (LOR) is a digital collection of LOs. It stores, manages, and makes accessible not only LOs but also associated metadata. LORs may facilitate reusing and sharing LOs (Australian National Training Authority [ANTA], 2003a; Matkin, 2002). From previous studies, however, it appears that the LORs are lacking users (Bond, Ingram, and Ryan, 2008; Caris, 2004; Margaryan & Currier, 2006; Matkin, 2002; Zemsky & Massy, 2004). Consequently, many high quality LOs in LORs are not accessed and used, and faculty members

may spend time and energy creating duplicate course materials. This raises a question: what are the factors influencing faculty use of LORs?

Recent research about LORs often focuses on technology issues such as standards, interoperability, resource description, storage, and delivery rather than on social factors, such as users' needs (Margaryan & Littlejohn, 2006). There is lack of research into the factors affecting faculty use of LORs, more specifically factors affecting the faculty who have used or are using LORs. Although several theoretical models explain information technology acceptance, little research reflects theoretical backgrounds for understanding factors that influence faculty acceptance of LORs. The goal of this study was to identify factors that influence faculty use of LORs and to explore how these factors influence faculty use of LORs. The model of the unified theory of acceptance and use of technology (UTAUT) (Venkatesh, Morris, Davis, G., & Davis, 2003) served as the theoretical framework for this study.

## 1.2. Definition of Terms

Specific terminology is used in the context of this study. The following provides definitions of key terms as used in this study:

- Learning object (LO): A learning object is “any digital resource that can be reused to support learning” (Wiley, 2000, p. 7). There are three key characteristics for an LO: digital, reusable, and having instructional value.
- Learning object repository (LOR): An LOR is a digital collection of LOs; it stores, manages, and makes accessible not only LOs but also associated metadata. An LOR usually adopts either a centralized model, a federated model, or a distributed model (ANTA, 2003a; Matkin, 2002).

- Use of LOs: In this study the use of LOs includes both reusing and repurposing LOs. Reusing refers to the use of an LO with little or no modification of the LO. The use may occur in a similar or different context for which the LO was originally created. The group using the LO may be similar to or different from the original target audience (Bond et al., 2008; Palmer & Richard, 2004; University of Strathclyde, 2005). Repurposing means modifying or disaggregating an LO and using various components to achieve a different LO for use in a similar or different context (Bond et al., 2008; University of Strathclyde, 2005).
- Faculty use of LORs: In this study faculty use of LORs means that faculty members use LOs stored in LORs. Faculty members are professors, instructors, lecturers, and instructional designers who design courses or offer instructions in higher education institutions (two-year colleges or four year universities).

### 1.3. Statement of the Problem

Instruction is one of the most important functions offered in higher education institutions. Improving student outcomes is not only the responsibility of higher education institutions but also the expectation of students and the public (Travis, 1997). LOs have many positive impacts on education. They may improve teaching and learning in both online education and traditional classroom environments. Used in education, LOs provide “new ways of visualizing, thinking about, presenting, interacting with, and understanding complex topics” (Roy, 2004, p. 1). Their use provides students who have different learning styles with opportunities to interact and understand content in their preferred way of learning and increases student engagement in class (Margaryan & Currier, 2006; Roy, 2004). LOs can support teaching online (Margaryan & Currier, 2006; Matkin, 2002). Once an LO is created, it can be shared and used many times.

Reusing LOs may effectively eliminate redundant effort and save the cost and time of course design (Caris, 2004; Hall, 2001; Littlejohn, 2003; Roy, 2004; South & Monson, 2000; Strijker, 2004).

However, the lack of using LOs limits their impacts on education (Matkin, 2002). The concept of an LOR emerged and was intended to encourage the use of LOs. The LOs stored in LORs may be created by faculty members based on curriculum and educational standards, and they may provide a better fit with other faculty members' needs for course design (Caris, 2004). LORs provide faculty members opportunities to search, find, and access learning objects (Proctor, 2007). The goal of building LORs is to make the best use of LOs, share content and good practices, improve the effectiveness of instruction, and reduce the cost of duplicate effort in content development (ANTA, 2003a; Goldsmith, 2007; Henderson, 2008; Matkin, 2002; Multimedia Educational Resources for Learning and Online Teaching [MERLOT], 2008; OnCore Blueprint, 2008).

Information technology and the Web enable the creation, discovery, accessing, sharing, reusing, and repurposing of high quality LOs. The National Science Foundation has invested about \$170 million to support creating, organizing, accessing, and reusing LOs (Mervis, 2009). Many states, such as California, Georgia, North Carolina, Kentucky, Minnesota, Louisiana, and Texas, are implementing LORs. This situation reflects an assumption that LORs are needed and can reduce education costs and improve teaching and learning (OnCore Blueprint, 2008).

However, the big challenge is to increase faculty use of LORs. Some research studies indicate that LORs have few users (Bond et al., 2008; Caris, 2004; Margaryan & Currier, 2006; Matkin, 2002; Zemsky & Massy, 2004). Establishing LORs requires a significant investment of human resources, equipment, and time (Matkin, 2002). Funders expect investments in LORs will

yield new benefits to those involved in education. It is very important to ensure faculty members do use them. The main goal of the LOR is to provide high quality LOs for faculty (MERLOT, 2008; OnCore Blueprint, 2008; Wisc-Online, 2007). If only a few faculty members use LORs, the goal of building LORs may not be achieved. Higher education institutions face the following paradox. On the one hand, faculty members complain about the time needed to develop high-quality instructional materials. On the other hand, many existing high-quality reusable LOs in LORs are neglected (Caris, 2004). If faculty members are supposed to be the main user group to whom LORs offer services, and they are not using LORs, there is a critical need to understand why.

To encourage faculty to use LOs from LORs, the factors affecting their use of LORs must be identified and investigated. Strategies to recruit faculty members to use LORs cannot be developed until the factors which motivate or impede their use of LORs are identified and understood.

#### 1.4. Research Questions

In this study, I explored the factors, positive and negative, that affect faculty use of LORs. The following research questions were addressed:

1. What are the factors that motivate faculty use of LORs?
2. What are the factors that serve as barriers for faculty use of LORs?

The research mainly studied actual faculty users who were using the LOR to discover relevant LOs for possible use. The actual faculty users meant that they had set up accounts on an LOR and had some familiarity based on their experience so that they could provide useful information about positive or negative factors affecting their use or non-use of LORs.

### 1.5. Purpose of the Study

The study was an exploratory research. The main purposes of this study were:

- To identify factors (positive factors) that motivate faculty use of LORs
- To identify factors (negative factors) that impede faculty use of LORs
- Use the UTAUT model as the theoretical framework to explore these factors

Faculty members can also use LORs to contribute LOs they have created. This study did not address this kind of LOR use; this study was limited to the use of LORs to find LOs for possible use.

### 1.6. Research Design

To achieve the above purposes, I first reviewed the literature relating to faculty use of LORs. Through the literature review some potential factors were found. Then two phases of research were conducted using both quantitative and qualitative approaches.

The main concern of this study was faculty use of LORs. The subjects of this study were not limited to actual faculty users of LORs who had job title as faculty but also included instructional staff users who assisted faculty in instruction or course design. Chapter 3 discusses the population and sampling of this study.

To explore both enabling factors and barriers, faculty members of concern for this research have at least set up an account on an LOR. If the faculty members go no further than one visit, this study was interested in questions such as:

1. What are the reasons?
2. What obstacles do they experience?
3. What factors prevent them from using the LORs?



At the other end of the spectrum are faculty members who are regularly using an LOR.

Questions of interest from these users were:

1. What factors foster them to use an LOR frequently?

2. What do they experience, especially difficulties and satisfaction, during their use of the LOR?

Finally, there may be faculty members who are occasional users of an LOR. The question of interest from them was:

Why do they only use the LOR occasionally?

The first phase of the study was conducted through semi-structured interviews. Data were analyzed by content analysis. The purpose of the first phase was to identify factors that may affect faculty use of LORs. The unified theory of acceptance and use of technology (UTAUT) served as the theoretical framework to construct interview questions for data collection and develop a coding scheme for data analysis. UTAUT is formulated based on eight prominent models in information technology acceptance (Venkatesh et al., 2003, p. 426). It synthesizes dimensions from eight theoretical models that play roles in technology acceptance. UTAUT was assumed to be the most appropriate framework to ensure as many as possible factors influencing faculty use of LORs were identified and explored.

During the interviews, I explored and confirmed the factors that have been found in the literature, identified the factors not found in the literature but revealed by interviewees, and also explored factors that belong to the dimensions of UTAUT but have not been mentioned in the literature. UTAUT provided dimensions for factors that may influence faculty use of LORs. This helped to frame a series of interview questions about the factors. The interviewees were

selected from the actual faculty users of the Orange Grove LOR. Based on the result of interviews, a survey questionnaire was constructed for the second phase of the study.

The second phase of the study was conducted with a survey of faculty and instructional staff users of two LORs: Orange Grove and Wisconsin Online Resource Center (Wisc-Online). Data were analyzed by descriptive statistics and analysis of variance (ANOVA). The purpose of the second phase was to provide more evidence for factors that were identified in the first phase of the study, and to interpret how these factors influence faculty use of LORs.

### 1.7. Significance of the Study

In the literature of LOR research, there are only a handful of studies that describe factors affecting faculty use of LORs (ANTA, 2003a; Caris, 2004; Margaryan, 2006; Margaryan & Currier, 2006; Margaryan, Currier, Littlejohn & Nicol, 2006; Matkin, 2002; Shea, McCall & Ozdogru, 2006), but few of these studies investigate the factors by studying actual faculty users of LORs. This exploratory study addressed this gap in the literature.

The study is significant because:

- This study is among the first known to identify and examine factors affecting faculty use of LORs using UTAUT as the theoretical framework. UTAUT is a relatively new but reliable theory about information technology acceptance. It has been developed from eight theoretical models, which are commonly used to explain and understand the behavior of user acceptance of new technologies. Using UTAUT as theoretical framework provides a better fit to identify as many factors as possible affecting faculty use of LORs.
- The findings and results of the study inform designers and managers of LORs about what positively or negatively influences faculty use of LORs, and serve as a basis to

develop strategies to recruit faculty members to use LORs, and reassure funders that their investments in LORs will bring the educational benefits they expect.

- This study contributes to filling the gap in the literature as mentioned above. It used actual faculty users of the Orange Grove and Wisc-Online LORs as research subjects. It explored the factors influencing faculty use of LORs from actual faculty users' perspectives, and provided evidence for these factors through a second phase of data collection.

### 1.8. Limitation of the Study

The data of this study were collected from faculty users of two LORs: Orange Grove and Wisc-Online. The research policies of Orange Grove and Wisc-Online limited the selection of study participants. This is a limitation in generalizability.

### 1.9. Summary

This chapter provided a general introduction and some relevant background information about the study. The research problem focuses on the apparent lack of use of LORs by faculty. The research questions address the factors influencing faculty use of LORs. This study identified these factors from actual faculty users' perspectives, and UTAUT served as the theoretical framework. The main purposes, research design, limitation, and significance of the study were presented. In addition, the key terms used in the study were defined. These terms and other concepts are further discussed in chapter 2.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1. Introduction

A learning object repository (LOR) is designed for storing and providing access to learning objects (LOs). The main characteristics of LOs are that they are digital, reusable, and have instructional value. LORs facilitate discovering, reusing, and sharing LOs. This chapter discusses the various definitions of LOs and their impact on education. It then addresses how LORs add value to LOs and discusses a number of existing LORs. Since faculty use of LORs is the focus of this study, previous research studies about faculty use of LORs are reviewed. These studies provide useful information for understanding faculty use of LORs but also expose the limitations of the previous research. The unified theory of acceptance and use of technology (UTAUT) is presented, as it serves as the theoretical framework for this study.

#### 2.2. Learning Objects and Learning Object Repositories

Several definitions are used to describe LOs. The Institute of Electrical and Electronics Engineers (IEEE) defines an LO as “any entity, digital or non-digital, which can be used, reused and referenced during technology-supported learning” (IEEE, 2002, p. 5). This definition includes LOs both in digital and non-digital formats. Generally in the current literature, LOs are understood to be in digital format. Wiley (2002) defines an LO as “any digital resource that can be reused to support learning” (p. 7). This definition excludes non-digital materials. The Wisconsin Online Resources Center considers LOs as “Web-based, self-contained, small chunks of learning” materials, but limits LOs to “small enough to be embedded in a learning activity, lesson, unit or course” and “flexible, portable, and adaptable, and can be used in multiple learning environments and across disciplines” (Wisc-Online, 2007, para. 2). This definition

views an LO as a basic building block of meaningful content but excludes a complete course or large chunks of learning materials. Another definition of an LO is “a digital, self-contained, reusable entity with a clear learning aim that contains at least three internal changing components: content, instructional activities, and context elements” (Laverde et al., 2007, p. 675). L’Allier defines an LO as “the smallest independent structural experience that contains an objective, a learning activity and an assessment” (as cited in Polsani, 2003, p. 2). These definitions emphasize the characteristics of an LO from different perspectives.

This study adopts Wiley’s definition. From that definition, we can characterize LOs as having three important characteristics. They are digital, reusable, and have instructional value. An LO may be a born digital resource or digitized material. A digital image, animation, flash, audio, video, game, text-based webpage, a whole course, or a lesson of a course, can be considered as LOs. LOs can be reused by others directly or can be edited, modified, and combined with other learning materials. LOs support not only online education but also classroom education. Teachers and learners may access them via the Web, download them, or print them. The reusability of an LO can be reflected in the expectation of “building it once and using it many times” (Goldsmith, 2007, para. 2). An LO has intrinsic instructional value or is associated with an instructional process, which distinguishes it from a knowledge or information object. It is created in or for an instructional context such as curriculum, or instructional pedagogy (ANTA, 2003b; Roy, 2004).

LORs are intended to facilitate reusing and sharing LOs (ANTA, 2003a; Matkin, 2002). A repository is “a digital collection of resources that can be searched, accessed and used through a network requiring no prior knowledge of the collection’s structure” (Florida Distance Learning Consortium [FDLC], 2008, FAQ section, para. 1). An LOR is a digital repository containing

LOs. It stores, manages, and makes accessible not only LOs but also associated metadata (ANTA, 2003a; Matkin, 2002). The metadata is used to describe an LO, such as an LO's type, author, format, audience, learning time, technical requirement for running, and other important attributes of the LO. The metadata can support the four basic user tasks defined by the functional requirements for subject authority data: finding, identifying, selecting, and exploring an LO (International Federation of Library Associations [IFLA], 2010). Normally, an LOR has a well-designed architecture and user-friendly interface that provide or support various functions such as access control, search, browse, submission, preservation, downloading, and digital rights management (George Mason University, 2003; Matkin, 2002).

The goal of building LORs is to make the best use of LOs, to share content and good practices, to improve the effectiveness of instruction, and to reduce the cost and duplication effort in instructional content development (ANTA, 2003a; Goldsmith, 2007; Henderson, 2008; Matkin, 2002; MERLOT, 2008; OnCore Blueprint, 2008). An LOR can add value to the LOs and can contribute to LOs' reusability in the following ways:

- Facilitate the discoverability of LOs. Metadata is critical for any digital repository and supports a variety of functions including management and end user interaction. LORs store not only the LOs but also metadata associated with each object. The metadata applied currently in most LORs is based primarily on two schemes: Dublin Core (DC) (Dublin Core Metadata Initiative, 2008) and IEEE 1484 LO Metadata (IEEE LOM) (IEEE, 2002). According to an analysis of metadata used in 13 LORs, all of the examined repositories use 6 elements: title, subject, description, LO type, authors or creators, rights. More than half of them use 5 additional elements: identifier (URL), technical requirement, media format, typical learning time, and

interactivity (Barnes, Li, Polyakov, Xu, & Moen, 2008). These metadata elements reveal different aspects of LOs to users and support their discovery and selection.

- Offer LOs at varying levels of granularity. Granularity is a term used in instructional design to describe the size of an LO (Wiley, 2000). A finer level of granularity (i.e., a smaller size LO) allows the LO to be reused in multiple contexts. An LO may be a whole lesson, a segment of a lesson, or an undividable object also referred to as an asset. In LORs, LOs of different levels of granularity might be stored and organized to facilitate their reuse (Learning Object Authoring Zone, 2004).
- Provide user assistance. Most LORs provide contact information for help when users encounter problems. Some repositories also provide tutorial modules to teach users how to use the repositories and their resources (ANTA, 2003a), and others may provide a link to software and plug-ins by which a certain type of LOs is shown. An LOR may also provide peer-review or user comments and statistical information about its LOs. The information can help users to select LOs.
- Enhance interoperability. For reusing and repurposing of LOs, it is very important to enable easy transfer of the LOs from one learning management system (LMS) to another and to ensure LOs developed in one location work in another location. Interoperability is “the ability of multiple systems with different hardware and software platforms, data structures, and interfaces to exchange data with minimal loss of content and functionality” (National Information Standards Organization, 2004). Metadata schemes used in LORs such as DC and IEEE LOM are designed to enhance interoperability. Some repositories provide LOs in the content packages according to standards such as IMS (Instructional Management System) or SCORM (Sharable

Content Object Reference Model), which ensure they can be transferred into an LMS that supports these content package standards (Learning Object Authoring Zone, 2004; Matkin, 2002).

- Support sharing and using LOs. By offering functionality for storing, searching, maintaining, and downloading, LORs effectively support sharing and using LOs (Azevedo, Martins, Carrapatoso, & Carvalho, 2006,). Creators can submit LOs for sharing; users can find and download what they need, and then use the LO in their own course and teaching.

Generally an LOR works as a web portal that provides an interface and a series of functions for managing and accessing LOs. An LOR usually adopts either a centralized model, federated model, or a distributed model (ANTA, 2003b). In a centralized repository, LO metadata and the LOs are stored in a single LOR database, and through its interface, users can only search LOs of that repository; the Wisc-Online is an example of a centralized model. A federated model LOR not only stores LOs and associated metadata but also allows for searching other LORs outside of its own by federated searching; the Orange Grove is an example of a federated model. In a distributed model repository, LOs are located on several servers or websites. The LOR only stores metadata about the LOs, and links point to the locations where the LOs are stored. By a single portal, users can search a number of repositories; Multimedia Educational Resources for Learning and Online Teaching (MERLOT) is an example of a distributed model.

### 2.3. Examples of Learning Object Repositories

This section introduces and discusses a number of operational LORs. For each, a URL to the LOR is provided.



ARIADNE (the name of European Knowledge Pool System) was developed by the European Commission's telematics for education and training program in 1996. The purpose of ARIADNE is to share and reuse knowledge and deliver educational content throughout Europe. It is open to the world to support collaboration in teaching. Its users include researchers, students, trainees, and learners. It hosts any format of digital LOs, such as HTML documents, images, video clips, and slide sets. The disciplines covered include informatics, economics, electronics and micro-techniques, telecommunications, medicine and health sciences, and life sciences. Its metadata is an application profile of the IEEE LOM specification (ARIADNE Website, 2008). The URL of ARIADNE is <http://www.ariadne-eu.org/index.php>.

Connexions was launched at Rice University in 1999 and funded by the William and Flora Hewlett Foundation. The purpose of Connexions is to provide an environment for users to collaboratively develop, freely share, and rapidly publish LOs on the Web. Its users vary from children to college students and professionals. In Connexions, the LOs are broken down into small knowledge chunks called modules. These modules can be linked and arranged as courses, books, reports, and the like. There are more than 400 collections that are constituted from more than 7,000 modules. The contents cover arts, business, humanities, mathematics and statistics, science and technology, and sciences. Its metadata is based on DC (Rice University, 2009). The URL of Connexions is <http://cnx.org/>.

DIDET (Digital Libraries for Global Distributed Innovative Design Education and Teamwork) was funded by the Joint Information Systems Committee (JISC) in the UK and the National Science Foundation in the USA. Its goal is to facilitate access by students, engineers, and educators to LOs, and also to support collaboration in creating LOs. The content is available in different formats such as text, video, and image. The content in DIDET is only in the

engineering area. Its metadata is based on DC (DIDET Website, 2008). The URL of DIDET is <http://www.didet.ac.uk/>.

EdNA (Education Network Australia) began as a joint initiative of the Australian state and territory governments and the Australian Government. Its goal is to provide free news, resources, networks, and online tools for educators. The EdNA metadata scheme draws on the Dublin Core, which is consistent with the Australian Government Locator Service (EdNA Website, 2008). The URL of EdNA is <http://www.edna.edu.au/edna/jsp/index.jsp>.

iLumina is a digital library of sharable undergraduate teaching materials for chemistry, biology, physics, mathematics, and computer science. It is designed to quickly and accurately connect users with the educational resources they need. These resources range in type from highly granular objects such as individual images and video clips to entire courses. iLumina metadata is drawn from the IEEE LOM (iLumina Website, 2008). The URL of iLumina is <http://www.ilumina.com/home/default.asp>.

Jorum was launched in 2006 and is a project funded by JISC in the UK. It provides a free online repository service for teaching and support staff in UK Further and Higher Education Institutions. Its purpose is to help build a community for the sharing, reuse, and repurposing of learning and teaching materials. The resources in Jorum come from all subject areas for both Higher and Further education in the UK. Jorum uses customized metadata based on UK LOM Core, which is consistent with IEEE LOM (Jorum Website, 2008). The URL of Jorum is <http://www.jorum.ac.uk/>.

MERLOT (Multimedia Educational Resources for Learning and Online Teaching) was first developed in the Center for Distributed Learning at California State University through the Authoring Tools and An Educational Object Economy project funded by the National Science

Foundation in 1997. Its purpose is to build shared knowledge bases of learning materials. Since 1999, six universities from four state systems have been collaborating to expand the MERLOT collections. MERLOT's goal is "to improve the effectiveness of teaching and learning by increasing the quantity and quality of peer reviewed online learning materials that can be easily incorporated into faculty designed courses" (MERLOT, 2008). MERLOT is a user-centered, searchable, cross-disciplinary LOR. It only stores metadata about LOs, and links point to the locations where LOs are stored. In May 2011, MERLOT had 28,043 LOs, 18,480 personal collections, and 94,551 members. The LOs are from biology, business, chemistry, engineering, health science, history, information technology, mathematics, music, and the like. MERLOT is free to access, but only members can contribute their materials. Users can post comments about LOs, and editorial boards are in charge of the quality control by reviewing the contributed materials. The MERLOT management team organizes the Faculty Development Community to provide support for creating, sharing, and using LOs. Its metadata record structure and fields are based on IEEE LOM (MERLOT, 2008). The URL of MERLOT is <http://www.merlot.org/merlot/index.htm>.

Spoken Word Services was built by the Saltire Centre at Glasgow Caledonian University. It is an international LOR that supports sharing authentic digital audio resources across UK and US higher education institutions. Its goal is "to enhance and transform educational experience through the integration of digitized spoken word audio and video into learning and teaching" (Glasgow Caledonian University, 2008). It uses Metadata Encoding and Transmission Standard (METS) to increase the interoperability of different existing metadata schemes used by its participating partners. The URL of Spoken Word Services is <http://www.spokenword.ac.uk/>.

TLF (The Learning Federation) was funded by the Australian Government. It employs emerging technologies to develop high-quality online curriculum content for grades P-12 in two formats: digitized materials and born-digital materials. The materials are designed to engage students and to support teachers. They are freely available to all schools in Australia and New Zealand. The TLF metadata standard is based on Dublin Core v1.1, EdNA Metadata (TLF Website, 2008). The URL of TLF is <http://www.thelearningfederation.edu.au/default.asp>.

#### 2.4. The LORs Examined in This Study

The Orange Grove is an operational repository of the Florida Distance Learning Consortium (FDLC). Its goal is to provide learning resources to Florida's K-20 teachers and educational institutions. It is being used by Florida community colleges and universities. Its main users are faculty, staff, and administrators. The types of LOs in the LOR include images, videos, audio clips, animations, text documents, slideshows, and electronic textbooks. The resources cover a variety of subjects such as algebra, American government, biology, calculus, environmental science, physics, psychology, statistics, and history. The Orange Grove also provides federated searching of other LORs. Users can access more than 40,000 LOs in other LORs, including, for example, MERLOT. The metadata standard of this LOR is based on IEEE LOM and Gateway to Educational Materials (GEM) (Barnes et al., 2008). Copyright information is included in the descriptive information about every resource. The default copyright statement for Orange Grove resources is the Creative Commons Attribution-NonCommercial-ShareAlike3.0 Unported License, which states that users are free to copy, distribute, transmit and adopt the work for non-commercial purposes, and if the users alter, transform, or build upon this work, users may distribute the resulting work only under a same or similar license to this one (FDLC, 2008). The URL of Orange Grove is <http://www.theorangegrove.org/>.

The Orange Grove has several valuable characteristics unique to this LOR. From 2009, a collection of open textbooks, Orange Grove Texts Plus (OGT+), has been available in Orange Grove. The Orange Grove Texts Plus is a collaboration project of Orange Grove and the University Press of Florida. This collection includes about 200 open textbooks. A textbook “becomes ‘open’ when its copyright-holder grants usage rights to the public through an ‘open license’, which typically includes the right to access, download, reformat, and customize it at no additional cost” (Orange Grove, 2010a). The purpose of OGT+ is to reduce the cost of textbooks and to provide faculty members more options of textbooks for their courses. An open textbook is free for students to download, and it is printable on demand with a much cheaper price than buying a textbook. All the LOs, including the open textbooks, are peer-reviewed.

The learning management system (LMS) integration tool is another characteristic of Orange Grove that allows for the integration of Orange Grove into a university’s or college’s LMS. The LMS integration tool “enables searching, contributing and management of the repository” directly within the LMS (Orange Grove, 2010b). Faculty members do not have to register in Orange Grove. As long as faculty members log in to their universities’ or colleges’ LMSs, they can access all the content and functions of Orange Grove. This integration can be implemented into LMS, such as Blackboard, Blackboard/Angel, Blackboard/WebCT, Desire2Learn, Moodle, and Sakai. The goal of the LMS integration tool is to make access to Orange Grove easy.

The Orange Grove uses both “top-down” and “bottom-up” approaches in its diffusion strategy, the goal of which is to spread the word about Orange Grove and to encourage users to use it. The targeted users of Orange Grove are faculty (DFLC, 2010). The “bottom-up” approach is mainly operated by Orange Grove Scholars who are “nominated by FDLC members or Orange

Grove institutional liaison for their leadership capabilities and their interest in digital content. These faculty members operate on their individual university and college campuses around the state and reach out to individual faculty members and departments” (DFLC, 2010, para. 5).

The Wisconsin Online Resource Center (Wisc-Online) is a repository of learning resources developed primarily by faculty from the Wisconsin Technical College System (WTCS) and produced by multimedia technicians who create the LOs for the online environment. Resources are accessible to all WTCS faculty for free and with copyright clearance for use in any WTCS classroom or online application. Other colleges, universities, and consortia from the United States and around the world use its LOs with permission. In May 2011, the Wisc-Online digital repository contained 2,555 LOs. Most objects are built in the latest version of Macromedia Flash to optimize the finished objects for the Web. The LOR is housed at Fox Valley Technical College (FVTC) in Appleton, Wisconsin. Types of LOs include assessments, animations, simulations, case studies, interactions, drills and practices, and templates (Wisc-Online, 2007). The metadata scheme is based on IEEE LOM. The URL of the Wisconsin Online Resource Center is <http://www.wisc-online.com/>.

Wisc-Online has several characteristics that are unique to it. Gamebuilder is a software package for users to create their own games. Gamebuilder provides a series of game templates for users to create LOs. Wisc-Online integrates Facebook on its interface so that users can build a user community with it. All users of Wisc-Online can use the LOs by linking to them freely, but Wisc-Online charges a fee for users, except for WTCS faculty, to use Gamebuilder or to download LOs.

## 2.5. The Ways Faculty Use Learning Object Repositories

For instruction and course design, faculty members may discover and access LOs from several sources. They can search and access LOs on the Internet, purchase from publishers, turn to peers, and ask for help from faculty support centers of their universities. This study focused on faculty members who use LORs as sources of LOs. Faculty members here include institutional staff and professors who design courses or who offer instruction to students in online or classroom environments in two- or four-year higher education institutions. In this study, the use of LOs included both reusing and repurposing LOs. Reusing refers to the use of an LO with little or no modification of the LO. The use may occur in a similar or different context for which the LO was originally created. The group using the LO may be similar to or different from the original target audience (Bond et al., 2008; Palmer & Richard, 2004; University of Strathclyde, 2005). Repurposing means modifying or disaggregating an LO and using various components to achieve a different LO for use in a similar or different context. Not changing content but changing the delivery platform is also considered as repurposing, such as converting an IMS object to a SCORM object or converting a video to a small 3G movie for use on a phone (Bond et al., 2008; University of Strathclyde, 2005). The concepts of reusing and repurposing are not always distinguished and defined in the literature. For purposes of this study, I include the activities of reusing and repurposing LO in the single construct of “using LOs.”

Based on review of existing studies, faculty members may turn to LORs for using LOs in the following ways:

- To create a new course and reconstruct old courses based on the LOs. For example, a professor used the MERLOT collection to design a new course, *Unraveling Mysteries*

- in History, based on LOs from biology and history fields. The theme of the new course was to resolve some historical riddles using DNA knowledge (Vens, 2008).
- To combine LOs into an existing course directly or with modification to meet the curriculum needs. Some faculty members may directly use a larger granularity level of LOs, such as course units, while others may use a small LO, such as an image. According to some research, faculty members do not like to use a whole course created by others, but they do express their preference for combining small LOs into their courses (Margaryna & Currier, 2006; Proctor, 2007; Threlkeld, 2006).
  - To search for LOs for courses and then to make them available for their students without combining into a course. For example a faculty member made audios from Spoken Word Services available for his students by introducing and including URLs of these audios on his personal website or other media with hopes that his students would access the objects directly (Margaryan & Currier, 2006).
  - To change a course from a face-to-face delivery environment into an online environment. For example, an institution turned to MERLOT and other LORs for videos when it moved an existing course online to reduce the cost of developing an entire course, avoid copyright limitation, and to overcome the lack of equipment (Palmer, 2008).
  - To learn others' practice. Some faculty members may not reuse or repurpose LOs physically, but they learn how others design and produce LOs. They may get inspiration from LOs created by others for their own course design and instruction. (Margaryan & Currier, 2006).



- To find and collect LOs to build their own collections for future use. Some faculty members like to search, download, and store LOs from LORs for future course design (Margaryan, 2006).

Learning the ways LOs from LORs are used is very helpful to understand faculty members' needs. LOR builders can improve LORs in functionality, content development, and management to make reusing and repurposing of LOs easy. These may become factors that encourage faculty members to use LORs.

## 2.6. Research Studies about Faculty Use of Learning Object Repositories

From the literature review, I found no studies that had the goal of identifying factors influencing faculty use of LORs by studying actual faculty users. However, two lines of research relate to this topic. One line of research focuses on the barriers and enablers to implementing LORs, contributing LOs to LORs, and using LOs from LORs, and the solutions to overcome these barriers. The scope of LOR users in these studies is broad. It includes school teachers, students, amateurs, learners, managers, and education institution staffs. Faculty members in two- or four-year colleges or universities are not specifically investigated.

The other line of research focuses on the reasons why faculty members do not use LORs. The goals of these research studies are similar to that of this study. However, the reasons found by these studies normally are too general and lack a deep understanding of the barriers for faculty use of LORs. Further research was needed to explore the factors behind these reasons.

These two lines of research serve as the literature foundation for this study by providing potential factors that influence faculty use of LORs. Reviewing these studies also sets the stage for the significance of conducting this study; that is, the necessity to explore the factors

influencing faculty use of LORs from actual faculty users' perspectives. The following sections review these studies.

#### 2.6.1. The Studies of the Community Dimensions of LORs Project

From June 2005 to May 2007, the Joint Information Systems Committee (JISC) sponsored a project, The Community Dimensions of LORs (CD-LOR), which was to identify and analyze the barriers and enablers that influence the practical uptake and implementation of LORs in different learning communities.

Before January 2006, the CD-LOR team reviewed the literature about practical implementation of LORs, which were further consolidated by a consultation workshop among the representatives of CD-LOR partners and follow-up email discussion. The partners included eight LORs or universities that had LORs. The study discussed the barriers to the use of LORs in education from socio-cultural, pedagogic, organizational and information management, and technological areas (Margaryan et al., 2006).

Barriers in the socio-cultural area were reflected in the following two aspects:

- The mismatch between developers and users of LORs in understanding of cultural norms and expectations
- The lack of a culture of sharing education materials in higher education

Barriers in the organization and information management area were reflected in the following three aspects:

- The lack of motivators, such as incentives and rewards
- The lack of policies governing use, such as copyright, quality assurance, workflow, and metadata quality
- The lack of organizational strategies supporting the use of LORs

Barriers in the pedagogic area were reflected in the following six aspects:

- Do not fit teachers' needs in curricula or teaching setting
- Reduce the enjoyment of teachers as knowledge creators
- The lack of rich educational metadata
- Users' lack of technology and information literacy skills (the ability to find, access, and use information)
- Discipline differences (scientists and engineers feel more comfortable with LOs than users from the humanities)
- The lack of co-construction of resources by students (teacher-driven vs. learner-driven education model)

Barriers in the technology area were reflected in the following two aspects:

- All issues related to LOs themselves, function and service of LORs
- Interoperability between learning systems and LORs that may be specifically reflected in the lack of usability and of utility of tools, processes, retrievals, uploadings, accesses, authentications, workflows, and standards for meta-tagging

In May-June 2006 the CD-LOR team conducted a survey in collaboration with The Repository Metadata and Management project (Joint Information Systems Committee, 2009) about personal resource management. The survey was sent by email to individuals in 12 teaching and learning institutions. There were 247 respondents, and more than 80% of them were from the UK; others were from the EU, the US, Australia, Middle East, and South America. The largest group of the respondents was teachers (43.7%), followed by learning technology staff (38.5%), and researchers (32.8%). A single respondent could play more than one role, for example as a teacher and also a researcher. The goal of the survey was to identify how individuals (potential

users of LORs) find, create, store, share and reuse educational materials in the teaching and learning community, and based on the findings explore what values LORs can provide in practice. Margaryan (2006) reported the following findings:

- Respondents share both completed and work-in-progress education materials. The sharing of work-in-progress materials is common among colleagues in the same institutions via email, personal website, and by hand. Meeting face-to-face plays an important role in collaboration on development. More than half of respondents contribute completed materials to repositories (institutional, national, or subject-specific). A larger number of respondents do not back up the completed work. The CD-LOR team assumes LORs can play a useful role in supporting collaboration in the development of education materials and preserving completed materials.
- Virtual Learning Environments (VLE [synonymous with LMS]) is the popular medium to support teaching and delivering completed education materials to students. The project team recommends that LORs should support VLE such as supporting the import of LOs into VLE.
- Most respondents reuse and repurpose materials created by others and themselves when they develop educational resources. It is not common for them to use materials without modification. Before developing materials, they collect materials that mostly are text-based resources, images, diagrams, and URLs of digital materials or websites. The most reused and repurposed materials are PowerPoint presentations, bibliographies, learning activities, images, and assessment materials. The project team comments that these types of materials can be shared and reused more by potential LORs' users.

- When finding and choosing materials to reuse, the principle criterion to select these materials is the recommendations by trusted colleagues and the reputation of sources.

The project team comments that trust can be a factor influencing LOR potential users.

This research is helpful for understanding how faculty reuse LOs. The suggestions and comments from the CD-LOR project team may inspire faculty to use LORs, but they need to be confirmed by the LORs' actual faculty users.

The CD-LOR project team conducted interviews in March and April 2006 with actual LORs users. Originally, they planned to interview 10 to 15 users from 5 to 6 LORs. These LORs were: Scottish Institute for Excellence in Social Work Education (SIESWE) Learning Exchange, Digital Libraries for Global Distributed Innovative Design (DIDET), The International Virtual Medical School (IVIMEDS), LionShare, Universities' Collaboration in E-Learning (UCEL), and Spoken Word Services. These six were chosen because they were relatively far ahead in their development and presumed to be the most likely ones to have actual users. However, the project team could only recruit 6 users from 3 LORs because of the lack of users. Two interviewees of DIDET were a student and system developer; one interviewee of Jorum was an education support staff member; the other three interviewees of Spoken Word Services were faculty members. Margaryan and Currier (2006) reported the result of these interviews.

The factors fostering the use of LORs are:

- The benefits they get from the LORs, for example, using LOs from LORs
- Students' positive feedback to instructors on the use of LOs in their teaching
- Creating LOR user communities so that users can exchange their practice of and experience with using LOs
- Promoting LORs' roles in education and functions

- Disseminating good practice
- Integrating the LOR with the existing institutional collections, such as library electronic collections

Barriers in using the LORs are:

- Copyright: Users are not clear about the copyright. For example, they do not know if they can use an audio file in class without the speaker's permission.
- Recognition: Reusing LOs cannot get the same recognition as doing research or publication. The creativity of reusing LOs is not recognized by institutions.
- Peer's influence, such as how other faculty members think about reusing LOs created by others
- Technological barriers, such as the difficulty of access and download, and the limitation of students' IT skills
- Pedagogic issues: LOs are not relevant to the curriculum and lack interactivity.
- Quantity of resources is not enough

The CD-LOR project provides useful information for understanding factors influencing faculty use of LORs. There were only three faculty members from Spoken Word Service being interviewed. The interviewee of Jorum was not a faculty member but he searched suitable LOs to recommend to faculty. This finding means although faculty members may not use LORs in person, they do use LOs from LORs. The questions are: do faculty members like the idea of entrusting to assistant staff the task of locating LOs from LORs? If yes, how does this idea influence faculty use of LORs? To better understand these factors, the current study attempted to study a larger number of faculty members.

### 2.6.2. The Australian Vocational Education and Training LOR Project

To define the guidelines for the development and use of Australian Vocational Education and Training (VET) LORs, the VET conducted a literature review and a consultation program with lecturers, content developers, and VET sector managers. Following the consultation, they conducted focus group sessions, one-on-one expert consultations, and online discussion in 2003 (ANTA, 2003a). The VET research reported that the following issues might be barriers for users to use the LORs:

- Poor quality of LOs
- Complicated copyright procedures
- Expensive use fee

The VET study also reported that the following strategies might draw more users to the LORs (ANTA, 2003a):

- Promotion and training: Before using the LORs, users must be aware of the available LORs and how to use them
- Technology Assistance: When users have problems in using LORs, they should be able to get help and technical support
- Building LORs and developing LO collections should be teacher-centered: Although LOs support teaching and learning, teachers play the important role in education. LOs should not reduce the importance of teachers. In addition equipment may limit the using of LOs.
- An LO has its context, which means it is created for a specific learning purpose with a certain curriculum and pedagogy. A context-rich LO will enhance learning but

decrease its reusability (as cited in Higgs, Meredith, & Hand, 2003). Developing context neutral LO collections will draw more users who want to use LOs.

- Keep it simple and save users' time: As one interviewee mentioned, "perhaps the number of barriers to uptake is equal to the number of clicks before a teacher can put an LO in part of their delivery design" (ANTA, 2003a, p. 9).
- Users would like to use one interface to search several LORs.

This study reported the issues that lecturers, content developers, and VET sector managers considered might be barriers for users to use the LORs, and recommended strategies that might motivate users to use the LORs. However, it did not learn the issues and strategies specifically from actual faculty users' perspectives.

### 2.6.3. Strategies to Increase the Use of LORs

Given the concern that LOs were not being reused to the extent hoped for, about 20 participants, including 2 educators and 18 representatives from the E-learning industry, met in 2002 together to discuss how to make LORs more useful. Matkin (2002) reported the following strategies to draw more users to LORs:

- Ensure quality control: Good practice will require peer-review and setting standards for accepting LOs
- Define the intended users, and identify and meet their needs
- Foster and support user communities: By sharing and reusing LOs from an LOR, users will naturally form different communities and regularly use the LOR. For example, faculty members in music will pay attention to the music LOs and their authors. They may want to collaborate in developing music LOs and interact with each other. They become a community of the LOR. They will use the LOR as a tool



- to share and reuse LOs. The LOR management team may support these communities with workshops, newsletters, web events, and directories of related resources.
- Clarify and reduce the restrictions of intellectual property rights to users by clearly addressing the copyright inherent in LOs, or setting different levels of restrictions according to the levels of accepting a licensing agreement
  - Keep LOR collections dynamic: This means keeping LOs current, permitting modification and updating, and removing problem and obsolete LOs in a timely manner.
  - Provide assistance in technologies
  - Provide user information such as how LOs are used, and information about an LOR's users
  - Provide funds and budget for marketing and recruiting users

These strategies, which were recommended on the meeting for LORs to implement, may reflect the factors that motivate faculty use of LORs.

#### 2.6.4. Reasons Keeping Faculty from Using LORs

To explore the reasons why faculty members did not use LORs, Caris (2004) surveyed college directors from the faculty centers of several universities in America (the report does not indicate the response rate). The result of the survey shows that two important reasons explain why faculty members do not use LORs:

- Faculty members are not familiar with LORs. The survey also shows most faculty centers do not promote LORs to their faculty members. Many faculty members have never heard of LORs. Although some faculty members know about one or two LORs,

they do not have information about them, such as how LORs can help in their instruction, how faculty members can use LORs, and what content is in LORs.

- Faculty members use textbooks and publishers' materials including electronic media products for their courses. These materials are based on education standards, do not have copyright problems, and do not need technology to combine with a course.

Faculty members only need to be familiar with the textbooks before the class and then use it. Because of the inertia and ease-of-use of textbooks and publishers' materials, they do not want to turn to LORs.

Caris (2004) also commented that faculty members preferred LOs of smaller granularity, such as the topic level LOs, rather than LOs of larger granularity, such as the whole course level LOs.

#### 2.6.5. The Case Study of MERLOT Adoption in State University of New York System (SUNY) Learning Network

MERLOT is currently a multidiscipline LOR involving 23 educational institutions as partners that collaborate in collection development, quality control, and system maintenance. SUNY has been a MERLOT partner since 2001. The SUNY Learning Network provides distance learning programs offered by forty SUNY colleges. SUNY provides MERLOT training and technical assistance for the online faculty who teach in the SUNY Learning Network programs. Shea, McCall, and Ozdogru (2006) conducted a study on the usage of MERLOT. They surveyed online faculty members at SUNY in 2004-2005. The response rate was about 60%. Both numerical and narrative data were collected by online surveys. Seven hundred ten online faculty members from 33 SUNY institutions responded to the survey.

A key finding from the study is that faculty members who commit to teaching online, and who think students can learn more online than in a classroom, are significantly more likely to use MERLOT.

The narrative response data were analyzed by the analytic procedure of constant comparison to explore why faculty do not use MERLOT. There were 375 out of 710 faculty members responding to the narrative items. The result shows that the top four reasons for not using MERLOT are: time constraints (37%); simply choosing not to use (35%); lack of relevant content (25%); already had a lot of other resources (21%). Other reasons are: do not know about MERLOT; in general do not find it useful; do not understand how to use MERLOT; not applicable; and have not used, but anticipate future use.

Out of 710 faculty members, 555 responded “Heard of MERLOT,” but only 122 responded “Adopted MERLOT materials” (Shea et al., 2006, p. 147). One hundred ten out of these 122 respondents thought MERLOT was useful.

This research provides valuable information from a faculty perspective about the use or non-use of MERLOT. The survey subjects were only faculty members who taught online courses. For the use of MERLOT, the view of faculty teaching online may be different from that of faculty who teach classes face-to-face. In addition, the data collection instrument was not an independent survey questionnaire specifically designed for the study, but a section of a general survey questionnaire which was designed for another study. Shea et al. (2006) used part of the data to investigate the faculty members’ responses to using MERLOT. So the quality and quantity of data were limited.

#### 2.6.6. Summary of Previous Research

The previous studies were useful for this study. They indicated some potential factors that influence faculty use of LORs. However, the following aspects formalize a gap in the literature:

- A study with a rigorous and systematic research design is expected to explore the factors influencing faculty use of LORs. In the research studies, the CD-LOR project team only interviewed three faculty members. In the SUNY case study, the data collecting instrument was not specifically designed for studying faculty use of MERLOT but a small component of a larger survey of faculty concerns. So the quality and quantity of the data it provided were limited. In addition, some reasons identified were too simple, such as “simply chose not to” use MERLOT; as the authors of the SUNY case study indicated, these kind of responses “require other methodologies (interviews for example) to elicit more meaningful responses” (Shea et al., 2006, p. 154).
- More actual faculty users of LORs need to be studied. Although the CD-LOR project interviewed three faculty users of an LOR, three faculty members may not be expected to provide enough data. The subjects of SUNY case study were faculty users of MERLOT, but they were only online faculty and may not represent classroom faculty.
- The potential factors explored in the above research studies need to be supported by more data from actual faculty users. For example the suggestions to increase use of LORs need to be tested in practice; otherwise they are only ideas not implementations.

- It is necessary to learn faculty members' vocabularies in expressing their needs from LORs, the reasons why they use or do not use an LOR.
- The reasons for faculty use or non-use of LORs need to be understood better. For example, Caris' study shows the important reason for faculty not using LORs is that they have not heard of them. In the SUNY case study, however, only about one fourth of faculty members who had heard of MERLOT used it. This situation indicates that even if faculty members have heard of an LOR, they may not use it.
- In the research studies, no theoretical frameworks served as the underpinning theory model to explore factors influencing faculty use of LORs. Although in the SUNY case study, Rogers' innovation diffusion stages model helped in understanding the organization and individual adoption of MERLOT at SUNY, the model was not used as a framework to explore the reasons for faculty use or non-use of MERLOT.

The above limitations have left a gap in the literature and in our knowledge. They set the stage for justification to conduct this study, which intended to fill this gap by exploring as many factors as possible influencing faculty use of LORs from actual LORs' faculty users' perspectives based on a theoretical framework, UTAUT.

## 2.7. Unified Theory of Acceptance and Use of Technology (UTAUT)

The study used UTAUT as the theoretical framework. UTAUT provided a basis for informing the interview questions and items on the survey. It provided a theoretical lens for the coding scheme that was used in the analysis of the interview data.

Information technology "in its broadest sense encompasses all aspects of computing technology. IT, as an academic discipline, focuses on meeting the needs of users within an organizational and societal context through the selection, creation, application, integration and

administration of computing technologies” (Association for Computing Machinery, 2005, p. 5).

LORs are recognized as applications of information technology in the education area

(Abernethy, Treu, Piegari, & Reichglt, 2005). In the information technology area there exist several theoretical models to explain the behavior of user acceptance of new technologies.

UTAUT (Venkatesh et al., 2003) is based on eight commonly used models:

- Theory of reasoned action (Davis, Bagozzi, & Warshaw, 1989)
- Technology acceptance model (Venkatesh & Davis, 2000)
- Motivational model (Davis, Bagozzi, & Warshaw, 1992)
- Theory of planned behavior (Ajzen, 1991; Mathieson, 1991; Taylor & Todd, 1995b)
- The model combining the technology acceptance model and the theory of planned behavior (Taylor & Todd, 1995a)
- The model of PC utilization (Thompson, Higgins, & Howell, 1991)
- The innovation diffusion theory (Moore & Benbasat, 1991; Rogers, 1995)
- Social cognitive theory (Bandura, 1986; Compeau & Higgins, 1995; Compeau, Higgins, & Huff, 1999)

Each of these theoretical models makes important and unique contributions to understanding user acceptance of information and technology. Each model defines sets of constructs as key determinants of user acceptance of new technologies. UTAUT combines and integrates the constructs from these eight models into seven dimensions: performance expectancy, effort expectancy, social influences, facilitating conditions, attitude toward using technology, self-efficacy, and anxiety. UTAUT determines that four out of seven dimensions (performance expectancy, effort expectancy, social influences, and facilitating conditions) as key

direct determinants of user acceptance and usage behavior. UTAUT is a relatively new theory in information technology acceptance, but it has been proven to be valid and reliable by different statistical data analysis methods in many studies (Venkatesh et al., 2003; Al-Awadhi & Morris, 2008; Cantoni & Succi, 2008; Herron, 2006). The goal of this study was to identify as many as possible factors that influence faculty use of LORs. Using UTAUT as the theoretical framework provided a better fit for this study than only adopting one or two models because UTAUT combines constructs from eight models. This study reviewed the definitions and associated constructs of all seven dimensions. Table 1 presents the dimensions and constructs of UTAUT.

Table 1

*Dimensions and Constructs of UTAUT*

UTAUT Dimensions	UTAUT definition	Constructs (as cited in Venkatesh et al., 2003)	Construct definition (as cited in Venkatesh et al., 2003)
Performance expectancy	“Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance” (Venkatesh et al., 2003, p. 447).	Perceived usefulness	The degree to which a person believes that using a particular system would enhance his or her job performance.
		Extrinsic motivation	The perception that users will want to perform an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions.
		Job-fit	How the capabilities of a system enhance an individual’s job performance.
		Relative advantage	The degree to which using an innovation is perceived as being better than using its precursor.
		Expectations	Outcome expectations relate to the consequences of the behavior. Based on empirical evidence, they are separated into performance expectations (job-related) and personal expectations (individual goals).

*(table continues)*

Table 1 (continued).

UTAUT dimensions	UTAUT definition	Constructs (as cited in Venkatesh et al., 2003)	Construct definition (as cited in Venkatesh et al., 2003)
Effort expectancy	“Effort expectancy is defined as the degree of ease associated with the use of the system” (Venkatesh et al., 2003, p. 450).	Perceived ease of use	The degree to which a person believes that using a system would be free of effort.
		Complexity	The degree to which a system is perceived as relatively difficult to understand and use.
Social influence	“Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new system” (Venkatesh et al., 2003, p. 451).	Subjective norm	The person’s perception that most people who are important to him think he should or should not perform the behavior in question.
		Social factors	The individual’s internalization of the reference group’s subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations.
		Image	The degree to which use of an innovation is perceived to enhance one’s image or status in one’s social system.
Facilitating conditions	“Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system” (Venkatesh et al., 2003, p. 453).	Perceived behavioral control	Reflects perceptions of internal and external constraints on behavior and encompasses self-efficacy, resource facilitating conditions, and technology facilitating conditions.
		Facilitating conditions	Objective factors in the environment that observers agree make an act easy to do, including the provision of computer support.
		Compatibility	The degree to which an innovation is perceived as being consistent with existing values, needs, and experiences of potential adopters.

(table continues)



Table 1 (continued).

UTAUT dimensions	UTAUT definition	Constructs (as cited in Venkatesh et al., 2003)	Construct definition (as cited in Venkatesh et al., 2003)
Attitude toward using technology	“Attitude toward using technology is defined as an individual’s overall affective reaction to using a system” (Venkatesh et al., 2003, p. 455).	Attitude toward behavior	An individual’s positive or negative feelings about performing the target behavior.
		Intrinsic motivation	The perception that users will want to perform an activity for no apparent reinforcement other than the process of performing the activity per se.
		Affect toward use	Feelings of joy, elation, or pleasure; or depression, disgust, displeasure, or hate associated by an individual with a particular act.
		Affect	An individual’s liking of the behavior.
Self-efficacy	“Judgment of one’s ability to use a technology (e.g., computer) to accomplish a particular job or task” (Venkatesh et al., 2003, p. 432).	Self-efficacy	Judgment of one’s ability to use a technology (e.g., computer) to accomplish a particular job or task.
Anxiety	“Evoking anxious or emotional reactions when it comes to performing a behavior (e.g., using a computer)” (Venkatesh et al., 2003, p. 432).	Anxiety	Evoking anxious or emotional reactions when it comes to performing a behavior (e.g., using a computer).

In Table 1, the seven dimensions are used to categorize the constructs. Definitions of each dimension and construct are provided also. Chapter 3 discusses how these dimensions and constructs were used in the data collection instrument design and the data analysis.

## 2.8. Summary

This chapter has reviewed the literature and related research studies about faculty use of LORs. These research studies provided useful information for this study and identified a series of potential factors that may influence faculty use of LORs. This chapter also addressed UTAUT, which served as this study's theoretical framework. The study not only explored the factors identified in the literature but also looked for other factors not identified in previous studies. The next chapter presents the research design of this study.

## CHAPTER 3

### RESEARCH DESIGN AND METHODOLOGY

#### 3.1. Introduction

The goal of this study was to identify factors influencing faculty use of learning object repositories (LORs) and explore how these factors influence faculty use of LORs. Research questions were as follows:

RQ1. What are the factors that motivate faculty use of LORs?

RQ2. What are the factors that serve as barriers for faculty use of LORs?

The unified theory of acceptance and use of technology (UTAUT) served as the theoretical framework for the study. The study was conducted in two phases and used a mixed method approach. In Phase I of the study, I conducted a series of face-to-face interviews; interviewees were selected based on purposeful sampling principles from faculty users of Orange Grove. The interview questions were guided and informed by the goal of the research, UTAUT dimensions and constructs, and previous research findings discussed in the literature review. The data were analyzed by a content analysis method. By the completion of Phase I, the factors influencing faculty use of LORs were explored and identified. In Phase II, a survey was designed based on the results of Phase I and used to collect data from faculty users of two LORs: Orange Grove and Wisc-Online. The data were analyzed and described by descriptive statistics and ANOVA techniques to provide more evidence for the results of Phase I.

According to the literature, faculty may use an LOR with the assistance of instructional staff. For example, the user of Jorum, an educational support staff member reported his purpose of using Jorum was to search “the LOR for suitable materials and recommend them to teachers” (Margaryan & Currier, 2006, p. 12). The instructional staff may have different titles such as

instructional designer, teaching assistant, or education support staff, but their main role is to assist faculty in instruction or course design. Although faculty use of LORs was the main concern of this study, in order to fully understand the factors influencing faculty use of LORs, the population of this study also included instructional staff users of LORs. Other user groups of LORs such as students were not addressed in this study.

This chapter discusses the interview protocol design and data collection of Phase I of the study, followed by the survey instrument design and data collection of Phase II of the study.

### 3.2. Phase I of the Study

The strength of qualitative research is to explore complicated human issues such as people's behavior and actions (Marshall, 1996). Phase I of the study took advantage of this method's strength to identify and understand the factors influencing faculty use of LORs from actual faculty users' perspectives through a series of interviews. The interviewees were selected from users of Orange Grove. The data were analyzed by a qualitative content analysis technique.

The following sections describe the interview protocol design, sampling, and data collection and respondents.

#### 3.2.1. Interview Protocol and Sampling

Phase I used a semi-structured interview to collect data. The interview is a very common instrument to gather data in qualitative research. The strength of the interview technique is in exploring a phenomenon from the subjects' points of view, experiences and perceptions, and collecting in-depth information about a topic (Kvale, 1996; McNamara, 1999). A semi-structured interview combines the advantages of a structured interview and an unstructured interview. It uses a set of pre-defined questions to probe the topic under study, and also uses questions which are not pre-determined to explore in-depth information about the topic (Stanton, Salmon,

Walker, Baber, and Jenkins, 2005). Appendix A presents the protocol for the interview. It includes an introduction to the study, the purpose of the interview, the interviewees' rights, and interview questions. The interview questions were designed based on the purpose of the research, the UTAUT model, literature review, and the characteristics of Orange Grove.

Data were collected from both faculty and instructional staff users of Orange Grove. The interview questions were grouped in two sets: one set of questions designed for faculty users, and one set of questions designed for instructional staff users. In the first set of questions, questions 1 through 8 were general questions for faculty interviewees. The purpose was to gather background information and teaching philosophy of the interviewees, and the main reasons that faculty users have used or have not used Orange Grove. Questions 9 through 16 were specific questions for faculty users. Questions 9 through 13 were five pre-defined questions based on UTAUT. UTAUT defines four dimensions (performance expectancy, effort expectancy, social influences, and facilitating condition) as the key direct determinants of user acceptance of new technologies and usage behavior. I used these 5 questions to explore interviewees' responses from these four dimensions. Questions 14 and 15 were designed based on the result of the literature review (Margaryan & Currier, 2006). The purpose was to learn faculty interviewees' opinions about entrusting others to use Orange Grove. Questions 16 and 17 were designed based on the Orange Grove's characteristics to gather the information on faculty members' opinions about the open textbooks and LMS integration.

The second set of questions was designed for instructional staff interviewees. The purposes of these questions were to learn: (1) the reasons they used Orange Grove, (2) their opinions about factors influencing faculty use of Orange Grove, and (3) their influences on faculty use of Orange Grove.

The interview protocol was evaluated and reviewed by two LOR experts who had previously worked on an LOR project for the Texas Higher Education Coordinating Board. Pilot tests were conducted to test the feasibility and adequacy of interview questions (Teijlingen & Hundley, 2001). Based on the comments from experts and results of pilot tests, the interview protocol was revised and used in the study.

All interviews were guided by the interview protocol, but since the interviews were semi-structured, I asked additional questions for in-depth or additional information. For example, when a faculty user mentioned that Florida had the Textbook Affordability regulation, I asked this interviewee to explain further.

Interview subjects were selected based on purposeful sampling method. Purposeful sampling does not randomly select respondents. “The logic and power of the purposeful sampling lies in selecting information-rich cases for study in depth.” (Patton, 1990, p.169) The interviewees were two types of LOR users: faculty and instructional staff.

To operationalize who was considered as an actual faculty or instructional staff user, two criteria must be met:

- Has set up an account on the LOR or can access the LOR by LMS integration without the user account
- Has some familiarity with the LOR based on use

Interviews were conducted with two categories of faculty users.

- Group A comprised users who only had an account on Orange Grove but had not used any learning object (LO) in their teaching or course design: They were considered low users and chosen to provide a perspective on why some faculty members have not used the LOR.

- Group B comprised users who had used LOs from the LOR in their teaching or course design: They were considered high users and chosen to provide a perspective on why some faculty members have used the LOR.

Purposeful sampling focuses more on the richness of information collected from respondents rather than focusing on sample size (Patton, 1990). According to the report of Margaryan and Currier (2006), the CD-LOR project team originally planned to interview 10 to 15 users, but they only recruited 6 interviewees. Some researchers suggested 6 to 12 interviewees of information-rich informants would reach the expected richness of information (Guest, Bunce, & Johnson, 2006). The sample size of this study was, in total, 13 interviewees including 8 faculty users, 2 instructional staff users, and 3 users who were both faculty and instructional staff.

### 3.2.2. Data Collection

Before the interview was conducted, the interview protocol and consent letter had been approved by the Institutional Review Board (IRB) at the University of North Texas (UNT). The potential interviewees were identified with the help of the Orange Grove staff. As noted in the description of Orange Grove in chapter 2, section 2.4, the Orange Grove Scholar (OG Scholar) plays a very important role in using and promoting Orange Grove. The Orange Grove staff introduced this study to OG Scholars, and also introduced the researcher to OG Scholars and some other faculty users who have been actively involved in Orange Grove. I contacted the OG Scholars and active faculty users through email to invite them to participate in the study; at the same time I asked them to recommend other faculty users for interviewing.

The interview invitations were sent by email to 26 potential interviewees at 3 universities and 4 colleges in Florida. Besides UNT IRB approval, according to these institutions' requirements, I have gotten IRB approval from 2 universities and 1 college and one IRB

exemption from another college (see Appendix E). Thirteen out of 26 potential interviewees accepted the invitations. The 13 interviewees were from 6 academic institutions, 3 community colleges and 3 four-year universities. After confirming the appointments, the interviews were conducted. The letter of consent was handed to or emailed to, and signed by every interviewee; I collected and archived the letter in a database that was established for this study on a server of College of Information at UNT in a password protected researcher account.

From June to July 2010, I conducted 13 interviews, 4 of which were face-to-face interviews, 7 of which were interviews by Skype, and 2 of which were interviews by cell phone. Table 3 presents the basic information about the 13 interviewees, some of whom had more than one job title such as instructional designer, OG Scholar or faculty. In this study, the interviewees were 8 faculty users, 2 instructional staff users, and 3 both faculty and instructional staff users. Three faculty users were also OG Scholars, and one of them was a former OG Scholar.

Table 2

*Basic Information of Interviewees*

#	Job title	Institution	Usage of Orange Grove	Discipline/Course	Interview type
1	Instructional designer	University 1	Visit OG often; help faculty use OG; promote OG by workshops		face-to face
2	Instructional designer	University 2	Visit OG often; help faculty use OG; promote OG by workshops		Skype
3	Instructional designer/faculty	College 1	Visit OG often; has not used OG; introduce OG to faculty	Sociology/online, face-to-face & hybrid	phone

Note: OG = Orange Grove

(table continues)

Table 2 (continued).

#	Job Title	Institution	Usage of Orange Grove	Discipline/Course	Interview Type
4	Education support	College 2	Visit OG often; has not used OG; promote OG	Education/face-to-face	Skype



5	staff/faculty Education support staff/faculty	College 3	by workshops Visit OG often; contribute LOs to OG; has not used OG; introduce OG to faculty	Health education/online	Skype
6	Faculty/OG Scholar	University 2	Visit OG often; has used OG; contribute LOs to OG; promote OG by workshops and trainings	Math/online	Skype
7	Faculty/OG Scholar	University 3	Visit OG often; has used OG; contribute LOs to OG; promote OG by workshops and trainings	Business/online	Skype
8	Faculty/OG Scholar	College 3	Visit OG often; has used OG; promote OG by workshops and trainings	Math & Statistics/online & face-to-face	Skype
9	Faculty/technology committee chair	University 1	Visit OG often; has used; promote OG by presentations	Education/face-to-face	face-to-face
10	Faculty/technology committee	University 1	Visited OG a year ago; may use OG in future; plan to contribute open textbooks	Sociology/online	face-to-face
11	Faculty/technology committee	University 1	Rarely visit OG; may use in future	Computer science/face-to-face	face-to-face
12	Faculty/technology committee	University 1	Rarely visit OG, no plan to use OG	History/face-to-face	phone
13	Faculty	College 1	Visit OG often, has used OG, contribute LOs to OG	Education/online	Skype

*Note:* OG = Orange Grove

The duration of each interview was from 30 to 45 minutes. I took notes as well as recording each interview. After the interview, I transcribed the recording. All the interview recordings and transcripts were stored and maintained in the database.

### 3.2.3. Data Analysis

The study used content analysis to analyze the data gathered from interviews. Content analysis is “a research method that uses a set of procedures to make valid inferences from text” (Weber, 1990, p. 9). One of the strengths of content analysis is that it can “reveal the focus of individual” (Weber, 1990, p. 9) by the procedures to operate on the documents of communication, such as interview transcripts. Content analysis can use either quantitative or qualitative operation (Weber, 1990; Zhang & Wildemuth, 2009). The qualitative nature of the content analysis is the “subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns” (Hsieh & Shannon, 2005, p. 1278). This study mainly implemented qualitative operation of content analysis on interview data.

Data analysis procedures consisted of 5 steps: (1) deductively developing the initial coding scheme; (2) transcribing interview recordings; (3) coding interview data; (4) inductively developing the coding scheme; (5) checking the credibility and validity of the data analysis.

(1) Developing a coding scheme is a very important step in the analysis procedures. The initial coding scheme (see Appendix C) was developed mainly by a deductive process guided by UTAUT and the results of prior related research studies in the literature review. The initial coding scheme adopted the seven dimensions of UTAUT: performance expectancy, effort expectancy, social influence, facilitating conditions, attitude toward using technology, self-efficacy, and anxiety. The constructs of the dimensions were adapted as categories. In every dimension, there was an “Other” category to hold the codes which might not belong to any other categories. There were 24 categories in the initial coding scheme. Each category was identified by a definition. Some categories had sub-categories. Some potential codes, which were identified

in the previous studies, served as the codes' examples. The definitions of categories and code examples comprised the coding rule. The code examples indicated the kind of codes a category might hold. The initial coding scheme was reviewed by one of the LOR experts who had evaluated and reviewed the interview protocol. The initial coding scheme was applied to the pilot tests and subsequently revised.

(2) The process of transcribing was also the one of understanding and integrating interview data. During the interview transcription, I also explored and used the Orange Grove website when the answer was ambiguous or needed more contexts to understand. I took notes about these exploration activities. The notes were referenced during the interview coding.

(3) and (4) were conducted at the same time. The process of coding the interview data was also the one of enriching and revising the initial coding scheme. The coding was conducted manually using a spreadsheet to record the results. Several procedures were involved in these processes.

- Defining and segmenting the coding units. The coding unit is the basic unit of the transcript text to be coded. The coding unit could be a word, phrase, sentence, or a whole paragraph (Weber, 1990, p. 21). I read through all the transcripts to decide the coding units. At the same time I highlighted key words and key phrases, and segmented the coding units by putting these key words and phrases as the preliminary codes in parentheses. The purpose of using the key words and phrases as preliminary codes was to use the interviewees' terms to reflect their thoughts. Because an interviewee might have more than one title such as faculty and instructional designer, the titles were also noted in the segmentation to reflect the perspective on which the

interviewee expressed his or her opinions. The following is a sample of the segmented transcript.

Researcher: Oh, once you logged into the Orange Grove. What is the motivation for you to log into the Orange Grove?

Interviewee: I browsed before the MERLOT, Wisc-Online. I am interested in what **LOs are available to the discipline I teach (faculty— what LOs available to the discipline a faculty member teaches)**. I am looking for the **supplemental** for the theoretical perspective sociology I teach **(faculty—look for supplemental LOs for courses)**. I went to the Orange Grove to see what is available there. I did not find anything **specific to my teaching (faculty— do not find LOs specific for my teaching)**, but I did look at some other items there, and just see what is in there. I am **curious** what is there **(faculty— curious what is there)**. I co-facilitate a hybrid and blended community. We have **links to several LORs including the Orange Grove for faculty** so they can get the ideas of what they want to do. I link it to the community **(instructional designer— link the Orange Grove to hybrid and blended teaching community)**.

- Entering coding units into spreadsheets. The coding units were entered into four spreadsheets according to the purpose of this study. The goal of the interview was to probe the answers for RQ1 and RQ2 from faculty users' perspectives. The instructional designers played an important role in helping faculty use Orange Grove. The ways of faculty use Orange Grove reflected how faculty use LORs. So the coding units were entered into four spreadsheets: one managing the coding units about the reasons faculty used the Orange Grove; one managing the coding units about the reasons faculty did not use the Orange Grove; one managing the coding unit about instructional staff's assisting faculty in using Orange Grove; and the other one managing the coding units about the ways faculty used Orange Grove in their teaching or course design. Figure 1 shows an example of the spreadsheet used to assist coding.

	A	B	C	D	E	F	G
1	Unit	Question	Key Word	Code	Category	Dimension	
2	It saves the time of their development (faculty—save the time of their development).		faculty—save the time of their development	save time			
3	They do not have to learn the high level skills when they can find the LOs already existed there (faculty—LOs with high level skills existed).		faculty—LOs with high level skills existed	high level skills	Advantages	Performance Expectancy	
4	The open source textbook are not charged for adopting (faculty—it is free).		faculty—it is free	free			
5	The OG put the open source textbooks there, a couple of faculty members are interested in that (faculty—interested in OAT).		faculty—interested in OAT	open textbooks	Teaching-fit		

Figure 1. Example of spreadsheets used for coding.

- Labeling the coding units. After being entered into the spreadsheets, the coding units were grouped under the interview questions. I read through these units and the initial codes, and then labeled these coding units with codes. Codes are “tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study” (Miles & Huberman, 1994, p. 56). Codes were derived from the preliminary codes, which were the key words or phrases.
- Sorting or grouping codes into categories and subcategories. The initial coding scheme had already defined dimensions, categories, and some subcategories. The codes with the associated coding units were sorted into these categories and subcategories according to the coding rule. Figure 1 shows how a coding unit was sorted and grouped according to the initial coding scheme. For example, in the initial coding scheme, “save time” is an example code under the “relative advantages”

category, so the coding unit “It saves time with their (LOs’) development” was coded by the code “save time”, grouped under “relative advantages” category. During this process the initial coding scheme was revised, and the final coding scheme was created. New dimensions, categories, and subcategories that emerged were added to the coding scheme; the dimensions, categories and subcategories into which no codes were sorted were deleted. The initial coding scheme had seven dimensions: performance expectancy, effort expectancy, social influence, facilitating conditions, attitude toward using technology, self-efficacy, and anxiety. During the coding process, no codes were assigned to the anxiety and attitude toward using technology dimensions, so these dimensions were deleted. Under each dimension, categories or subcategories were modified, deleted, or added to hold the codes that were assigned to coding units. Besides the seven dimensions, I used “time” to code the data reflecting a prediction about the future of Orange Grove, and “ways of using OG” to code the data reflecting the ways faculty use Orange Grove. By these processes, the final coding scheme was created and applied (see Appendix D).

(5) Inter-coder reliability or reproducibility measures “the consistency of shared understandings held by two or more coders” (Weber, 1990, p. 17). It is a normal way of addressing reliability used in content analysis. The same LOR expert, who had reviewed the initial coding scheme, reviewed all the coding units, preliminary codes, codes, subcategories and categories, and dimensions. I and the expert discussed any issues where there were questions or disagreements and resolved these issues.

Validity in content analysis normally refers to the correspondence between the classification scheme and data, and the generalizability of results (Weber, 1990). The preferred

strengths of deductive coding scheme are that it has a “direct relationship to the theory which is being asserted” and that it also has “better generalizability to untested cases” (Shaw, 2006, p. 14). UTAUT guiding the coding scheme development improved the validity of this study.

### 3.3. Phase II of the Study

Once Phase I was completed, Phase II was started. The purpose of Phase II was to provide more evidence for the factors that were identified in Phase I and to explore further how these factors influence faculty use of LORs. The study used a survey method to collect data. The survey instrument, in the form of an online questionnaire, was designed based on the results of Phase I. The target population of the survey was faculty and instructional staff users of two LORs, Orange Grove and Wisc-Online. Phase II used non-probability sampling techniques to recruit survey subjects. The data were described and analyzed by both descriptive statistics and ANOVA techniques.

The following sections describe the survey instrument design, sampling and respondents, data collection and analysis.

#### 3.3.1. Survey Instrument Design

I used a survey in phase II to collect data. The survey instrument was designed to collect three types of data: demographic information, usage information, and attitude information. The demographic information included respondents’ information such as job titles and academic areas; usage information included their use of the LORs, such as frequency of usage, experience, and ways of using LORs; the attitude information included respondents’ opinions to the factors influencing their use of the LORs. The questionnaire consisted of a series of close-ended and open-ended questions. The main question items on the survey were designed based on the results of Phase I (see chapter 4, session 4.2.1). A 5-point Likert scale (Likert, 1932; Trochim, 2006a)

was adopted for responses to close-ended question items; these were designed to gather respondents' attitudes on the factors influencing their use of the LORs. The scale used was: 1=*Strongly disagree*, 2=*Disagree*, 3=*No opinion*, 4=*Agree*, 5=*Strongly agree*. For the open-ended questions, respondents self-reported their answers or opinions about the factors.

The survey questionnaire had two versions: One for the Orange Grove users, and one for the Wisc-Online users. The structure and question items are almost same in the two versions, except several question items especially designed to gather the respondents' attitude information on the specific LOR characteristics; for example the Orange Grove questionnaire asked about open textbooks and LMS integration, and the Wisc-Online questionnaire asked about Gamebuilder and Facebook. In addition, by the suggestion of the reviewer of the IRB of the Fox Valley Technical College, the version of Wisc-Online survey used the question, "Which category(ies) of learning objects are you interested in?" to learn respondents' academic areas, while the version of Orange Grove survey used the question, "Which academic area are you from?" Appendix B contains the survey questionnaire used in the study.

The survey questionnaire was implemented using Lime Survey, an online open source survey application tool. The survey questionnaire was first reviewed by the two LORs experts who had reviewed the interview protocol in Phase I, and then tested with two LOR users to ensure all the questions and items were understood so that to enhance the validity of the survey instrument.

In the study, the main independent variable was the faculty usage status or usage level of LORs. It was measured by the question whether the faculty and instructional staff users had used the learning objects or open textbooks from the Orange Grove/Wisc-Online in their course design or teaching. It was an ordinal variable. Three answers were provided for this question.



There are (1) Yes, (2) No, and (3) Not yet, but plan to. By answering this question, the respondents were divided into three groups.

The main dependent variables were factors influencing faculty use of LORs, which were identified in Phase I. Phase I identified 22 specific factors that motivate faculty use of LORs, and 21 specific factors that serve as barriers for faculty use of LORs. Eight constructs from UTAUT were determined to capture the 22 motivating factors and 9 constructs to capture the 21 impeding factors. The Orange Grove instrument also included 5 items designed to measure the effects of specific Orange Grove characteristics on faculty use of Orange Grove, and the Wisc-Online instrument included 3 items to measure the effects of specific Wisc-Online characteristics on faculty use of Wisc-Online. The survey used open-ended questions to gather the narrative data about factors influencing faculty use of the LORs.

### 3.3.2. Survey Instrument Reliability Test

The survey questionnaire includes a series of items. The study used Cronbach's alpha (Cronbach, 1951) to measure the internal consistency reliability of the survey instrument. Internal consistency is a commonly used indicator of survey instrument reliability, which assesses how well a group of items measures the same concept (Litwin, 1995). The items of the survey questionnaire were designed based on the results of Phase I and the literature review, which reflected the specific factors influencing faculty use of LORs. Cronbach's alpha tested whether a group of items were measuring one construct, which was adopted from UTAUT and represented as a category in the final coding scheme (see Appendix D). Table 3 presents the survey items designed to measure the 22 motivating factors and 8 constructs. Table 4 presents the survey items designed to measure the 21 impeding factors and 9 constructs.

Table 3

*Survey Structure about Factors Motivating Faculty Use of LORs*

Constructs	Specific factors	Survey items
Perceived usefulness	Usefulness	It is useful in teaching and course design.
	Extrinsic motivation	Using it can reduce students' education cost.
Job-fit	Education Environment-fit	It supports both online and face-to-face courses.
	Course Supplement	I use it to supplement the course I teach or design.
	Course-fit	Its learning objects are related to my course.
	Support Active Learning	I am interested in highly interactive and engaging learning objects.
Relative advantages	High Quality	The quality of its learning objects is high.
	Save Time	It saves my time in course design.
	Convenient for Teaching	It is convenient for teaching.
	Free	It is free.
	Advance Student Learning	Using it can help students learn better.
Ease of use	Ease for Faculty	I find it easy to use.
	Ease for Students	The learning objects are easy for my students to use.
Subject norm	Peers' Influence	Other faculty members' successful experience of using the Orange Grove/Wisc-Online motives me to use it.
	Students' Feedback	Student's positive feedback motivates me to use it.
Facilitating conditions	Institution Facilitation	The Orange Grove/Wisc-Online trainings and workshops motivate me to use it.
	Faculty Center's Help	My State has pushes for us to use the online resources such as the Orange Grove/Wisc-Online
	LOR Promotion	My institution is open to the use of such resources like the Orange Grove/Wisc-Online.
	LOR Copyright State Facilitation	Faculty center provides help in using it. Its copyright is clear.
Compatibility	Belief in Sharing	I believe in sharing.
	Enjoy Using Technology	I enjoy using technology in my teaching or course design.

Table 4

*Survey Structure about Factors Impeding Faculty Use of LORs*

Constructs	Specific factors	Survey items
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Perceived usefulness	Uselessness	It is not useful to me.
Extrinsic motivation	No Help for Tenure	It does not help my tenure.
Job-fit	Course-unfit	Its learning objects are not related to my course.
	Learning Outcome-unfit	Its learning objects do not fit the learning outcome I need.
	Stable and Consistence Concern	I am concerned with the stability and consistence of the learning objects.
Relative advantages	Low Quality	I think the quality of learning objects is not high.
	Inadequate Quantity	The quantity of learning objects is not enough.
	Time Constraint	I do not have time to use it.
Complexity	Lack of Ease of Use	The searching function is not very powerful; it takes time to find what I want.
Social factors	Department Culture	Department culture values creating more than reusing.
Behavior control	Other Resources	I have other resources to use.
	Curriculum Limitation	My course curriculum is set so I can't use it.
	Course be Sold	My course will be sold so I can't use it.
	Storage Limitation	My institution limits course size, so I can't add too many learning objects in my course.
	State Limitation	I do not create new courses because of budget limitation.
	LOR Copyright Limitation	The copyright limits my use.
Compatibility	Non-update Courses	I do not update my course very often.
	Create Your Own LOs	I would like to create my own learning objects instead of using others.
	Against Change	If I can do my teaching and course design without it, there is no reason to add it.
Self-efficacy	No Familiarity	I am not familiar with it.
	No Confidence	I am not technology savvy; I am not confident in using it.

As Table 3 and Table 4 show, except for perceived usefulness, extrinsic motivation, complexity, and social factors constructs, all other constructs have multiple items as their components. Table 5 and Table 6 present the results of Cronbach's alpha tests that were used to measure the reliability of the survey instrument.

The acceptable value of the alpha should be equal to or higher than .70 (George & Mallery, 2003), but in the exploratory research the alpha value of .60 is considered acceptable especially when the number of items in one construct is lower (Garson, 2011; Gliem, J., & Gliem, 2003). In this study, the 3 constructs (subjective norm, compatibility, and self-efficacy) with alpha values less than .70 only had 2 items individually, so the 3 alpha values were considered acceptable. As to the factors serving as barriers to faculty use of the LORs, the item, “I do not update my course very often,” resulted in an unacceptable alpha on compatibility construct, so it was excluded from the subsequent data analysis. All alpha values met the minimum requirement. The instrument reliability was tested and the internal consistency of the instrument was considered reliable.

Table 5

*Reliability of the Instrument Measuring Motivating Factors*

Construct	Item numbers	Cronbach’s alpha
Job-fit	3 items	$\alpha = .88$
Relative advantages	5 items	$\alpha = .85$
Ease of use	2 items	$\alpha = .75$
Subjective norm	2 items	$\alpha = .66$
Facilitating conditions	5 items	$\alpha = .73$
Compatibility	2 items	$\alpha = .69$

Table 6

*Reliability of the Instrument Measuring Impeding Factors*

Construct	Item numbers	Cronbach's alpha
Job-fit	3 items	$\alpha = .84$
Relative advantages	3 items	$\alpha = .77$
Behavior control	6 items	$\alpha = .78$
Compatibility	2 items	$\alpha = .78$
Self-efficacy	2 items	$\alpha = .69$

### 3.3.3. Sampling and Recruitment of Participants

The target survey populations were faculty users of both the Orange Grove and Wisc-Online LORs. The ideal sample is a random sample. However because of the privacy policies of both LORs, the faculty users' information could not be provided by either Orange Grove or Wisc-Online; therefore non-probability sampling rather than random sampling was applied to the population of Wisc-Online and Orange Grove faculty and instructional staff users. Non-probability sampling is that "population elements are selected on the basis of their availability (e.g., because they volunteered) or because of the researcher's personal judgment that they are representative" (Herek, 2009, para. 5).

The staff of Wisc-Online posted a note on Wisc-Online to inform and encourage their faculty users to participate in the survey. The survey was web-based, and the participation was voluntary. All Wisc-Online users who visited the website of Wisc-Online during the period of the survey had the chance to access the survey. The faculty users who visited Wisc-Online with high frequency had more opportunity to participate in the survey, but faculty users who did not visit the Wisc-Online website very often might not even know about the survey. So the survey

participants from the Wisc-Online were more likely to be faculty high users (addressed in section 3.2.1).

For the Orange Grove survey, invitations were sent to 2978 faculty at 4 colleges and 2 universities via email. The invitation contained a link to the questionnaire. Three colleges were the same ones in Phase I. College 4 has promoted Orange Grove by the OG Scholars, but no faculty members participated in Phase I. The survey invitations were only sent to 14 faculty members at 2 universities because the IRBs at these universities did not encourage surveying their entire faculty. The 14 faculty members were potential interviewees identified in Phase I, and 7 of them participated in the interview. Table 7 presents the numbers of faculty who were sampled.

Table 7

*Orange Grove Sample of Survey Subjects*

College and universities	Number of faculty (2978)	Note
University 1	12	Six of them were interviewed
University 2	2	One of them was interviewed.
College 1	1560	Two of them were interviewed
College 2	580	One of them were interviewed
College 3	551	Two of them were interviewed
College 4 (Department of Mathematics and College of Nursing)	273	No faculty members were interviewed

Not all 2978 faculty members who received invitations were Orange Grove users; some of them might not even have heard of it. Only faculty members who had a user account or could access Orange Grove by LMS integration were considered as users. Sending survey invitations to

all of these faculty members provided the opportunity to collect data from faculty low users (addressed in section 3.2.1); however, faculty users who visited the Orange Grove website with high frequency but were not from the 6 colleges and universities might not even know about the survey. So the respondents of the Orange Grove survey were more likely to be faculty low users rather than high users.

Surveying only one LOR, either Orange Grove or Wisc-Online, might have resulted in data bias: collecting data more likely from faculty low users or high users. Collecting data from both Orange Grove and Wisc-Online minimized the deficiency resulting from the non-probability sampling from faculty users of either Orange Grove or Wisc-Online.

#### 3.3.4. Data Collection and Respondents

The survey was web-based. The consent form was displayed before the survey text. The survey was accessed after agreeing to participate in the survey study. After approval by the IRB of the Fox Valley Technical College (host of Wisc-Online), the survey notification was posted on the Wisc-Online website in December, 2010, and closed in February, 2011. The survey invitations were sent by emails to 2978 faculty members of 4 colleges and 2 universities in Florida in December, 2010, and closed in February, 2011. In order to increase the response rate, the follow up survey invitations were sent to faculty of College 1 and College 2 in January 2011 via email; besides the website, the survey notification was also posted on the Facebook of Wisc-Online.

Thirty nine out of 2978 faculty members submitted their responses to the Orange Grove survey. Out of 39 respondents, 18 were faculty and instructional staff users. Out of the 18 faculty and instructional staff users, 7 had user accounts only, 8 could access Orange Grove by LMS

integration only, and 3 could access Orange Grove both ways. The non faculty respondents were not addressed in this study.

Forty-four respondents from Wisc-Online submitted their survey responses. Out of 44 respondents, 20 were faculty and instructional staff users. Other respondents were students, parents or non faculty respondents, who were not addressed in this study.

Table 8 presents the faculty and instructional staff user respondents to the Orange Grove and Wisc-Online surveys by their job titles.

Table 8

*Job Titles by Respondents*

	Wisc-Online		Orange Grove		Total	
	<i>Freq.</i>	<i>Percent</i>	<i>Freq.</i>	<i>Percent</i>	<i>Freq.</i>	<i>Percent</i>
Faculty (professor/adjunct/instructor)	16	80	16	88.9	32	84.2
Instructional staff	4	20	0	0	4	10.5
Both faculty and instructional staff	0	0	2	11.1	2	5.3
Total	20	100	18	100	38	100

Phase II of the study collected data from 38 respondents to Orange Grove and Wisc-Online surveys. Out of 38 respondents, 32 (84.2%) were reported as faculty only, 4 (10.5%) as instructional staff only, and 2 (5.3%) both faculty and instructional staff. As a job title, the instructional staff includes instructional designer, teaching assistant, or education support staff.

### 3.3.5. Data Analysis

Phase II data were described and analyzed by descriptive statistics and analysis of variance (ANOVA). Descriptive statistics summarize and describe the “basic features of the



data” (Trochim, 2006b). ANOVA is a statistical test concerning with the mean comparison among multiple groups (Coolidge, 2006).

In the study, LORs’ usage level was measured by whether the respondents had used the Orange Grove or Wisc-Online in their teaching or course design. The survey provided three answers to this question. The answer were “No”, “No, but I plan to” and “Yes”. According to their answers, the 38 respondents were assigned to 3 groups: Group 1=No, Group 2=No, but I plan to, and Group 3=Yes.

For each specific factor that was identified as motivating or impeding faculty use of LORs, ANOVA was used to test whether the motivating or impeding effects on the 3 groups of respondents are different.

The narrative data collected by open-ended question items were coded according to the final coding scheme developed and used in Phase I study.

In addition, the data about faculty and instructional users’ background situations and their usage of LORs were summarized and described with descriptive statistics.

### 3.4. Summary

This chapter discussed the research design, data collection and analysis for the two phases of the study. Phase I used semi-structured interviews to collect data. Interviewees were selected according to purposeful sampling principles from faculty and instructional staff users of Orange Grove. Data were analyzed by content analysis. Phase II used the web-based survey to collect data from faculty and instructional staff users of two LORs, Orange Grove and Wisc-Online. The survey was designed based on the results of Phase I. Data were analyzed by descriptive statistics and ANOVA. Chapter 4 presents the results of data analysis.

## CHAPTER 4

### ANALYSIS AND RESULTS

#### 4.1. Introduction

This chapter presents the results of data analysis for both phases of the study. The main purpose of this study was to identify the factors that affect faculty use of learning object repositories (LORs). In order to achieve this purpose, two phases of the study were conducted. In Phase I, data were collected by a series of interviews. Interviewees were selected from users of Orange Grove, who were 8 faculty members, 2 instructional staff members, and 3 who were both faculty and instructional staff members. In Phase II, data were collected by a survey from users of Orange Grove and Wisc-Online. Thirty-eight survey respondents included 32 faculty users, 4 instructional staff users, and 2 who were both faculty and instructional staff users.

#### 4.2. Results of Phase I

As described in chapter 3 (see section 3.2.3), Phase I data were entered into four spreadsheets for analysis. During data analysis, the initial coding scheme was applied and revised, and the final coding scheme was constructed. I explored the subcategories and categories (constructs) of the unified theory of acceptance and use of technology (UTAUT) dimensions, examined the relationships between codes and categories, and tested the subcategories and categories against the full range of interview data (Bradley, 1993). Results were drawn out from the data analysis.

#### 4.2.1. Specific Factors Affecting Faculty Use of Orange Grove

Twenty-two specific factors and 2 specific Orange Grove characteristics were identified as motivating faculty use of Orange Grove. Eight constructs under 4 dimensions of UTAUT were determined to capture the specific factors. Table 9 presents the constructs and specific factors. The specific Orange Grove characteristics were Open Textbooks and LMS Integration.

Table 9

*Constructs and Specific Factors Motivating Faculty Use of Orange Grove*

Constructs	Specific factors	Definitions	Data example
Perceived usefulness	Useful Resource	Faculty and instructional staff generally believe LORs are useful resources for education.	I personally think the OG is an excellent resource for online instructors.
Extrinsic motivation	Reduce Students' Education Costs	Faculty and instructional staff believe using LORs would reduce students' education costs.	We consider the cheaper way to provide students high quality resources.
Job-fit	Education Environment-fit	Education environment means the education delivering methods such as face-to-face, online, and blended.	It is more appropriate for the online, but certainly it should be a supplement to face to face courses to make them to be blended courses.
	Course Supplement	Using learning objects (LOs) from LORs to supplement faculty members' courses.	I use them for course supplement.
	Course-fit	LOs meet faculty members' needs on course topics.	I think the people who can find LOs there; they would like to use it.
	Support Active Learning	It means the LOR contains LOs which support active learning. This type of LOs mainly focuses on presenting a topic in multiple ways such as video, audio, image, and animation.	I am always looking for interactive contents to make things more interesting for my students.

*Note:* OG = Orange Grove. For definitions of constructs see Appendix D.

*(table continues)*

Table 9 (continued).

Constructs	Specific factors	Definitions	Data example
Relative advantages	High Quality	Faculty and instructional staff's evaluation on the quality of LOs.	We are very interested in the OG and I think it has excellent content.
	Save Time	Saving faculty members' time in creating LOs on their own.	If I can find an LO in the OG, it may save me hours of work.
	Convenient for Teaching	Saving effort by using LOs on teaching.	They can just give a link (of an LO) rather than introduce it to the courses over and over again.
	Free	No financial cost for using LOs from LORs.	That is a good resource for our school and it does not cost a penny for us to have it.
	Advance Students' Learning	It includes strengthening student learning, helping students learn better, and enhancing learning outcomes.	It is a small interact simulation to get the students to think about how probability would work.
Ease of use	Ease for Faculty	Easy for faculty to find, identify, select, obtain, and access LOs. It includes the aesthetics of an LOR's interface.	I can very easy and quickly to find resources which may be done in a better way than I can do it.
	Ease for Student	Easy for students to access and operate.	Faculty prefer to teach the concept instead of teaching students how to use.
Subjective norm	Peer's Influence	Other faculty members' suggestion or practice on using LORs.	I think the faculty who are using OG success is a great influence.
	Student's Feedback	Students' positive feedback on courses using LOs.	I get the highest students rating every semester.

Note: OG = Orange Grove. For definitions of constructs see Appendix D.

(table continues)

Table 9 (continued).

Constructs	Specific factors	Definitions	Data example
Facilitating conditions	Institution Facilitation	Generally higher education institutions encourage using good education resources and strategies.	The institution is certainly supporting it.
	Faculty Center's Help	Instructional staff help faculty in teaching and course design.	We tell them if there are specific resources you are lacking in your courses, let us know and we can help.
	LOR Promotion	LOR promotion activities offered on campus.	In OG there are links to other LORs where there are more available materials. I attended the meeting so I know.
	LOR Copyright	The copyright of an LOR clearly defines who can use and how to use LOs.	It is kind of honor code. It is make someone not intention to make money using your stuff.
	State Facilitation	The encouragement on using LORs comes from the state.	It has been mandated in FL to try to use more online tools.
Compatibility	Belief in Sharing	The belief in sharing education materials such as LOs.	I feel really handicapped without my technology
	Enjoy Using Technology	Faculty like and value using new technologies such as LORs in their teaching and course design.	I believe in sharing good content

Note: OG = Orange Grove. For Definitions of constructs see Appendix D.

Twenty-one specific factors and 3 Orange Grove characteristics were identified as barriers for faculty using Orange Grove. Nine constructs under 5 dimensions of UTAUT were determined to capture these factors. The specific Orange Grove characteristics were Open Textbooks' Low Quality, No Streaming Server, and Fitting K-12 Education. Table 10 presents the constructs and specific factors.

Table 10

*Constructs and Specific Factors Impeding Faculty Use of Orange Grove*

Constructs	Specific factors	Definitions	Data example
Perceived usefulness	Uselessness	Individual faculty member believes using LORs would not enhance his or her instruction performance.	It is very nice but there is nothing useful to me.
Extrinsic motivation	Does not Help Tenure	Using LORs was not recognized as a scholarly activity and does not help tenure.	Collecting others content is not scholarly activity, not help for your tenure.
Job-fit	Course-unfit	The LO's subject does not fit the discipline or topic of a course. It may be expressed as not meeting faculty members' needs.	But most of them are math and physics. But if it fits my course I will grab it.
	Learning Outcome-unfit	The learning outcome of an LO may not meet the expectation of a faculty user.	They do not fit the learning outcome so we cannot use them to the best ability.
Relative advantages	Low Quality	The quality of LOs in an LOR was considered low.	They usually have the impression that there is not good stuff on there
	Inadequate Quantity	The quantity of LOs in an LOR was considered insufficient.	They should continually increase their content.
	Stable and Consistence Concern	The concern about if the hyperlink of an LO is live or the LO is the same one when it is introduced to students.	Faculty also give the feedback which is they concern the Persistence of the URL.
	Time Constraint	Faculty members do not have time to learn or use LORs.	No time to learn it. No time to search.
Complexity	Lack of Ease of Use	Faculty spend a lot of time to find, identify, select, obtain, and access LOs.	One thing I complain to the Orange Grove is the searching function is not good.
Social factors	Department Culture	It is an understood department culture to value creating and innovating LOs rather than reusing others.	In the department culture, harvesting or using others content is not valuable than creating your own.

*Note:* OG = Orange Grove. For Definitions of constructs see Appendix D.

*(table continues)*

Table 10 (continued).

Constructs	Specific factors	Definitions	Data example
Behavior control	Curriculum Limitation	The curriculum is set in a department.	The dean said this was the course you teach and how to teach and there is not enough room to add additional materials.
	Course be Sold	A course developed in a department or an institution is sold.	The course I teach will be sold to other colleges or universities. Because we do that I cannot put content which is not completely owned by our college.
	Storage Limitation	The storage limits a course size in a department or an institution.	We have restriction on how much you can put in your courses.
	LOR Limitation	An LOR's policy may limit who can use it or the copyright limits how to use its LOs, such as its LOs can't be modified.	You have the control of how that content is to be shared.
	State limitation	A state limits the budget or grants for new program development.	Our budget limits new program.
	Other Resources Competition	The competition is from publishers, other online resources, local departments or local institutional resources, or peers' sharing.	They have already had resources and there is no reason to change. Some faculty like to create their own.
Compatibility	Non-updated Courses	Faculty do not want to enrich or diversify their courses.	They do not want to increase or enrich their course anymore than they already have.
	Creating Your Own LOs	Faculty members like to create and use their own LOs instead of using others.	Some faculty like to create their own (LOs).
	Against Change	Faculty members do not want to change the way they use resources.	If I can do my job without technology why I add it? It is a common thought.
Self-efficacy	No Confidence	Faculty members were not confident in their skill in using LORs.	The hard thing for faculty is if they can learn the way of blackboard. I think if they can, probably they pull an LO to incorporate to their course from the Orange Grove.
	Not Familiar with LORs	Faculty members were not familiar with LORs services and functions.	When you are not familiar with that you just do not think about it.

Note: OG = Orange Grove. For Definitions of constructs see Appendix D.

Besides the above factors influencing faculty use of Orange Grove, 12 out of 13 faculty and instructional staff interviewees predicted Orange Grove would be used widely in the future while one faculty interviewee remained uncertain about the future of Orange Grove.

During the interview process, some faculty interviewees talked about factors that might motivate or impede faculty contributing LOs to Orange Grove. One faculty member said the LOs he created were published, but the copyright limited contributing them to Orange Grove; another faculty member said scholarly recognition and financial compensation would encourage faculty members to contribute open textbooks to Orange Grove. Although these factors might influence faculty use of Orange Grove by increasing the quantity of LOs, they were not in the research scope addressed by this study. This study did not examine factors motivating or impeding contributions to LORs.

#### 4.2.2. Instructional Staffs' Role in Helping Faculty Using Orange Grove.

I interviewed 5 instructional staff users who were 3 instructional designers and 2 education support staff members. The instructional designers were from two different universities and one community college, and the education support staff were from another two community colleges. They were experts in using Orange Grove and visited it often. They first heard about Orange Grove from the Florida Distance Learning Consortium (DFLC), and one of the instructional designers and the two education support staff users were members of DFLLC. They attended the training workshops and presentations about Orange Grove given either by the DFLLC or by the Orange Grove Scholars.

Although the departments where they worked have different names (e.g. Center for Instruction & Research Technology, Professional Development, Center for Teaching Excellence, Academic Technology Center and e-Learning), the mission of these departments is almost the



same, to assist and advance faculty teaching and course development. These departments or centers are normally recognized as faculty support centers.

The data analysis revealed that instructional staff had a positive influence on faculty using Orange Grove. They encouraged and helped faculty to use Orange Grove in the following ways.

- Making Orange Grove available for faculty by a link in the LMS or department website
- Implementing LMS integration
- Helping faculty locate LOs from Orange Grove and integrate them into their courses
- Promoting Orange Grove as an instructional resource or a good teaching strategy through training, workshops, or demonstration sessions
- Recommending valuable LOs from Orange Grove to appropriate faculty members.
- Encouraging faculty to contribute their LOs to Orange Grove
- Using LOs from Orange Grove as examples to implement faculty members' ideas

#### 4.2.3. The Ways Faculty Use Orange Grove

Chapter 2, section 2.5 presents 6 ways faculty use LORs, 5 of which were identified by faculty and instructional staff using Orange Grove, except as a way of “changing a face-to-face course to online.” The study identified the following ways faculty and instructional staff used Orange Grove, which include the 5 ways presented in section 2.5.

- Establishing a personal collection for preservation and reusing, as an interviewee said: “I have a collection in there; I just have a link to there.”
- Linking to LOs in Orange Grove directly without modification, as an interviewee said: “I think they like just to put a link rather than do any modification.”

- Downloading the LOs from Orange Grove and combining them into their courses with or without modification; as an interviewee said: “The one I used I just downloaded it and I combined it with my course by asking them to react it or response it on the discussion board.”
- Adopting the open textbooks from Orange Grove, as an interviewee said: “One thing is next semester I will use an open source textbook which is available in Orange Grove.”
- Using LOs from Orange Grove to enrich their courses, as an interviewee said: “It is a small interact simulation to get the students to think about how probability would work. Then I supplement that with my own lecture material, textbooks or course material I am using.”
- Developing a new online course, as an interviewee said: “What we would like to do is online course development, there are some things already existing and you do not have to do a lot of work.”
- Checking what is in Orange Grove, as an interviewee said: “I have reviewed it at a regular basis to see if anything is new there.”
- Learning how others are creating LOs, as an interviewee said: “We can go to Orange Grove or MERLOT to find examples to show them. We did some. Like here are the LO examples and you can do things similar with these.”
- Collaborating with others in creating and sharing LOs, as an interviewee said: “There are many faculty who are in collaboration and commitment to building and sharing (LOs).”

- Finding useful LOs and pointing them to faculty, as an interviewee said: “When I find them I will point them to the appropriate faculty.”
- Teaching faculty to use LORs, as an interviewee said: “I use the Orange Grove to search for LOs, and also to train other faculty to look into the Orange Grove as a source for materials for their courses.”

### 4.3. Results of Phase II

Phase II collected data from 38 respondents who were considered faculty and staff users of LORs, 18 of them were Orange Grove users, and 20 of them were Wisc-Online users. The data were described and analyzed by descriptive statistics and ANOVA tests. The results of analysis are presented in the following sections.

#### 4.3.1. Demographic and Usage Information

Out of 38 respondents, 16 were from four-year colleges or universities, 21 from two-year colleges or universities, and 1 from a five-year university.

Respondents to the Orange Grove survey were all from Florida. Respondents to the Wisc-Online survey were from several states in America as well as other countries, except one respondent did not provided an answer to this question. Six respondents were from Wisconsin where Wisc-Online is located in, 3 respondents from other courtiers, and only 1 respondent from each of the other 10 states. Figure 2 depicts the locations of the respondents to the Wisc-Online survey.

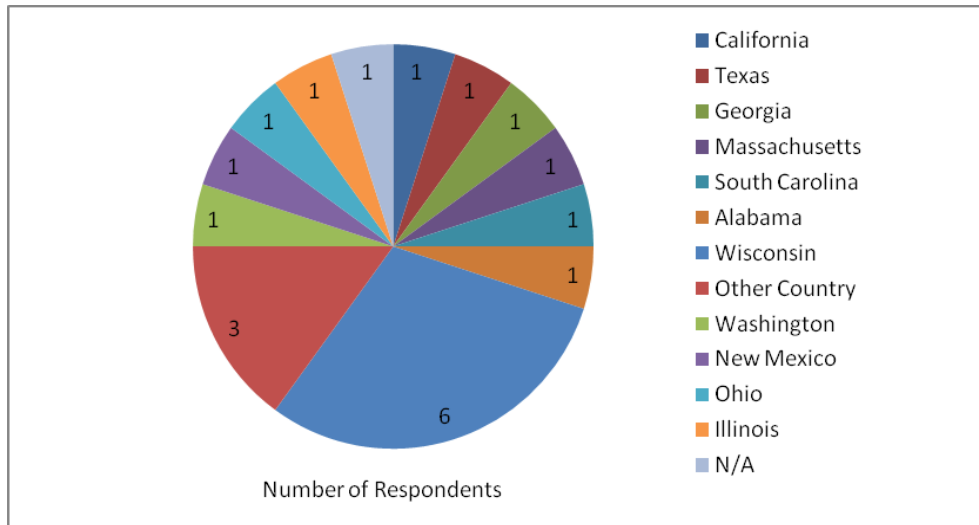


Figure 2. Locations of respondents to the Wisc-Online survey.

In chapter 3, Table 8 described the job titles of these respondents. Out of 38 respondents, 32 (84.2%) were faculty only, 4 (10.5%) were instructional staff, and 2 (5.3%) were both faculty and instructional staff. Figure 3 shows the responsibilities of the respondents by their job titles. The respondents who were both faculty and instructional staff were counted in both groups.

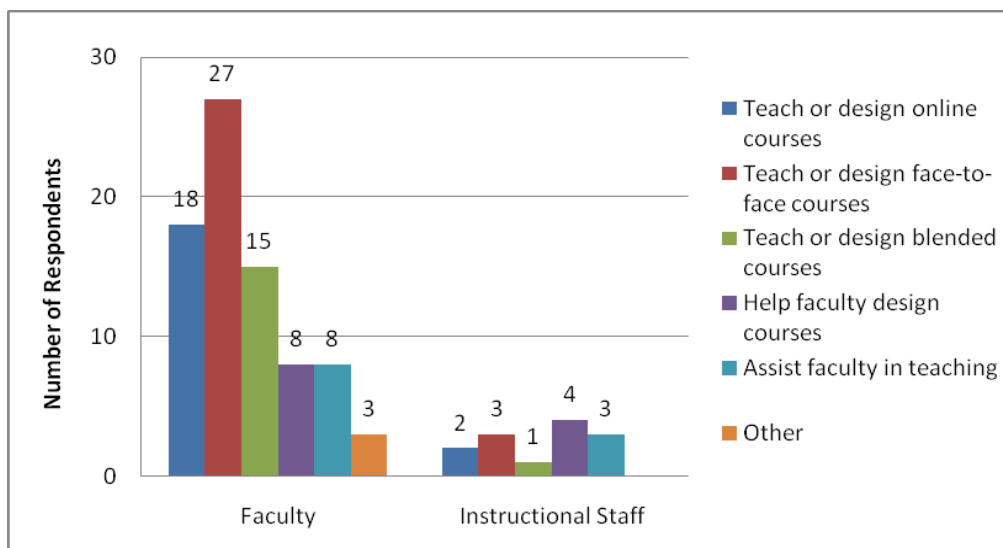


Figure 3. Responsibilities of respondents according to their job titles.

The respondents were assigned into 3 groups according to their usage of LORs. Table 11 presents LORs' usage level by respondents.

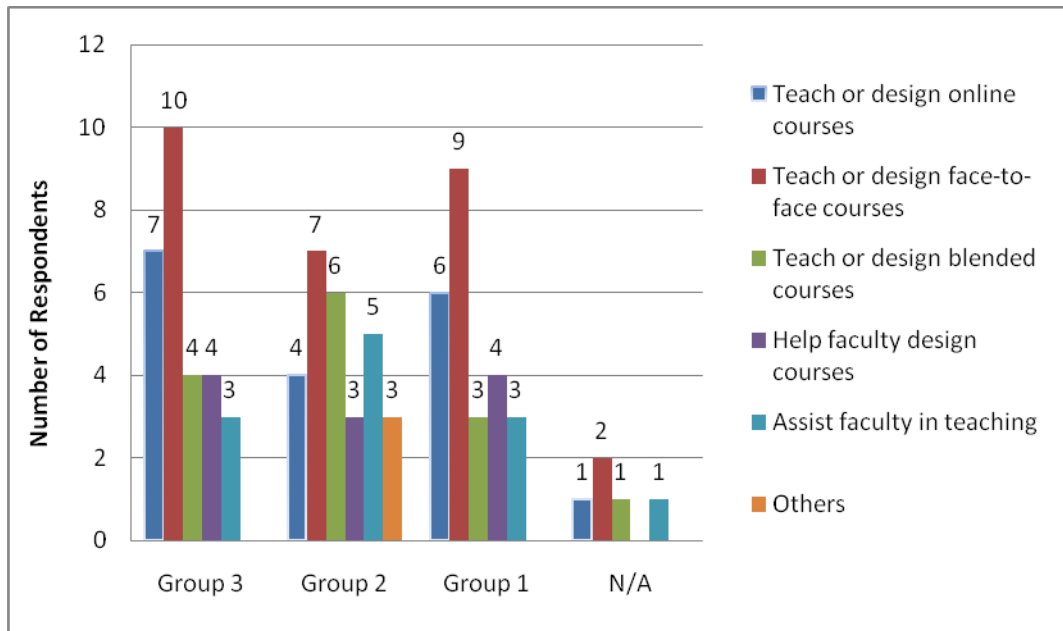
Table 11

*Usage Levels by Respondents*

Usage level	Wisc-Online		Orange Grove		Total	
	<i>Freq.</i>	<i>Percent</i>	<i>Freq.</i>	<i>Percent</i>	<i>Freq.</i>	<i>Percent</i>
Group 3 (Yes)	11	45.8	2	11.1	13	34.2
Group 2 (No, but I plan to)	5	37.5	7	38.9	12	31.6
Group 1 (No)	1	4.2	9	50	10	26.3
N/A (no answer)	3	12.5	0	0	3	7.9
Total	20	100	18	100	38	100

*Note.* N/A was used to mark the missing data

Figure 4 shows the distribution of the responsibilities among 3 groups of respondents. Respondents in every usage level were involved in all the responsibilities. For all 3 groups of respondents, the top responsibility was teaching or designing face-to-face courses.



*Figure 4.* Distribution of responsibilities in different groups of respondents.

To the question about the average frequency of visiting the LORs, the survey provided five answers: (1) once a week, (2) once a month, (3) once a semester, (4) once a year, and (5) less than once a year. The study defined “once a week”, “once a month”, and “once a semester” as high frequency, while “once a year” and “less than once a year” as low frequency. Figure 5 shows the average frequency of visiting the LORs by the 3 groups of respondents. In Group 3, Group 2, and Group 1, the numbers of respondents who visited the LORs with high frequency were 11 out of 13 (85%), 9 out of 12 (75%), and 4 out of 9 (44%) respectively (one respondent of Group 1 did not provide an answer to this question). The visiting frequencies indicated that the survey respondents more likely to use the LORs visited the LORs more often.

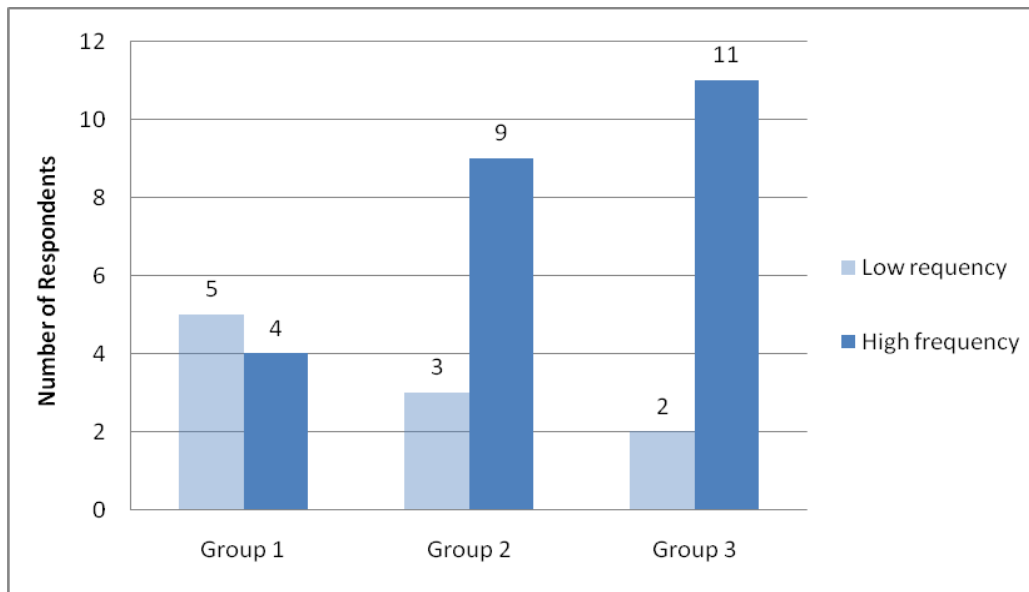


Figure 5. Distribution of visiting frequency in different groups of respondents.

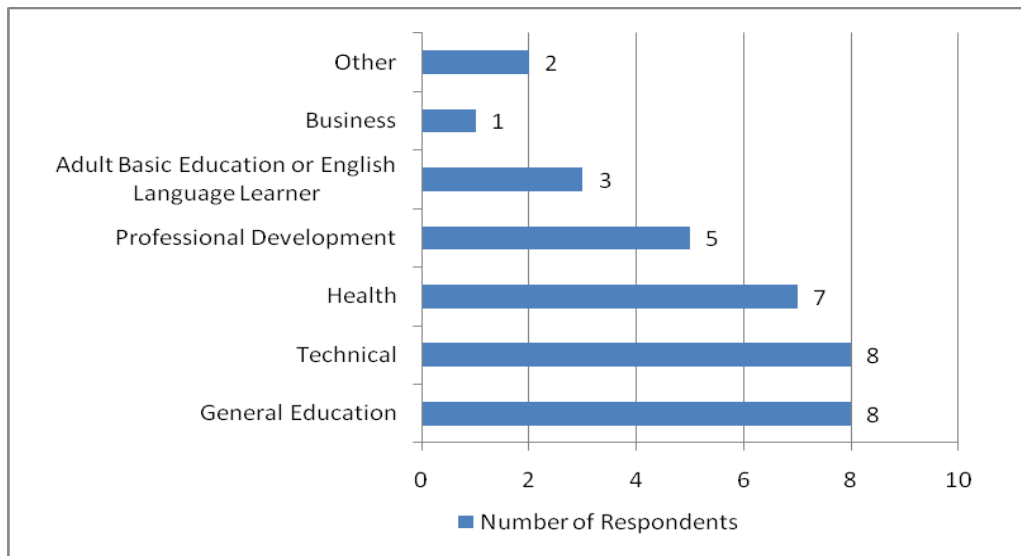
Table 12 presents the academic areas of respondents to the Orange Grove survey. Most Orange Grove users were from science and social science areas. Some respondents also reported their disciplines. About one third of these users were from Mathematics, and Nursing and Healthcare disciplines.

Table 12

*Academic Areas by Groups of Respondents to the Orange Grove Survey*

	Respondents' Frequency			Total
	Group 3	Group 2	Group 1	Freq.
Sciences	1	2	4	7
Social Sciences	1	4	3	8
Humanities	0	0	1	1
Arts	0	1	0	1
Other	0	0	1	1
Total	2	7	9	18

By the suggestion of the IRB reviewer of the Fox Valley Technical College, the version of Wisc-Online survey investigated the categories of the LOs that respondents were interested in rather than respondents' academic areas. Figure 6 reveals the top 3 categories of LOs the faculty users of Wisc-Online preferred were General Education, Technical, and Health.



*Figure 6. Categories of LOs by respondents to the Wisc-Online survey.*

Figure 7 shows the channels by which respondents were aware of the LORs. Online searching and recommendation by peers were two important ways by which faculty were aware

of the LORs. The workshops and trainings offered by faculty centers at institutions and the LORs were also effective ways to introduce the LORs to faculty. Out of 18 faculty respondents to Orange Grove survey, 9 were aware of it by peers' recommendation while out of 20 respondents to Wisc-Online survey, 9 found it by online searching; 9 out of 18 respondents to Orange Grove survey, and 3 out of 20 respondents to Wisc-Online survey were aware of the LORs via promotion offered by the LORs or faculty centers.

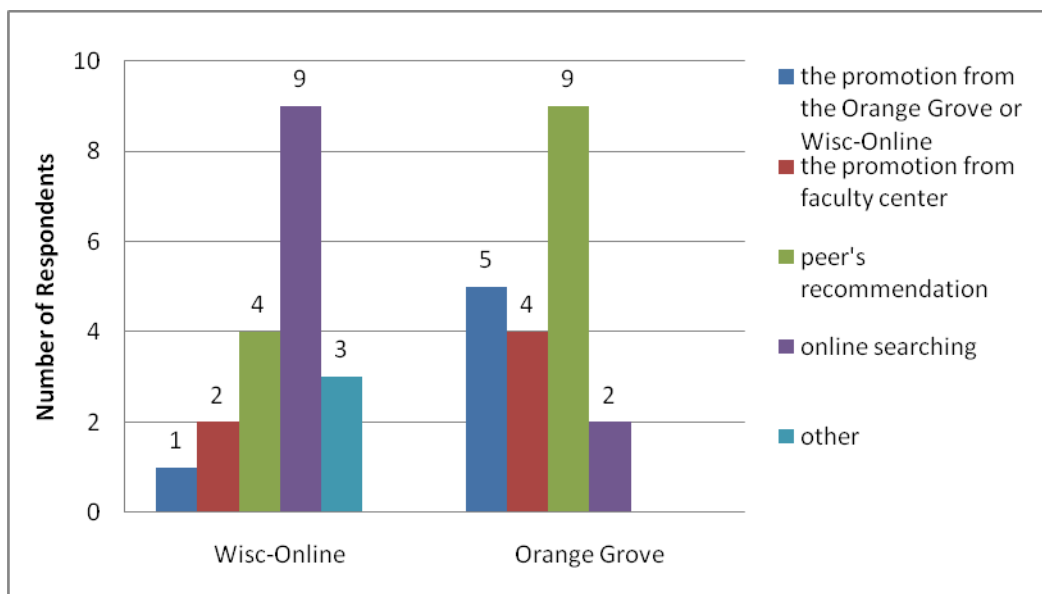


Figure 7. Comparison of awareness channels between two LORs.

Figure 8 shows the ways faculty and instructional staff respondents used the LORs and LOs in their teaching and course design. The results of data analysis not only verified ways of faculty use LORs and LOs that were identified by Phase I and literature review (see section 4.2.3) but also indicated the ways most faculty users used the LORs and LOs. Out of 38 respondents, 26 (68.4%) reported they were using the LORs to enrich course content, 19 (50%) reported they went to the LORs just for checking what was there, and 16 (42%) reported they would like to use an LO just by linking to it directly.



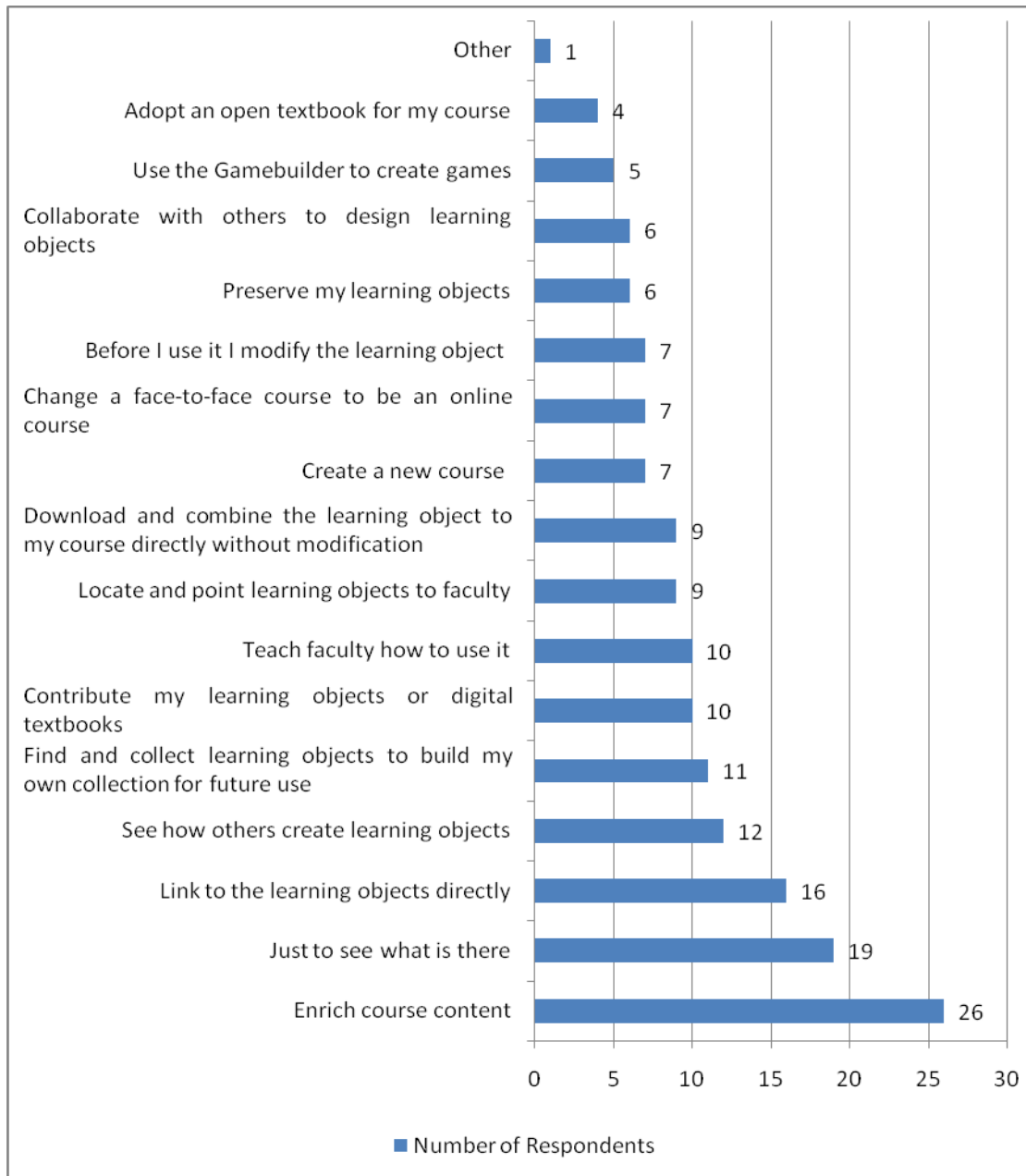


Figure 8. Ways of faculty use LORs and LOs.

In Phase I, 12 out of 13 interviewees predicted Orange Grove will be widely used by faculty in the future, and the other interviewee did not express his opinion. Phase II surveyed the respondents' prediction by the question: What is your opinion on the future of the Orange

Grove/Wisc-Online? Figure 9 shows that 15 respondents agreed that the LORs will be widely used by faculty, and 12 respondents agreed that the LORs may not be widely used by faculty.

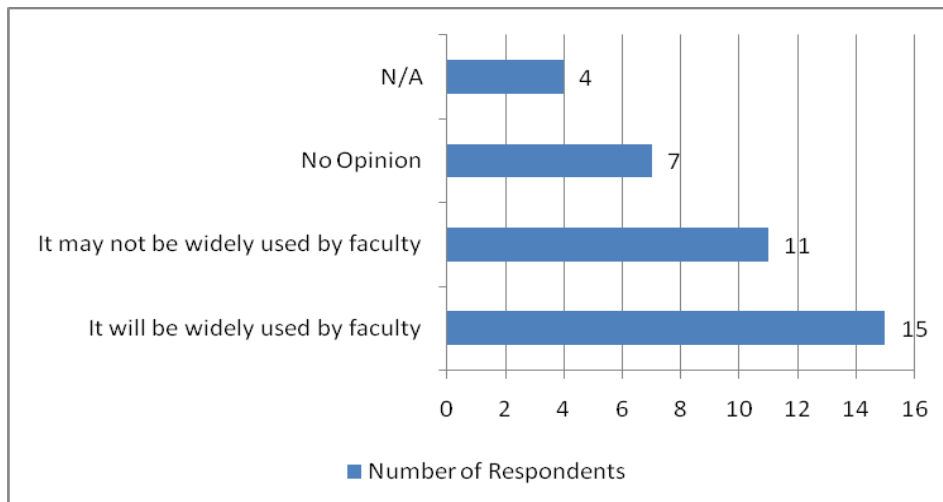


Figure 9. Prediction about the usage of LORs by respondents.

#### 4.3.2. Results of ANOVA Tests and Descriptive Statistics of Factors Affecting Faculty Use of LORs

Faculty and instructional staff users of the LORs were classified into 3 groups according to their usage levels of the LORs. The 3 groups were the users who had already used the LORs in their teaching or course design, the users who planned to use the LORs in their teaching or course design, and the users who had not used and had no plan to use the LORs in their teaching or course design. In the study, I explored the central tendency of respondents' opinions about the factors motivating or impeding their use of the LORs, and further examined the differences of these factors' effects on the 3 group users of the LORs by ANOVA tests, followed by the Least Significant Difference (LSD) post hoc test to determine which group was different from others.

The results of Phase I indicated 22 specific factors as motivating factors for faculty use of LORs. These specific factors were considered as dependent variables in Phase II analysis. Table 13 presents the label, total mean score, and standard deviation of each variable.

Table 13

*Descriptive Statistics and Motivating Factors*

# of Var.	Dependent variables	Total	
		<i>M</i>	<i>SD</i>
m1	Useful resources	3.63	1.00
m2	Reducing students' education costs	3.41	1.31
m3	Education environment-fit	3.94	0.94
m4	Course supplement	3.77	1.14
m5	Course-fit	3.51	1.22
m6	High quality	3.60	1.04
m7	Supporting active learning	3.80	1.17
m8	Saving time	3.29	1.00
m9	Convenient for teaching	3.46	1.09
m10	Free	4.13	0.99
m11	Advancing students' learning	3.66	1.06
m12	Ease of use for faculty	3.37	1.24
m13	Ease of use for students	3.42	1.15
m14	Peer's influence	3.15	1.16
m15	Students' positive feedback	3.18	1.17
m16	LOR promotion	2.91	1.08
m17	State facilitation	2.80	1.23
m18	Institution facilitation	3.86	0.94
m19	Faculty center's help	3.03	1.10
m20	LOR copyright is clear	3.37	1.03
m21	Believing in sharing	4.03	1.10
m22	Enjoy using technology	4.55	0.71

*Note:* The range of mean scores is from 1=*Strongly Disagree* to 5=*Strongly Agree*

Table 14 presents the groups' mean scores and standard deviations for each variable related to motivating factors, and the F scores and p values of ANOVA tests.

Descriptive statistics showed the feature of the dataset as the following.

- For 12 out of 22 variables, all 3 group means were higher than 3.0 (*No Opinion*), and tended toward 4.0 (*Agree*) or 5.0 (*Strongly Agree*). These variables were m1, m2, m3, m7, m8, m9, m10, m11, m18, m20, m21, and m22.
- For 8 out of 22 variables, 2 group means were higher than 3.0 (*No Opinion*), and tended toward 4.0 (*Agree*) or 5.0 (*Strongly Agree*). They were m4, m5, m6, m12, m13, m14, m15, and m19.

- For the other 2 variables, 1 group mean was higher than 3.0 (*No Opinion*), and tended toward 4.0 (*Agree*). They are m16 and m17.

The ANOVA test showed for variable m4, there was a significant difference on 3 group means,  $F(2, 32) = 6.33, p = .005$ . The (LSD) post hoc test indicated the mean of Group 1 was significantly different from the means of Group 2 ( $p = .036$ ) and Group 3 ( $p = .001$ ). For other variables ANOVA tests showed there were no significant differences among 3 group means.

Table 14

*Descriptive Statistics and ANOVA Tests for Motivating Factors*

# of Var.	Group 1		Group 2		Group 3		ANOVA Tests <i>F, p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
m1	3.10	0.88	3.75	0.87	3.92	1.16	$F(2, 32)=2.18, p = .13$
m2	3.10	0.88	3.75	1.36	3.33	1.07	$F(2, 31)=0.94, p = .40$
m3	3.70	0.82	4.08	0.90	4.00	1.08	$F(2, 32)=0.48, p = .62$
m4	2.90	1.29	3.83	1.03	4.38	0.65	$F(2, 32)=6.33, p = .005^{**}$
m5	2.90	1.29	3.50	1.67	4.00	1.08	$F(2, 32)=2.50, p = .098$
m6	3.00	0.94	3.75	1.14	3.92	0.86	$F(2, 32)=2.69, p = .084$
m7	3.50	1.08	3.83	1.19	4.00	1.08	$F(2, 32)=0.57, p = .57$
m8	3.11	0.78	3.25	1.29	3.46	0.88	$F(2, 31)=0.33, p = .72$
m9	3.10	0.88	3.58	1.38	3.62	0.96	$F(2, 32)=0.74, p = .49$
m10	4.00	0.86	4.00	1.27	4.36	0.81	$F(2, 28)=0.46, p = .64$
m11	3.50	0.53	3.67	1.30	3.77	1.17	$F(2, 32)=0.18, p = .84$
m12	3.00	1.05	3.42	1.38	3.62	1.26	$F(2, 32)=0.68, p = .51$
m13	2.89	0.93	3.83	0.84	3.42	1.44	$F(2, 30)=1.84, p = .17$
m14	2.56	0.88	3.33	1.23	3.38	1.19	$F(2, 31)=1.67, p = .21$
m15	2.56	0.88	3.33	1.16	3.46	1.27	$F(2, 31)=1.86, p = .17$
m16	2.60	0.70	3.33	1.23	2.75	1.14	$F(2, 31)=1.50, p = .24$
m17	2.80	0.92	3.33	1.37	2.31	1.18	$F(2, 32)=2.33, p = .11$
m18	3.60	0.84	4.08	0.79	3.85	1.14	$F(2, 32)=0.70, p = .50$
m19	3.10	0.88	3.17	1.34	2.85	0.88	$F(2, 32)=0.28, p = .76$
m20	3.10	0.88	3.50	1.17	3.46	1.05	$F(2, 32)=0.48, p = .63$
m21	4.30	0.68	4.00	1.35	3.85	1.14	$F(2, 32)=0.48, p = .63$
m22	4.50	0.71	4.65	0.674	4.50	0.80	$F(2, 30)=0.13, p = .88$

Note: \*\*  $p < .01$ . The range of mean scores is from 1=*Strongly Disagree* to 5=*Strongly Agree*. The # of variable was consistent with the # of variable in Table 13.

The results of Phase I indicated 21 specific factors as impeding factors for faculty use of LORs. Except for one specific impeding factor, “Non-updated Courses”, all the other specific

factors were considered as dependent variables in Phase II analysis. Table 15 presents the label, total mean score, and standard deviation of each variable.

Table 15

*Descriptive Statistics and Impeding Factors*

# of Var.	Dependent variables	Total	
		<i>M</i>	<i>SD</i>
b1	Uselessness	2.68	1.32
b2	No help for tenure	2.91	1.25
b3	Course-unfit	2.77	1.26
b4	Learning outcome-unfit	2.94	1.26
b5	Low quality	2.74	1.27
b6	LOs' quantity is not enough	3.29	1.26
b7	Concerns about LOs' stability and Persistence	3.23	1.19
b8	Time constraint	2.80	1.23
b9	Lack of Ease of Use for faculty	3.03	1.18
b10	Department culture	2.54	0.98
b11	DIY in LOs (Creating your own LOs)	3.00	1.24
b12	Other resources competition	3.00	1.23
b13	Curriculum limitation	2.26	1.16
b14	Course be sold	2.09	1.12
b15	Course storage limitation	2.49	1.20
b16	Budget limitation	2.37	1.24
b17	LOR Copyright limitation	2.97	1.10
b18	Against change	2.51	1.12
b19	Lack of Familiarity with LORs	2.49	1.20
b20	No confidence in using an LOR	2.26	1.34

*Note:* The range of mean scores is from 1=*Strongly Disagree* to 5=*Strongly Agree*

Table 16 presents the groups' mean scores and standard deviations for each variable related to impeding factors, and the F scores and p values of ANOVA tests.

Descriptive statistics showed the feature of the dataset as the following.

- For 2 out of 20 variables, all 3 group means were higher than 3.0 (*No Opinion*), and tended toward 4.0 (*Agree*). These variables were b6 and b7.
- For 1 out 20 variables, 2 group means were higher than 3.0 (*No Opinion*), and tended toward 4.0 (*Agree*). This variable was b9.

- For 10 out of 20 variables, 1 group mean was higher than 3.0, and tended toward 4.0 (*Agree*). These variables were b1, b2, b3, b4, b5, b8, b11, b12, b15, b19.
- For other 7 out of 20 variables, no single group mean was higher than 3.0 (*No Opinion*). These variables were b10, b13, b14, b16, b17, b18, and b20.

An ANOVA test showed that for variable b19, there was a significant differences on 3 group means,  $F(2, 32) = 3.99, p = .028$ . The (LSD) post hoc test indicated the means of Group 2 and Group 3 ( $p = .009$ ) were significantly different with each other. For other variables, ANOVA tests show there were no significant differences among 3 group means.

Table 16

*Descriptive Statistics and ANOVA Tests for Impeding Factors*

# of Var.	Group 1		Group 2		Group 3		ANOVA Tests <i>F, p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
b1	3.10	1.29	2.73	1.27	2.31	1.38	$F(2, 31)=1.03, p =.37$
b2	2.70	1.06	3.08	1.51	2.92	1.19	$F(2, 32)=0.25, p =.78$
b3	3.30	0.95	2.92	1.31	2.23	1.36	$F(2, 32)=2.22, p =.13$
b4	3.30	0.95	2.92	1.17	2.69	1.55	$F(2, 32)=0.65, p =.53$
b5	3.10	1.10	2.83	1.34	2.38	1.33	$F(2, 32)=0.94, p =.40$
b6	3.30	1.34	3.33	1.30	3.23	1.54	$F(2, 32)=0.02, p =.99$
b7	3.50	0.85	3.08	1.31	3.15	1.35	$F(2, 32)=0.36, p =.70$
b8	3.20	0.79	3.00	1.35	2.31	1.32	$F(2, 32)=1.81, p =.18$
b9	3.20	1.23	3.25	1.06	2.69	1.25	$F(2, 32)=0.84, p =.44$
b10	2.50	0.70	2.75	1.14	2.38	1.04	$F(2, 32)=0.43, p =.65$
b11	2.40	0.97	3.00	1.28	3.46	1.27	$F(2, 32)=2.23, p =.12$
b12	3.67	0.87	2.83	1.12	2.69	1.38	$F(2, 31)=1.94, p =.16$
b13	1.89	0.78	2.58	1.17	2.23	1.36	$F(2, 31)=0.92, p =.49$
b14	2.10	0.88	2.42	1.31	1.77	1.09	$F(2, 32)=1.04, p =.36$
b15	2.30	0.95	3.08	1.08	2.08	1.32	$F(2, 32)=2.60, p =.09$
b16	2.40	0.70	2.75	1.56	2.00	1.23	$F(2, 32)=1.16, p =.33$
b17	2.90	0.99	3.00	1.13	3.00	1.23	$F(2, 32)=0.03, p =.97$
b18	2.60	1.08	2.50	1.17	2.46	1.20	$F(2, 32)=0.42, p =.96$
b19	2.60	1.17	3.08	1.24	1.85	0.90	$F(2, 32)=3.99, p =.028^*$
b20	1.90	0.88	2.42	1.51	2.38	1.50	$F(2, 32)=0.49, p =.62$

*Note: \*  $p < .05$ . The range of mean sore is from 1=Strongly Disagree to 5=Strongly Agree. The # of variable was consistent with the # of variable in Table 15.*

#### 4.3.3. LOR Specific Features in Faculty's Perceptions

Phase I of the study indicated that specific Orange Grove characteristics either motivated or impeded faculty to use Orange Grove. They were Open Text book, LMS Integration, Open Textbooks' Low Quality, No Streaming Server, and Fit to K-12 Education. The first two characteristics were motivating factors, and the last three were impeding factors.

In the study, not every college or university listed in Table 7 has implemented the LMS integration of Orange Grove. Only the faculty of the college or university that had already implemented the LMS integration could access Orange Grove through LMS directly. Out of 18 respondents of the Orange Grove survey, 11 reported that they could access Orange Grove through LMS directly, and 7 reported that they could not access Orange Grove through LMS directly. I assigned the 11 respondents who could access Orange Grove through LMS directly into Group A, and the 7 respondents who could not access Orange Grove through LMS directly into Group B. An ANOVA test showed that the LMS Integration had a significantly stronger effect on motivating Group A respondents to use Orange Grove ( $n = 11, M = 3.36, SD = 1.12$ ) than on motivating Group B respondents to use Orange Grove ( $n = 7, M = 1.86, SD = 1.07$ ),  $F(1,16) = 8.06, p = .012$ .

Table 17 presents the total mean scores, group mean scores, and the results of the ANOVA tests of the other four motivating or impeding factors.

The descriptive statistics showed the feature of the dataset as the following.

- For the Open Textbooks as a motivating factor, all the 3 group means were higher than 3.0 (*No Opinion*), and tended toward 4.0 (*Agree*).
- For Open Textbooks' Low Quality as a barrier, the mean of Group 3 was higher than 3.0 (*No Opinion*), and tended toward 4.0 (*Agree*).

- For No Streaming Server as a barrier, the mean of Group 1 was higher than 3.0 (*No Opinion*), and tended toward 4.0 (*Agree*).
- For K-12 Education as a barrier, no single group mean was higher than 3.0 (*No Opinion*).

The ANOVA tests showed that for the four motivating or impeding factors, there were no significant differences among 3 group means.

Table 17

*Specific Orange Grove Characteristics*

Variables	Total		Group 1		Group 2		Group 3		ANOVA <i>F, p</i>
	<i>N</i>	<i>M</i>	<i>n</i>	<i>M</i>	<i>n</i>	<i>M</i>	<i>n</i>	<i>M</i>	
Open Textbooks	18	3.67	9	3.67	7	4.00	2	3.50	$F(2,15)=0.39, p =.69$
Open Text Books' Low Quality	18	2.50	9	2.56	7	2.14	2	3.50	$F(2,15)=1.41, p =.28$
No Streaming Server	18	3.06	9	3.33	7	2.86	2	2.50	$F(2,15)=0.76, p =.48$
Fit K-12 Education	15	2.87	7	2.86	6	3.00	2	2.50	$F(2,12)=0.13, p =.89$

*Note:* The range of mean is from 1=*Strongly Disagree* to 5=*Strongly Agree*.

According to the literature review (see chapter 2, section 2.4), the Wisc-Online has several characteristics that are unique to it. The specific Wisc-Online characteristics are Facebook, Gamebuilder, and Cost of Downloading LOs and Gamebuilder. In this study, the Gamebuilder and Facebook were assumed to be motivating factors for faculty use of Wisc-Online, while the Cost of Downloading LOs and Gamebuilder was assumed to be an impeding factor for faculty use of Wisc-Online.

Table 18 presents the total mean scores, group mean scores, and the results of ANOVA tests of these specific motivating or impeding factors. ANOVA tests showed that for all these factors, there were no significant differences among 3 group means. The descriptive statistics showed the feature of the dataset as the following.



- For Gamebuilder as a motivating factor, all the 3 group means were higher than 3.0 (*No Opinion*), and tended toward 4.0 (*Agree*).
- For Facebook as a motivating factor, the mean of Group 2 was higher than 3.0 (*No Opinion*), and tended toward 4.0 (*Agree*).
- For the Cost of Downloading LOs and Gamebuilder as an impeding factor, no single group mean was higher than 3.0 (*No Opinion*).

Table 18

*Specific Wisc-Online Characteristics*

Variables	Total		Group 1		Group 2		Group 3		ANOVA <i>F, p</i>
	<i>N</i>	<i>M</i>	<i>n</i>	<i>M</i>	<i>n</i>	<i>M</i>	<i>n</i>	<i>M</i>	
Gamebuilder	18	3.88	1	4.00	5	3.80	11	3.91	$F(2,15)=0.39, p =.69$
Facebook	18	2.29	1	3.00	5	3.20	11	2.27	$F(2,15)=0.33, p =.99$
Cost of Downloading LOs and Gamebuilder	15	2.31	1	3.00	4	2.08	8	2.38	$F(2,12)=0.13, p =.89$

*Note:* The range of mean is from 1= *Strongly Disagree* to 5 = *Strongly Agree*

The survey also collected narrative data using open-ended questions from 6 respondents to the Wisc-Online survey and 4 respondents to the Wisc-Online survey, which revealed the factors that motivated or impeded respondents to use the LORs. The data were coded by the final coding scheme developed in the Phase I of the study. The coding scheme captured all the data.

#### 4.4. Summary

This chapter presented results from data analysis of both phases of the study. Phase I used content analysis to analyze interview data, and identified 22 specific factors as motivating faculty use of LORs and 21 specific factors as impeding faculty use of LORs. In Phase II, these identified factors were examined by descriptive statistics and ANOVA based on survey data collected from faculty and instructional staff users of two LORs, Orange Grove and Wisc-Online, and provided evidence in support of the 22 specific motivating factors and 13 specific

impeding factors, but no evidence was found to support the other 8 impeding factors. This chapter also reported the results about respondents' demographic and usage information.

## CHAPTER 5

### FINDINGS, DISCUSSIONS, AND CONCLUSIONS

#### 5.1. Introduction

The primary purpose of the study was to identify and explore the factors that motivate or impede faculty use of learning object repositories (LORs). The study used a mixed method approach research design to achieve this purpose, and the unified theory of acceptance and use of technology (UTAUT) served as the theoretical framework to explore these factors. The data analysis results from both phases of the study were presented in chapter 4. This chapter uses the results of Phase I and II to develop a set of findings and to answer the research questions. These provide a basis for discussion of the implication of the results and for recommendations for future research. This chapter also points out the limitations of the study.

#### 5.2. Answers to Research Questions

The study investigated the factors affecting faculty use of LORs, using the following two research questions to guide the study:

RQ1: What are the factors that motivate faculty use of LORs?

RQ2: What are the factors that are barriers for faculty use of LORs?

Phase I identified the factors that motivate or serve as barriers for faculty use of LORs. Phase II provided more evidence to support the results of Phase I. Based on the results of both phases of the study, the research questions were answered. For RQ1, 22 specific factors were identified; for RQ2, 13 specific factors were identified. Group 1, Group 2, and Group 3 represented faculty members who had not used, planned to use, and had used the LORs, respectively. In the study, at least one of the three groups considered all or some factors to be

motivating factors or barriers for them to use the LORs. Table 19 presents these factors. The definitions and data examples of the factors can be found in chapter 4, section 4.2.1.

Table 19

*Factors Affecting Faculty Use of LORs*

Specific factors		Faculty user groups		
Motivators	<i>Barriers</i>	Group 1	Group 2	Group 3
Usefulness		+	+	+
	<i>Uselessness</i>	-		
Reduce Students' Education Costs		+	+	+
	<i>No Help for Tenure</i>		-	
Education Environment-fit		+	+	+
Course Supplement			+	+
Course-fit			+	+
	<i>Course-unfit</i>	-		
Support Active Learning		+	+	+
	<i>Learning Outcome-unfit</i>	-		
	<i>Concerns about LOs' Stability and Persistence</i>	-	-	-
High Quality			+	+
	<i>Low Quality</i>	-		
Save Time		+	+	+
	<i>Time Constraint</i>	-		
Convenient for Teaching		+	+	+
Free		+	+	+
Advance Students' Learning		+	+	+
	<i>Inadequate Quantity</i>	-	-	-
Ease of Use for Faculty			+	+
Ease of Use for Students			+	+
	<i>Lack of Ease of Use</i>	-	-	
Peer's Influence			+	+
Students' Feedback			+	+
Institution Facilitation		+	+	+
Instructional Staff's Facilitation		+	+	
LOR Promotion			+	
Copyright Facilitation		+	+	+
State Facilitation			+	
Belief in Sharing		+	+	+
Enjoy Using Technology		+	+	+
	<i>Create Your Own LOs</i>			-
	<i>Other Resources' Competition</i>	-		
	<i>Course Storage Limitation</i>		-	
	<i>Lack of Familiarity with LORs</i>		-	

*Note:* Italics indicate barriers. + indicates motivating effect. - indicates impeding effect. Group 1=faculty who had not used LORs; Group 2=faculty who planned to use LORs; and Group 3=faculty who had used LORs.

### 5.3. The Implication of UTAUT on Faculty Use of LORs

This study used UTAUT as a theoretical framework. It provided dimensions and constructs into which the factors in Table 19 were classified. UTAUT uses 7 dimensions and 19 constructs to examine the behavior of user acceptance of new technologies (see Table 1). UTAUT defines 4 out of 7 dimensions as direct determinants of user acceptance of new technologies.

- Performance expectancy: “the degree to which an individual believes that using the system will help him or her to attain gains in job performance” (Venkatesh et al., 2003, p. 447)
- Effort expectancy: “the degree of ease associated with the use of the system” (Venkatesh et al., 2003, p. 450)
- Social influence: “the degree to which an individual perceives that important others believe he or she should use the new system” (Venkatesh et al., 2003, p. 451)
- Facilitating conditions: “an individual believes that an organizational and technical infrastructure exists to support use of the system” (Venkatesh et al., 2003, p. 453).

The other 3 dimensions are attitude toward using technology, self-efficacy, and anxiety, which UTAUT does not find have direct effects on user acceptance of new technologies.

UTAUT does not define specific factors to address user acceptance of a specific technology system. Instead, it provides dimensions and constructs to understand acceptance behavior. These dimensions and constructs are general and broad. In this study, 22 identified motivating factors and 12 identified impeding factors were classified into 10 constructs under the 4 direct determinate dimensions of user acceptance of new technologies defined by UTAUT. The other one identified impeding factor was classified into the construct under the self-efficacy

dimension, that is, the “judgment of one’s ability to use a technology (e.g., computer) to accomplish a particular job or task” (Venkatesh et al., 2003, p. 432). Data analysis resulted in no specific factors being classified into the dimensions of attitude toward using technology and anxiety. Although self-efficacy dimension is not defined as the direct determinant of user acceptance of new technologies by UTAUT, this study found that the impeding effect of the specific factor (Lack of Familiarity with LORs) that was classified under self-efficacy dimension was significant on faculty use of LORs. Thus this study included the self-efficacy dimension with the 4 direct determinant dimensions of user acceptance defined by UTAUT to account for factors affecting faculty use of LORs. The credibility of this classification was checked by inter-coder reliability in Phase I (see chapter 3, section 3.2.3), and examined by Cronbach’s alpha in Phase II (see Table 5 and Table 6). The results of the reliability check and Cronbach’s alpha tests indicated the credibility of this classification was acceptable. Thus, UTAUT provides a theoretical guide from dimension and construct perspectives to understand the factors that motivate or serve as barriers for faculty use of LORs, and the results of the study also validate UTAUT in the context of faculty use of LORs.

Table 20 presents these dimensions, constructs, and their relationships with the specific motivating or impeding factors that affect faculty use of LORs. Some constructs only hold motivating factors or impeding factors; for example, facilitating conditions only has motivating factors, and behavior control only has impeding factors. Some constructs, however, include both motivating and impeding factors. For example, UTAUT defines the construct, relative advantages, as “the degree to which using an innovation is perceived as being better than using its precursor” (as cited in Venkatesh et al., 2003). The degree can be understood as both positive and negative, so, relative advantages construct includes both motivating and impeding factors.

Table 20

*Dimensions and Constructs Used in the Study*

Dimensions	Constructs	Specific factors
Performance expectancy	Perceived usefulness	Usefulness
		<i>Uselessness</i>
	Extrinsic motivation	Reduce Students' Education Costs
		<i>No Help for Tenure</i>
	Job-fit	Education Environment-fit
		Course Supplement
		Course-fit
		<i>Course-unfit</i>
		Support Active Learning
		<i>Learning Outcome-unfit</i>
	Relative advantages	<i>Concerns about LOs' Stability and Persistence</i>
		High Quality
		<i>Low Quality</i>
		Save Time
		<i>Time Constraint</i>
Convenient for Teaching		
Free		
Effort expectancy	Ease of Use	Ease of Use for Faculty
		Ease of Use for Students
Social influence	Subjective norm	<i>Lack of Ease of Use</i>
		Peer's Influence
Facilitating conditions	Facilitating conditions	Students' Feedback
		Institution Facilitation
		Instructional Staff's Facilitation
		LOR Promotion
	Compatibility	Copyright Facilitation
		State Facilitation
		Belief in Sharing
		Enjoy Using Technology
Behavior control	Behavior control	<i>Create Your Own LOs</i>
		<i>Other Resources' Competition</i>
Self-efficacy	Self-efficacy	<i>Course Storage Limitation</i>
Self-efficacy	Self-efficacy	<i>Lack of Familiarity with LORs</i>

Note: Italics indicate barriers.

5.4. Findings and Implications

The purpose of the research was to identify and explore the factors that motivate or serve as barriers for faculty use of LORs. I conducted two phases of the study to achieve this purpose.

Based on the results of both Phases I and II, this section presents a set of findings I has developed. The findings and results of the study can inform designers and managers of LORs about what positively or negatively influences faculty use of LORs, and serve as a basis to develop strategies to recruit faculty members to use LORs, and ensure funders that their investments in LORs will bring the educational benefits they expect. This section describes the findings and discusses their implications in encouraging faculty to use LORs.

#### 5.4.1. LORs' Values Attract Faculty to Use Them

The study revealed that all 3 groups of faculty respondents to the Orange Grove and Wisc-Online surveys considered 12 specific factors as motivating them to use the LORs (see Table 19). The 12 motivating factors reflect that LORs generally attract faculty from the aspects of (1) perceived usefulness, (2) extrinsic motivation, (3) job-fit, (4) relative advantages, (5) facilitating conditions, and (6) compatibility. The following discusses each of these constructs of UTAUT with influences of specific factors.

(1) Perceived usefulness: Faculty generally believe that using LORs would enhance their performance in teaching or course design. In the study, most faculty members gave a positive evaluation to the LORs. For example, an interviewee said: "I personally think Orange Grove is an excellent resource for online instructors," and a respondent to the Wisc-Online survey provided "it is very useful" as the answer to the open-ended item regarding the reasons that faculty had used Wisc-Online.

(2) Extrinsic motivation: Faculty have compassion for students' education costs, so reducing students' education costs becomes an extrinsic motivation for faculty use of LORs. For example, interviewees said: "There are many faculty being interested in it (Orange Grove), especially the students complain that the cost of the textbooks is more and more high. It is really



a valuable option,” and, “We consider the cheaper way to provide students high quality resources”.

(3) Job-fit: LORs have the capability to facilitate faculty in teaching and course design. LORs can support teaching and course design in different education environments: face-to-face, online, and blended courses, as one interviewee said: “I think what Orange Grove provides is not only for distance learning courses. It is supplemental materials for face to face courses as well, and they can be delivered by the learning management system for any course not only for online course.” In the literature review, the study of Shea et al. (2006) showed that the faculty members who commit to teaching online are more likely to use LORs. However, in this study as Figure 4 showed, in the group of respondents who had used the LORs, the proportion of the number of faculty members who taught face-to-face courses to that of faculty members who taught online courses is 10 to 7. In the group of respondents who planned to use the LORs, the proportion of the number of faculty members who taught face-to-face courses to that of faculty members who taught online courses is 7 to 4. These results indicate for both these groups, the faculty members who teach face-to-face courses are likely to use LORs as well as those who teach online courses. In addition, faculty consider LORs as good education resources to provide supplemental materials for their courses, and they like to go to LORs to look for learning objects (LOs) that can support active learning. One interviewee said: “A lot of items in the Orange Grove or other LORs are practical.” Another interviewee said: “The LO provides an interesting way to move students through some process, learning, developing, and enhancing skills.”

(4) Relative advantages: Compared to other education resources, using LORs is convenient for teaching and can help students learn better. A respondent to the Wisc-Online survey reported: “Students enjoy it because in my country it is still a rarity.” Using LORs can

also increase the reusability of LOs and saves faculty members' time. For example, interviewees said: "There are other persons' productions you can harvest and reuse," "if I can find a LO in the Orange Grove, it may save me hours of work. It prevents me from having to do it by myself," and "it does not cost a penny for us to have it."

(5) Facilitating conditions: Higher education institutions normally are open to good education resources. Although an institution may not have specific policies to motivate faculty to use LORs, some departments and committees take promoting good education resources as their responsibility. For example, one interviewee said: "I am a member of the campus technology committee. It is a committee trying to understand what resources the faculty can use." The library of University 1 introduces Orange Grove as one of its resources. Different from several previous studies (ANTA, 2003a; Caris, 2004; Margaryan et al., 2006) that mentioned that lack of copyright governing use is a barrier for users to use LORs. This study found that the copyright statements of both Orange Grove and Wisc-Online are very clear, which define who can use and how to use the LOs in the LORs. The respondents to the Orange Grove and Wisc-Online surveys considered the copyright statements as facilitating their use of the LORs.

(6) Compatibility: The services LORs provide are consistent with faculty members' belief in sharing good education materials and the intention to use technology. Margaryan et al. (2006) found a lack of culture of sharing education materials in higher education, but this lack does not mean faculty do not want to share education materials. This study found that faculty members do like to share education materials, as interviewees said: "I believe in sharing good content," and, "I think it is a good place for faculty to share." Faculty also enjoy using technology in their teaching and course design, as one interviewee said: "Now, I use so much interactive digital content, then when you take it away from me, I cannot enter (a classroom to)

face my students at all. I feel really handicapped without my technology.” LORs are recognized as applications of information technology in the education area (Abernethy et al., 2005). The concept of an LOR is consistent with these beliefs.

This discussion has indicated that there are clear motivators for faculty to use LORs. LOR designers and promoters can build on this finding about LORs to attract more users.

#### 5.4.2. The Critical Issues Impeding Faculty Use of LORs and Strategies to Minimize the Effects of These Issues on Faculty Use of LORs.

The study identified 13 specific factors that serve as barriers for faculty use of LORs. These factors indicate the reasons that some faculty members have not used LORs, the concerns that make some faculty members hesitate to use LORs, and the difficulties faculty members experienced during using LORs. The reasons, concerns, and difficulties reflect the critical issues that impede faculty use of LORs in aspects of (1) perceived usefulness, (2) extrinsic motivation, (3) job-fit, (4) relative advantages, (5) complexity, (6) compatibility, (7) behavior control, and (8) self-efficacy. The following discusses each of these constructs of UTAUT with influences of specific factors, and also proposes the strategies to minimize the impeding effects of these issues on faculty use of LORs.

(1) Perceived usefulness: Although LORs are generally perceived as useful education resources by faculty, an individual faculty may think LORs are not useful to him or her. For example, an interviewee said: “It (Orange Grove) is very nice but there is nothing useful to me.” No perceived usefulness is a general issue used to express the reasons that faculty do not use LORs. The reasons behind this general issue are reflected in other constructs.

(2) Extrinsic motivation: Using LORs is not viewed as a scholarly activity, so the fact that using LORs does not help faculty get tenure is an issue that impedes faculty use of LORs.

The strategy to deal with this issue is to get support from university or college policies to encourage faculty to use LORs by giving credit and rewarding the faculty. It is not easy to get the support from universities or colleges to include using LORs into faculty tenure and promotion process, but the results of the study indicate generally higher education institutions are open to good education resources, such as LORs. Thus, it is possible to offer credit to faculty to use LORs. One interviewee mentioned her institution gave faculty credit for attending workshops or trainings as a way to build up faculty members' professional development.

(3) Job-fit: The issues reflected by this construct are lack of suitable LOs and concerns about the stability and persistence of LOs. Lack of suitable LOs is the main reason that faculty do not use LORs. This lack mainly refers to the lack of LOs that are relevant to the courses faculty members teach, that fit the learning outcome faculty members expect, or are in the formats faculty members want. In this study, several interviewees discussed this issue, such as “I looked the subject I am teaching; I did not find anything that helps me in my teaching;” and, “I am looking for mixed-media material, not warmed over print oriented resources.” Several previous studies also revealed this issue is a significant barrier for faculty use of LORs (Margaryan & Currier, 2006; Margaryan et al., 2006). In Shea et al.'s (2006) study, “lack of relevant content” was listed as the top reason that faculty had not used MERLOT.

This study also found that faculty expressed concerns about the stability and persistence of LOs in an LOR. One interviewee said: “It is there today, but how about tomorrow? You link to it there, the person who put it to there may change it.” In the literature review, no previous studies mentioned this issue. The study also found faculty prefer to use an LO by linking to it directly rather than downloading and then combining to courses. This usage preference makes the stability and persistence of LOs more important for faculty to use an LOR.

To address these issues, the following strategies are proposed:

- Identify the disciplines that most LOs address, and then promote the LOR to the faculty in these disciplines. At the same time, identify the disciplines which have the strong need for LOs, and then to develop the collections of LOs relating to these disciplines. Based on the experiences, the LOR may expand the LO collections gradually to meet the need of more faculty members in more disciplines. In this study, most LOs in Orange Grove are about math and nursing; one interviewee who was also an OG Scholar said: “we found the very specific items that were for the College of Health Professions, nursing examples, medication examples, patient interaction examples. We went to there to show them very specific items instead of generally what Orange Grove can do.” About the development of Orange Grove, another interviewee said: “I have been involved in Orange Grove since it first started talking about it... when we first were developing Orange Grove, one of the things which we were really pushing was to try to find those courses which students often did not pass, like math.” The results of the study show that about one third of the respondents to the Orange Grove survey were from Mathematics, and Nursing and Healthcare disciplines.
- Focus on developing the types of LOs which faculty prefer to use. Margaryan (2006) mentioned the most reused and repurposed education materials are PowerPoint presentations, bibliographies, learning activities, images, and assessment materials. However, the results of this study show faculty are more interested in LOs that can support active learning and present a concept in multiple ways. For example, one interviewee wanted LOs that “provide an interesting way to move students through

some process, learning, developing, and enhancing skills.” Another interviewee wanted: “more games, simulation,” and expected “the content more interactive.”

- Implement version control and assign each LO a persistent URL. The policy of an LOR should notify contributors that withdrawing LOs is not encouraged and has negative consequences on users. If an LO is withdrawn, the reason and notice should be sent to every faculty user by email.

(4) Relative advantages: The issues reflected by this construct are quality, quantity, and time issues. Facing the competition of other resources, such as published materials, digital archives, libraries, personal websites, and the like, how does a faculty member decide to choose an LOR? The quality of LOs is an important criterion. Unfortunately, faculty have the impression that LORs do not have high quality LOs, although this impression may not be true. One interviewee said: “The struggle I have is to get faculty to actually look at them. They usually have the impression that there is not good stuff there.” Another issue is inadequate quantity. Lack of enough LOs limits faculty use of LORs, as one interviewee said: “I think what is there is good. But the main problem we have is that we need more.” The time constraint is also an issue. One interviewee said: “No time to learn it. No time to search.”

As to these issues, four strategies are proposed:

- Build up the reputation by increasing and promoting the quality of LOs. Make policies to ensure LOs’ quality, such as peer-review, quality control, contribution standards, and the like. One interviewee commended the quality of LOs in Orange Grove: “I think the content is high quality and I think it is peer-reviewed. It has high credibility.” If an LOR really has high quality LOs, advertising the quality of LOs is an important way to correct the misperceptions and build up reputation.

- Encourage contribution by offering time or grants to create LOs, or credits for professional development, etc. One respondent to the Wisc-Onlien survey suggested offering some credits to the developers. An interviewee said: “When they offered the items, normally they asked the questions how these go through the peer review and how these adjusted to my promotion.”
- Make LOs in other resources (e.g., LORs) available to increase LOs’ quantity. The Orange Grove uses the federated search to allow users to search materials in other resources, such as ABC Online (Australia), North Carolina-NCLOR, the Library of Congress, and the like. One interviewee said: “In Orange Grove, there are links to other LORs where there are more available materials.” Although these materials are not stored in Orange Grove, and faculty may not obtain them directly, it provides a way for faculty to find more LOs.
- Encourage faculty to use new technologies and attend LORs’ trainings and workshops by offering faculty time, for example including using LORs in faculty’s workload, is a way to break the time constraint on faculty use of LORs. One interviewee said: “We use quality matter that is a standard for online instruction and hybrid courses, and standard source to do with resources and materials.”

(5) Complexity: This addresses the issue that an LOR is perceived as relatively difficult to understand and use. The LOR is built to facilitate faculty using LOs. If it is not easy to use, the goals for building it cannot be achieved. For example, one respondent to the Wisc-Online survey reported: “the email result links are all broken and interactive results cannot be reported to the instructor, which makes good objects worthless.” An interviewee also said: “One thing I

complain to the Orange Grove is the searching function is not good. ... If it takes a long time to find something, they will be discouraged.”

Two strategies may deal with this issue.

- This study found Ease of Use for Faculty and Ease of Use for Students are two motivating factors for faculty use of LORs. All methods which can strengthen these motivating factors will minimize the impeding effect of complexity, such as providing technology assistance, removing problems, maintaining the LOR in time, treating user’s feedback seriously, and operating quality control.
- Bring metadata into play to support user tasks, such as finding, identifying, selecting, and obtaining LOs (IFLA, 2010). In this study, one interviewee suggested allowing LO contributors to tag LOs: “in Orange Grove, there is a form for the contributor to tag it with the class number, subjects, and other metadata information that makes sense and makes people easy to find it.”

(6) Compatibility: The study found some faculty members like to use LOs created by themselves. One interviewee said: “people do not like to adopt others’ materials. They want to create their own materials.”

As to this issue, providing good tools for faculty to create their LOs is proposed as a way to attract faculty to use LORs. Wisc-Online provides Gamebuilder for faculty to create their own games. A respondent to the Wisc-Online survey reported a reason he or her used the Wisc-Online was: “I love the games I have built. They really help students to learn.” In addition it is assumed that a faculty member who uses the tool provided by an LOR to create LOs would be more likely to contribute the LOs to the LOR. This strategy may also be a way to increase the quantity of LOs.



(7) Behavior control: Shea et al. (2006) mentioned the fact that faculty had already had a lot of other education resources was a big reason that faculty did not use MERLOT. This study also found the competition of other resources is a barrier for faculty using LORs. These resources include publishers, other online resources, local department or institutional resources.

As to this issue, the proposed strategy is to promote an LOR by demonstrating other faculty members' successful experience in using the LOR. One interviewee said: "One thing is next semester I will use an open source textbook which is available in Orange Grove...Several people tell me they want to see how it works and how students respond to." Margaryan (2006) commented that because users trust their peers, peers can influence a user's decision of using LORs. In this study, the interviewees and survey respondents did not talk about trust, but they emphasized the effects of peers' successful use and students' feedback in motivating them to use the LORs, which are reflected by subjective norm construct of UTAUT. Subject norm addresses a person's perception that most people who are important to him or her think he or she should or should not perform a behavior (as cited in Venkatesh et al., 2003).

(8) Self-efficacy: Caris (2004) pointed an important reason that faculty do not use LORs, is that they are not familiar with LORs. This study found lack of familiarity with the LORs had a significant impeding effect on faculty members who planned to use the LORs.

The best way to make faculty more familiar with LORs is to provide training and workshops to promote LORs on campus. One interviewee said: "to go to these people, to tell people what is available, that really builds it (Orange Grove) up." Actively promoting LORs on campus will increase faculty familiarity of LORs.

To introduce an LOR to faculty and assist them to use the LOR, instructional staff play an important role. The next section discusses the findings relating to instructional staff.

#### 5.4.3. Instructional Staff's Role in Helping Faculty Use of LORs

Instructional staff members play a very important role in helping faculty use LORs. The organizations in which instructional staff members work are commonly recognized as faculty support centers. These centers have the responsibility to introduce good instructional strategies and education resources to faculty, and instructional staff members provide assistance for faculty using LORs. Based on the results of the study, I determined the instructional staff's role in faculty use of LORs can be characterized as:

- Early adopter: Instructional staff members normally are familiar with LORs, and they have expertise in using LORs. Some of them not only assist faculty teaching or course design, but also teach or design courses themselves. They are more likely to be early adopters of LORs. The instructional staff interviewee said: "As LORs, like MERLOT and Orange Grove, I looked at them a lot." Another instructional staff interview said: "now we are ready to look at the open access textbooks. That is the piece we are most interested in now."
- Promoter: Instructional staff members normally have the perception and responsibility to introduce good education resources and technologies to faculty. They are LOR's promoters. One instructional staff interviewee said. "We try to promote good strategies to teaching, so an LOR is a good tool to use. We try to promote those." The study found that about 22% respondents to the Orange Grove survey and 10% respondents of the Wisc-Online survey were aware of the LORs by promotions from faculty centers (See Figure 7).

- Helper: Instructional staff help faculty in teaching and course design. One instructional staff interviewee said: “We tell them if there are specific resources you are lacking in your courses, let us know and we can help.”
- Ambassador: An LOR’s builders or managers may make the LOR available to faculty on campus through instructional staff, such as implementing LMS integration. At the same time, instructional staff members are assumed to give feedback about the LOR’s usage situation on campus to LORs’ builders and managers. One instructional staff interviewee said: “The new thing is the Orange Grove integration. We recommend the new thing now ... It is still on the test server now. In the Fall we will have a technology day, when we will invite all faculty to come; during that day we will do a demonstration.”

Given the roles instructional staff play in faculty use of LORs, it is an effective strategy to recruit faculty users for an LOR by targeting and inviting instructional staff members to introduce and promote the LOR on campus.

#### 5.4.4. Summary of the Ways Faculty Use LORs

This study identified 18 ways faculty use LORs (see Figure 8), which are summarized as the following:

- Using LOs from LORs in teaching or course design, which includes enriching course content, linking to LOs directly, adopting open textbooks, creating new courses, etc.
- Contributing LOs to LORs, which includes contributing LOs, open textbooks, etc.
- Preserving LOs in LORs, which includes establishing a personal collection, etc.
- Learning and teaching, this includes learning how others create LOs, checking what is in LORs, teaching others to use LORs, etc.

- Creating LOs, which includes collaborating with others to create LOs, using the tools provided by LORs to create LOs, etc.

Among these ways, “enrich course content,” “just to see what is there,” and “linking to the learning objects directly” were the top 3 responses in this study. The results indicate that faculty use LORs mainly for supplementing their courses, that faculty are interested in LORs although they may not use LOs from there, and that faculty prefer to use LOs by linking to them.

Learning the ways faculty use LORs provides a better understanding for LOR builders and managers to improve LORs’ services to meet faculty members’ needs. Supporting these patterns of use can strengthen LORs’ attraction to faculty, and increase LORs’ competitive advantages with other resources.

#### 5.4.5. Good Practices and Lessons Learned from Orange Grove and Wisc-Online

The special features of an LOR may motivate faculty to use the LOR, and the deficiencies of a specific LOR may be factors impeding faculty use of the LOR. The purpose of discussing the influence of the specific characteristics of Orange Grove and Wisc-Online on faculty use of the LORs is to identify good practices and lessons learned.

(1) Good practices: The LMS integration tool of Orange Grove makes it easy to access the LOR from within the LMS. The study found LMS integration has a significant motivating effect on faculty members using Orange Grove.

Developing the collection of open textbooks (Texts Plus) is a new focus of Orange Grove. The study found open textbooks is a factor motivating faculty to use Orange Grove.

Wisc-Online provides Gamebuilder as a tool for faculty to create games. Gamebuilder provides templates, such as “Matching,” “Tic-Tac-Toe,” “Jeopardy,” to guide faculty to create

their own games. The study found Gamebuilder is a factor motivating faculty to use the Wisc-Online.

Wisc-Online has Facebook, which is shown on the interface of Wisc-Online. It is convenient for Wisc-Online's faculty users to build user community and collaborate to create LOs. The study found it has a motivating effect on faculty using Wisc-Online.

These specific features of Orange Grove and Wisc-Online provide good practices in the aspects of providing ease of access, creating LOs, enriching LO's types, and building faculty user communities. LOR builders and managers may learn and apply these good practices to their own LORs

(2) Lessons learned: The lack of a streaming video server is an equipment limitation of Orange Grove. This results in time delays to access some LOs. The study found this limitation identified as a barrier for faculty using Orange Grove.

Some faculty interviewees thought the open textbooks' quality is not high: "They are nothing more than a PDF file and there is no interactivity there. You cannot teach math just by letting someone read a PDF file." Faculty members have higher expectations than they would for traditional textbooks. The expectation not only focuses on content, but also on the function. The study found the open textbooks' lack of interactivity is a potential barrier for faculty using Orange Grove.

LOR builders and managers may learn lessons from these deficiencies to avoid the impeding effect on faculty use of LORs resulting from equipment limitations, and learn faculty members' requirements regarding the quality of LOs.

#### 5.4.6. Effective Strategies of Orange Grove and Wisc-Online in Recruiting Faculty Users

An LOR usually adopts either a centralized model, a federated model, or a distributed model (ANTA, 2003a; Matkin, 2002). Wisc-Online is a centralized technical-college-system LOR. The Orange Grove is a statewide federated LOR. Both Wisc-Online and Orange Grove have their own effective strategies in recruiting faculty to use them.

(1) Wisc-Online's effective strategies in encouraging faculty to use it: The study found one important motivating factor for faculty use of LORs is that it contains LOs relating to faculty members' courses. For example, a respondent to the Wisc-Online survey reported the LOs in Wisc-Online "often relate directly to WI Tech College courses," and another respondent reported a reason that he or she used Wisc-Online was "the topics" of LOs. In order to understand the effect of this factor, LOs relating to faculty members' courses, I explored the strategies of identifying faculty members' needs for LOs and developing collections.

Wisc-Online is a centralized technical-college-system LOR. The LOs have been built by faculty, instructional designers, and technicians from Wisconsin Technical College System (WTCS), which includes 16 two-year Wisconsin Technical Colleges. The processes of developing an LO are:

- A faculty builder identifies a topic which is difficult for students to understand and for faculty to teach
- The instructional designer designs an LO on the topic
- The technician creates the LO
- The faculty builder reviews the LO according quality control standards (Wisc-Online, 2011)

These processes lay a solid foundation for Wisc-Online to meet faculty members' needs for LOs. Because the topics of LOs have been identified by faculty from WTCS, the faculty users of WTCS consider the LOs most often relate to their courses.

Although Wisc-Online is built by WTCS, the faculty users of Wisc-Online are not only from WTCS. The three characteristics of LOs, reusable, digital, and having instructional value, determine LOs' positive impacts on education. As Figure 7 shows, 9 out of 20 (45%) respondents to the Wisc-Online survey found the LOR by online searching. As Figure 5 shows that 24 out of 38 (63.2%) respondents to the Wisc-Online and Orange Grove surveys visited the LORs at least once a semester. The results indicate some faculty members from all over the world are searching LORs, and some faculty members keep tracking the development of the LORs. Wisc-Online is open to users from all over the world. Any user can use LOs in Wisc-Online via Internet and by linking to them free. Wisc-Online is easy to use. It supports simple search function. It is easy for users to navigate and browse LOs. Currently 2555 LOs are in Wisc-Online. Based on the disciplines of these LOs, these LOs are classified into 7 categories, such as Business, General Education, and Health (See Figure 6). Under each category, there are subcategories. Because the subcategories and categories are determined by the disciplines of the LOs in Wisc-Online, each subcategory at least has one LO. Open to the users all over the world, free, and ease of use increase the accessibility and usability of Wisc-Online by faculty. The study found that in 20 faculty respondents to the Wisc-Online survey, 30% were from Wisconsin, 55% were from other states than Wisconsin in American, and 15% were from other countries (see Figure 2). According to a statistical result of Biz Information (2011), which provides evaluations of websites, in June 2011, about 39% of users of Wisc-Online were from America, and 61% were from other countries; in 30 days, the average number of daily visitors was 3,552, and the

average number of daily pageviews was 3001. A report of Google Analytics shows that Wisc-Online had 11,054 daily visits and 19,712 daily pageviews on July 27, 2011 (Del Ponte, A. K. to H. Xu, July 29, 2011). These situations indicate that globally, many Internet users are interested in Wisc-Online.

Based on these discussions, the effective strategies of Wisc-Online in attracting faculty use of it are being clearly aware faculty members' needs, developing LOs based on faculty members' needs, open to faculty all over the world, free, and ease of use.

(2) Orange Grove's effective strategies in encouraging faculty to use it: This study found that state facilitation is an important factor in motivating faculty to use LORs. Cooperating with Florida State to get state support and developing Orange Grove Texts Plus (OGT+) collection to respond to faculty members' desire to reduce students' education costs is a key Orange Grove strategy in motivating faculty to use it. For example, one interviewee said: "The state of Florida pushes it (using open textbooks)"; another interviewee said: "One thing is next semester I will use an open source textbook which is available in Orange Grove."

The Orange Grove is a statewide federated LOR. It is supported by the Florida Distance Learning Consortium (FDLC), which consists of 39 public higher education institutions in Florida. It is a big challenge for Orange Grove to identify the FDLC's faculty members' needs in a range of disciplines. However, Orange Grove identifies faculty members' desire to reduce students' education costs, and cooperates with Florida State in developing a collection of open textbooks.

In 2008, the Legislature of the State of Florida enacted House Bill No.603 (2008), which is an act "requiring adoption of specified policies and practices to minimize the cost of textbooks" (p. 1). Textbook Affordability Rule (2009) took effect February 25, 2009 in Florida.



The purpose of the rule is to make textbooks affordable for students. One faculty member said: “That means by law any textbook or material I have my students purchased must be used for them to get a grade in the course, in another words, I cannot have my students to purchase materials that is not used as part of their grade. So that means we must be very careful about choosing our textbooks and online resources.”

In the past two years, Orange Grove has collaborated with The University Press of Florida in making the Orange Grove Text Plus (OGT+) a sub-division of Orange Grove. OGT+ is the collection of open textbooks. A textbook “becomes ‘open’ when its copyright-holder grants usage rights to the public through an ‘open license,’ which typically includes the right to access, download, reformat, and customize it at no additional cost” ( Orange Grove, 2010a). Currently, Orange Grove has 261open textbooks in OGT+. The Fund for the Improvement of Postsecondary Education also funded the Open Access Textbooks Project “to create a sustainable model for Florida and other states to discover, produce, and disseminate open textbooks” (Orange Grove, 2011).

Regarding the question whether open textbooks are LOs, I interviewed two faculty interviewees. One faculty interviewee, who had developed and used LOs for several years, said: “Yes, absolutely. It is just a different type.” Another faculty interviewee, who was also a senior instructional designer, said: “Yes. It is not a small granularity. It is a more complicated LO. It is putting many grains together to create a big thing.”

Textbook Affordability Rule and House Bill No.603 effectively enhance faculty members’ recognition of using the open textbooks to reduce students’ education costs. One interviewee said: “I do support it 100%, and I want to work on that (open textbooks). I have a book and it is already printed, and I would like to put it into there and make it available. I

sympathize the cost of students have to pay when they take a course. The price rises.” The statistical results of the study also indicate that the open textbook has an effect on motivating faculty users’ intention to use Orange Grove.

Providing the federated search service should be an effective strategy in motivating faculty to use Orange Grove, as one interviewee said: “In Orange Grove, there are links to other LORs where there are more available materials.” Faculty can search education materials from other resources, such as the Library of Congress, the North Carolina Learning Object Repository, etc. However, the item a faculty member has found from other resources may not have the three characteristics of an LO, digital, reusable, and having instructional values; faculty can only look at the item’s metadata information and may not access it directly. Other resources may have their own policies to govern how to use them, such as registering to get a user account, and the like. The VET study (ANTA, 2003a) reported that one of its research subjects said: “perhaps the number of barriers to uptake is equal to the number of clicks before a teacher can put an LO in part of their delivery design” (p. 9). Thus this strategy may not bring itself into full play in motivating faculty to use Orange Grove unless the inter-LOR access is enabled. The inter-LOR access means the Orange Grove users can directly access and obtain other LORs’ LOs. The function of inter-LOR access is like that of interlibrary loan. A group of LORs makes an agreement that allows and facilitates a user of one of the LORs to access and obtain LOs stored in the other LORs. The inter-LOR access should be a goal that LORs achieve in the future.

The purpose of exploring the effective strategies of the LORs in recruiting faculty users is to provide better understandings of how Orange Grove or Wisc-Online have developed effective strategies based on its specific situations, such its target users, faculty members’ needs,

collections, and state policies. Based on the understandings, the designers and promoters of LORs may consider developing effective strategies to recruit more faculty users of LORs.

### 5.5. Contributions of the Study

This study is exploratory in nature. It has three contributions. First, this study identified the factors that motivate or impede faculty use of LORs from actual faculty users' perspectives, so these factors more accurately reflect LORs' values to faculty in teaching and course design and the barriers for faculty use of LORs in a practical environment. Second, this study is among the first known to explore these factors using UTAUT as the theoretical framework. It sets a precedent for future research on faculty using LORs. Third, the survey instrument developed in this study was tested as reliable. It may be useful for future studies.

### 5.6. Limitations of the study

This study used a non-probability sample of faculty users of two LORs, the Orange Grove and Wisc-Online as survey subjects. The policies of the LORs made it impossible for me to get a random sample of faculty users as research subjects. Due to the IRB regulations of participating universities and colleges, I could not distribute the survey to every faculty member, and the ability to send follow-up notices to increase response rate was also limited. This resulted in a relative small sample size (38 survey respondents). Lack of a random sample and a small sample size limited the generalizability of the results and findings of the study. However, the purpose of this study was to identify and explore factors affecting faculty use of LORs, and the purpose was achieved by using information-rich informants as interviewees in Phase I, and two LORs as survey data sources in Phase II. As an exploratory research, the results and findings of the study are still valuable for LOR builders and managers to get a better understanding of

factors affecting faculty use of LORs, and to develop strategies to recruit more faculty members to use LORs.

### 5.7. Future Research

Through this study, I identified specific factors that affect faculty use of LORs and explored how the factors affect faculty use of LORs using both interview and survey techniques. The study not only provides a set of findings to understand faculty use of LORs, but also reveals the following areas that future research studies may investigate.

Since using non-probability sample rather than random sample is a limitation of this study, the future research should collaborate with LORs, which policies support user behavior research, to get a random sample of faculty users of the LORs to test the results of this study.

This study used Wisc-Online and Orange Grove as data sources to identify and explore factors that affect faculty use of LORs. The Wisc-Online is a centralized technical-college-system LOR. The Orange Grove is a statewide federated LOR. Future research may use distributed LORs, such as MERLOT, as data sources to test the results of this study.

I did not collect data about the age and gender of faculty users of the LORs in this study, because the results of the literature review did not show that age and gender are important factors influencing faculty use of LORs. A future study may survey faculty users' age and gender to investigate their effects on faculty use of LORs.

LORs provide a portal for faculty to share LOs which includes both contributing LOs and using LOs. This study only addresses using LOs. Future research may explore factors which affect faculty contributing LOs to LORs.

Another recommendation for future research is studying faculty members' LOs seeking behavior, which includes faculty members' LOs seeking practices, and how to implement the

theories of information seeking behavior in the context of LOs and LORs. Studying faculty members' LOs seeking behavior provides the guidance for designing LORs' index policies and improving LORs' searching functions.

The LOR is a special type of digital repositories, and there are many areas that may be fruitful to investigate. These recommendations provide some ideas for future research.

## 5.8. Summary

This chapter summarized the factors that affect faculty use of LORs and answered the research questions. Following a discussion of the value of UTAUT in understanding the factors affecting faculty use of LORs, this chapter presented the findings of the study, discussed the implication of the findings, and concluded the contributions of the study. Although this study has some limitations, it is very important for understanding factors affecting faculty use of LORs and is valuable for future research. The results and findings of the study are useful and practical for LORs' builders and managers to recruit more faculty members to use LORs.

APPENDIX A  
INTERVIEW PROTOCOL

## Interview Protocol

The purpose of this interview is to learn about your use of the Orange Grove for instruction or course design. In particular, I am interested in what factors motivate or impede you in using the Orange Grove.

The participation in this interview is voluntary. The data collected is associated with a respondent number instead of your name. Your name will not be associated with the respondent number and can't be identified. With your permission this interview will be recorded by a digital audio recorder. Thanks for your participation.

Interview questions for faculty users:

1. Could you please provide some information about the courses you teach or design?
2. In your opinion, what makes for a good course?
3. What do you strive to accomplish in all your courses?
4. Do you use learning objects in your teaching or course design?
5. Where do you look for learning objects?
6. How did you become aware of the Orange Grove?
7. Have you used the Orange Grove in your teaching or course design?
8. What is your main reason for using the Orange Grove? (for Group B)/ What is your main reason for not using the Orange Grove? (for Group A)
9. Could you please talk about your expectation of using the Orange Grove on teaching or course design?
10. In your opinion, what level of effort does it require you to use the Orange Grove?
11. Could you please talk about how the people around you, such as your supervisors, peers, students, influence your use of the Orange Grove? How do policies or strategies affect

your using the Orange Grove, which are either from your institutions, the Orange Grove, or other organizations?

12. How do you feel about the technology involved in using the Orange Grove?
13. Have you ever asked an assistant, a course designer, or any other person to find a learning object from the Orange Grove for you? Could you please recommend that person for the next interview? What do you think about this idea of entrusting an educational supporter to use the Orange Grove for you?
14. Has an assistant, a course designer, or any other person recommended to you learning objects from the Orange Grove? Would you mind recommending that person for the next interview?
15. What is your opinion about integrating the Orange Grove into the learning management system?
16. What do you think about the open textbooks?

Interview questions for educational support staff users:

1. How do you use the Orange Grove?
2. Have you been involved in designing a course using LOs from the Orange Grove?
3. Have you recommended to a faculty member the content you found from the Orange Grove?
4. Could you please talk about how you influence faculty use of the Orange Grove?
5. Could you please talk about the difficulties involved in using the Orange Grove?



APPENDIX B  
SURVEY INSTRUMENT

## Factors Affecting Faculty Use of the Orange Grove

You are invited to participate in this research study on factors affecting faculty use of learning object repositories, conducted by the principle investigator William Moen, a professor in the College of Information at the University of North Texas and Hong Xu, a doctoral student in the College of Information at the University of North Texas.

This survey will be conducted via Internet. The survey is expected to take 15 minutes. We expect the project to benefit you by playing an active role in improving the service of learning object repository that you might use for course designing and instruction. No foreseeable risks are associated with this study. If you decide to participate in this study, please understand that your participation is voluntary and you have the right to discontinue participation at any time without penalty or loss of any of benefits or rights. The research personnel may discontinue your participation at any time. Also, the confidentiality of your personal information will be maintained in any publications or presentations regarding this study. Your name will not appear in any documentation or report that results from this study. Each participant will be assigned a subject number and your name and all personal information will be detached from the subject number and associated data for purposes of analysis and reporting.

If you have any questions about the study, you may contact Hong Xu at [hongxu@my.unt.edu](mailto:hongxu@my.unt.edu), telephone: XXX, and William Moen at [william.moen@unt.edu](mailto:william.moen@unt.edu), telephone: 940-565-2473 .This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at 940-565-3940 with any questions regarding the rights of research subjects.

There are 16 questions in this survey

### Basic information

#### 1. What is your position?

Please choose all that apply:

- Faculty (professor/adjunct/instructor)
- Instructional designer
- Teaching Assistant
- Education Support Staff
- Other:

#### 2. What are your job duties?

Please choose all that apply:

- Teach or design online courses
- Teach or design face-to-face courses
- Teach or design blended courses

- Help faculty design courses
- Assist faculty in teaching
- Other:

3. Which kind of institution are you from?

Please choose only one of the following:

- A four-year college/university
- A two-year college/university
- Other

4. Which academic area are you from?

Please choose only one of the following:

- Science
- Social Science
- Humanities
- Arts
- Other

5. Have you used the learning objects or open textbooks from the Orange Grove in your course design or teaching?

Please choose only one of the following:

- Yes
- No
- Not yet, but I plan to

6. What is the average frequency you visit the Orange Grove?

Please choose only one of the following:

- Once a week
- Once a month
- Once a semester
- Once a year
- Less than once a year

7. Please check the ways you may use the Orange Grove for teaching or course design.

Please choose all that apply:

- Create a new course
- Enrich course content

- Preserve my learning objects
- Contribute my learning objects or digital textbooks
- Link to the learning objects directly
- Download and combine the learning object to my course directly without modification
- Before I use it, I modify the learning object
- Adopt an open textbook for my course
- Just to see what is there
- Locate and point learning objects to faculty
- Change a face-to-face course to be an online course
- Find and collect learning objects to build my own collection for future use
- See how others create learning objects
- Collaborate with others to design learning objects
- Teach faculty how to use it
- Other:

#### 8. How did you first hear about the Orange Grove?

Please choose all that apply:

- The promotion from the Orange Grove
- The promotion from the faculty center
- Peer's recommendation
- Online searching
- Other:

#### 9. Which State are you from?

Please choose only one of the following:

- Florida
- Wisconsin
- Alabama
- Alaska
- Arizona
- Arkansas

- California
- Colorado
- Connecticut
- Delaware
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York

- North Carolina
- North Dakota
- Ohio
- Oklahoma
- Oregon
- Pennsylvania
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- West Virginia
- Wyoming
- Other Country

10. Do you have an Orange Grove account?

Please choose only one of the following:

- Yes
- No

11. Can you access the Orange Grove directly within your institution's learning management system ?

Please choose only one of the following:

- Yes
- No

The Following questions are surveying your opinions about using the Orange Grove

12. The following statements are reasons that motivate you to use the Orange Grove.

Please choose the appropriate response for each item:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
It is useful in teaching and course design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using it can reduce students' education cost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It supports both online and face-to-face courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use it to supplement the course I teach or design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Its learning objects are related to my course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The quality of its learning objects is high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am interested in the highly interactive and engaging learning objects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am interested in the open textbooks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It saves my time in course design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is convenient for teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is free	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using it can help students learn better	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find it easy to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The learning objects are easy for my students to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is built in the learning management system of my institution, so I can access it easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other faculty members' successful experience of using the Orange Grove motives me to use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students' positive feedback motivates me to use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The OrangeGrove trainings and workshops motivate me to use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My State has pushes for us to use the online resources such as the Orange Grove	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My institution is open to the use of such resources like the Orange Grove	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Faculty center provides help in using it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Its copyright is clear	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe in sharing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy using technology in my teaching or course design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Please enter other reasons which motivate you to use the Orange Grove.

Please write your answer here:

14. The following statements reflect what you consider barriers to using the Orange Grove. Please choose the appropriate response for each item:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
It is not useful to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It does not help my tenure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Its learning objects are not related to my course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Its learning objects do not fit the learning outcome I need	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think the quality of learning objects is not high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The quantity of learning objects is not enough	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The function of open textbooks is not powerful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am concerned with the stability and consistence of the learning objects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not have time to use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The searching function is not very powerful; it takes time to find what I want	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It does not have a streaming server; the video download speed is slow	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Department culture values creating more than reusing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to create my own learning objects instead of using others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have other resources to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My course curriculum is set so I can not use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My course will be sold so I can not use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My institution limits course size, so I can't add too many learning objects in my course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not create new courses because of budget limitation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The copyright limits my use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not update my course very often	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I can do my teaching and course design without it, there is no reason to add it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am not familiar with it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think it mainly is for K-12 education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I am not technology savvy; I am not confident in using it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. Please enter other reasons that you consider barriers to using the Orange Grove.

Please write your answer here:

16. What is your opinion on the future of the Orange Grove?

Please choose only one of the following:

- It will be widely used by faculty in teaching and course design
- It may not be widely used by faculty in teaching and course design
- No Opinion

## Factors Affecting Faculty Use of Wisc-Online

You are invited to participate in this research study on factors affecting faculty use of learning object repositories, conducted by the principle investigator William Moen, a professor in the College of Information at the University of North Texas and Hong Xu, a doctoral student in the College of Information at the University of North Texas.

This survey will be conducted via Internet. The survey is expected to take 15 minutes. We expect the project to benefit you by playing an active role in improving the service of learning object repository that you might use for course designing and instruction. No foreseeable risks are associated with this study. If you decide to participate in this study, please understand that your participation is voluntary and you have the right to discontinue participation at any time without penalty or loss of any of benefits or rights. The research personnel may discontinue your participation at any time. Also, the confidentiality of your personal information will be maintained in any publications or presentations regarding this study. Your name will not appear in any documentation or report that results from this study. Each participant will be assigned a subject number and your name and all personal information will be detached from the subject number and associated data for purposes of analysis and reporting.

If you have any questions about the study, you may contact Hong Xu at [hongxu@my.unt.edu](mailto:hongxu@my.unt.edu), telephone: XXX, and William Moen at [william.moen@unt.edu](mailto:william.moen@unt.edu), telephone: 940-565-2473 .This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at 940-565-3940 with any questions regarding the rights of research subjects.

There are 15 questions in this survey

### Basic information

#### 1. What is your position?

Please choose all that apply:

- Faculty (professor/adjunct/instructor)
- Instructional designer
- Teaching Assistant
- Education Support Staff
- Other:

#### 2. What are your job duties?

Please choose all that apply:

- Teach or design online courses
- Teach or design face-to-face courses
- Teach or design blended courses
- Help faculty design courses
- Assist faculty in teaching
- Other:

#### 3. Which kind of institution are you from?

Please choose only one of the following:

- A four-year college/university
- A two-year college/university
- Other

#### 4. Which category(ies) of leaning objects are you interested in?

Please choose all that apply:

- Adult Basic Education/English Language Learner
- Business
- General Education
- Health
- Professional Development
- Service
- Technical
- Other:

5. Have you used the learning objects from Wisc-Online in your course design or teaching?

Please choose only one of the following:

- Yes
- No
- Not yet, but I plan to

6. What is the average frequency you visit the Wisc-Online?

Please choose only one of the following:

- Once a week
- Once a month
- Once a semester
- Once a year
- less than once a year

7. Please check the ways you may use the Wisc-Online for teaching or course design.

Please choose all that apply:

- Create a new course
- Enrich course content
- Preserve my learning objects
- Contribute my learning objects or digital textbooks
- Link to the learning objects directly
- Download and combine the learning object to my course directly without modification
- Before I use it, I modify the learning object
- Use the Gamebuilder to create games
- Just to see what is there
- Locate and point learning objects to faculty
- Change a face-to-face course to be an online course
- Find and collect learning objects to build my own collection for future use
- See how others create learning objects
- Collaborate with others to design learning objects
- Teach faculty how to use it
- Other:

8. How did you first hear about the Wisc-Online?

Please choose all that apply:

- The promotion from the Wisc-Online
- The promotion from the faculty center
- Peer's recommendation
- Online searching
- Other:

9. Which State are you from?

Please choose only one of the following:

- Florida
- Wisconsin
- Alabama

- Alaska
- Arizona
- Arkansas
- California
- Colorado
- Connecticut
- Delaware
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina
- North Dakota
- Ohio
- Oklahoma
- Oregon
- Pennsylvania
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- West Virginia
- Wyoming
- Other Country

10. Do you have an account of the Wisc-Online?

Please choose only one of the following:

- Yes

No

The Following questions are surveying your opinions about using the Wisc-Online

11. The following statements are reasons that motivate you to use the Wisc-Online

Please choose the appropriate response for each item:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
It is useful in teaching and course design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using it can reduce students' education cost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It supports both online and face-to-face courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use it to supplement the course I teach or design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Its learning objects are related to my course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The quality of its learning objects is high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am interested in the highly interactive and engaging learning objects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to use the Gamebuilder to create games	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy the Wisc-Online community on Facebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It saves my time in course design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is convenient for teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is free	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using it can help students learn better	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find it easy to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The learning objects are easy for my students to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other faculty members' successful experience of using the Wisc-Online motivates me to use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students' positive feedback motivates me to use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Wisc-Online trainings and workshops motivate me to use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My State has pushes for us to use the online resources such as the Wisc-Online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My institution is open to the use of such resources like the Wisc-Online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Faculty center provides help in	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
using it					
Its copyright is clear	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe in sharing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy using technology in my teaching or course design	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Please enter other reasons which motivate you to use the Wisc-Online.

Please write your answer here:

13. The following statements reflect what I consider barriers to using the Wisc-Online.

Please choose the appropriate response for each item:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
It is not useful to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It does not help my tenure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Its learning objects are not related to my course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Its learning objects do not fit the learning outcome I need	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think the quality of learning objects is not high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The quantity of learning objects is not enough	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can't use the Gamebuilder or download learning objects for free	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am concerned with the stability and consistence of the learning objects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not have time to use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The searching function is not very powerful; it takes time to find what I want	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Department culture values creating more than reusing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to create my own learning objects instead of using others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have other resources to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My course curriculum is set so I can not use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My course will be sold so I can not use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My institution limits course size, so I can't add too many learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
objects in my course					
I do not create new courses because of budget limitation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The copyright limits my use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not update my course very often	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I can do my teaching and course design without it, there is no reason to add it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am not familiar with it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am not technology savvy; I am not confident in using it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Please enter other reasons that you consider barriers to using the Wisc-Online.

Please write your answer here:

15. What is your opinion on the future of the Wisc-Online?

Please choose only one of the following:

- It will be widely used by faculty in teaching and course design
- It may not be widely used by faculty in teaching and course design
- No Opinion

APPENDIX C  
INITIAL CODING SCHEME



Dimensions	Categories and Definitions	Sub-categories	Codes' examples
Performance Expectancy	<b>1. Usefulness</b>		Useful
	<i>The degree to which a user believes that using the Orange Grove would enhance his or her job performance.</i>		Not useful
	<b>2.Extrinsic Motivation</b>		Recognition
	<i>The perception that users will want to use the Orange Grove because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions</i>		No recognition
			Promotion
	<b>3. Teaching-fit</b>	<b>3.1 Pedagogy</b>	Not fit curriculum
	<i>How the capabilities of the Orange Grove enhance a user's job performance.</i>	<b>3.2 Teaching type</b>	Fit on-line teaching
	<b>4. Advantages</b>		Save time
	<i>The degree to which a user believes that using the Orange Grove would enhance his or her teaching and course design performance, or be better than using other sources</i>		No time
			Advance student education
		Convenient	
<b>5. Others</b>			
<i>Categories other than the above in this dimension</i>			

*Note:* Based on the dimensions and constructs of UTAUT (Venkatech et al., 2003) and literature review.

Dimensions	Categories and Definitions	Sub-categories	Codes' examples
Effort Expectancy	<b>6. Ease of Use</b>		Easy
	<i>The degree to which a user believes that using the Orange Grove would be free of effort.</i>		Not easy
	<b>7. Complexity</b>		Complicated
	<i>The degree to which an LOR is perceived as relatively difficult to understand and use.</i>		
Social Influence	<b>8. Others</b>		
	<i>Categories other than the above in this dimension</i>		
	<b>9. Subjective Norm</b>	<b>9.1 Peers' Influence</b>	Trust
	<i>The user's perception that most people who are important to him think he should or should not perform the behavior in question.</i>	<b>9.2 Students' feedback</b>	Positive feedback Learn more
		<b>10. Social Factors</b>	Negative
	<i>The user's internalization of the reference group's subjective culture, and specific interpersonal agreements that the faculty member has made with others, in education situations.</i>		
	<b>11. Image</b>		Illegal time Academic game Increase my image
	<i>The degree to which use of an LOR is perceived to enhance one's image or status in one's institution or department</i>		
<b>12. Others</b>			
<i>Categories other than the above in this dimension</i>			

Note: Based on the dimensions and constructs of UTAUT (Venkatech et al., 2003) and literature review.

<b>Dimensions</b>	<b>Categories and Definitions</b>	<b>Sub-categories</b>	<b>Codes' examples</b>
Facilitating Conditions	<b>13. Behavioral Control</b>  <i>Reflects perceptions of internal and external constraints on behavior and encompasses self-efficacy, resource facilitating conditions, and technology facilitating conditions.</i>	<b>13.1 Institution Policy</b>	Support Not support Encourage change
		<b>13.2 Technology</b>	Firewall Can't download
		<b>13.3 Equipment &amp; environment</b>	Not enough computers
		<b>13.4 Resource</b>	Other sources Quantity Limitation
		<b>13.5 LOR policy</b>	Copyright Expensive use fee Use free
		<b>14. Facilitating Conditions</b>	<i>Objective or technical factors in the environment that users agree make an act easy to do.</i>
	<b>15. Compatibility</b>  <i>The degree to which the Orange Grove is perceived as being consistent with existing values, needs, and experiences of potential users.</i>		Fit LMS Like new technology Web based  Worry about software fitting
	<b>16. Others</b>  <i>Categories other than the above in this dimension</i>		

*Note:* Based on the dimensions and constructs of UTAUT (Venkatech et al., 2003) and literature review.

<b>Dimensions</b>	<b>Categories and Definitions</b>	<b>Sub-categories</b>	<b>Codes' examples</b>
	<b>17. Attitude Toward Behavior</b>		Do not choose it
	<i>A user's positive or negative feelings about performing the target behavior with the Orange Grove</i>		
Attitude Toward Using Technology	<b>18. Intrinsic Motivation</b>	<b>18.1 Personality</b>	Like Challenge
	<i>The perception that users will want to perform an activity by the Orange Grove for no apparent reinforcement other than the process of performing the activity per se.</i>	<b>18.2 Learning</b>	Learn others – practice
	<b>19. Affect Toward Use</b>		Like a facilitator
	<i>Feelings of joy, elation, or pleasure; or depression, disgust, displeasure, or hate associated by a user with the Orange Grove</i>		
	<b>20. Others</b>		
	<i>Categories other than the above in this dimension</i>		
Self-efficacy	<b>21. Self-efficacy</b>		Do not know how to use
	<i>Judgment of a user's ability to use the Orange Grove to accomplish an instruction or course design task</i>		
	<b>22. Others</b>		
	<i>Categories other than the above in this dimension</i>		
Anxiety	<b>23. Anxiety</b>		No anxiety
	<i>Evoking anxious or emotional reactions when it comes to use the Orange Grove.</i>		
	<b>24. Others</b>		
	<i>Categories other than the above in this dimension</i>		

*Note:* Based on the dimensions and constructs of UTAUT (Venkatech et al., 2003) and literature review.

APPENDIX D  
FINAL CODING SCHEME

### Codes Legend

Encourage faculty using OG	
Indirect encourage or discourage faculty using OG	
Barriers for faculty using OG	
Ways faculty use LOs and OG	

Dimension	Category (Construct)	Sub-category	Code
Performance Expectancy	Usefulness	usefulness	useful
		uselessness	not useful to me
	Extrinsic motivation	encourage contribution	Professional development compensation
		Reduce const	Reduce students' cost of education
		Not help tenure	not help tenure
		Teaching-fit	Support both online and face-to-face courses
	support blended courses		
	support face-to-face courses		
			Supplement the course
			support active learning
			high quality
			relate to the course
	Course-unfit		discipline limitation
			not fit it the course
			not fit the learning outcome
		education division limitation	
	LO type-unfit	not fit the teaching approach	
	Advantages	benefit faculty	a central resource
			support personal collection
			save time and effort
			LOs with high technology
			efficiency in production
			convenient
			free
		a good place for sharing	
		benefit students	strengthen students' learning
			high accessibility
			pre-impression of low quality
			function limitation of open textbooks
			quantity is not enough
		the stability and Persistence of LOs	
		time constraint	
Research-fit		support research	

### Codes Legend

Encourage faculty using OG	
Encourage or discourage faculty contribute to OG	
Barriers for faculty using OG	

Dimension	Category (Construct)	Sub-category	Code	
<b>Effort Expectancy</b>	<b>Ease of Use</b>	ease for faculty	setting is simple	
			easy and quick to find	
		easy to download		
		LMS integration		
	<b>Complexity</b>	No ease	ease for students	easy for students to use
				search function
				search terms
<b>Social Influence</b>	<b>Subjective Norm</b>	Peer's influence	Faculty members' successful using	
		Student's influence	students' positive feedback	
			students' feedback	
	<b>Social factors</b>		collaboration in creating and sharing	
			department culture	
			share LOs with peers	
<b>Facilitating Conditions</b>	<b>Facilitating conditions</b>	Institution facilitating conditions	quality standard	
			Instructional designers and education support staff assistance	
			campus technology committee	
			campus libraries	
			institution policy	
			department support	
		LOR facilitating conditions	OG scholars assistance	
			OG diffusion strategy	
		State facilitating conditions	open access textbook task force	
			copyright	
			education rules	
			State support online technologies	

### Codes Legend

Encourage faculty using The OG	
Indirect encourage or discourage faculty using the OG	
Barriers for faculty using the OG	

Dimension	Category (Construct)	Sub-category	Code
<b>Facilitating Conditions</b>	<b>Behavior Control</b>	Institution behavioral control	selling courses
			storage limitation
			curriculum is set
			promotion is not enough
		LOR behavior control	reputation of K-12
			lack of public relations
			copyright
		State behavior control	budget cutting
			education situation
		Other resources	publisher competition
			local repositories and libraries
			online resources
	<b>Compatibility</b>	enjoy using LOs	enjoy using LOs
		belief of sharing	understand the value of using LOs
			belief of sharing
		DIY	create and reuse their own LOs
		do not update	do not enrich courses
		against change	against changing
	no concept for contribution		
<b>Self-efficacy</b>	<b>self-efficacy</b>	No confidence	not confident in using OG
		not familiar	not familiar with LORs
<b>Others</b>	<b>Time</b>	Future	open textbooks' future
			potential faculty' preparation
			innovation diffusion process
			faculty members' opinion
	<b>Ways of Using OG</b>		Ways using LOs and OG

### Definitions

OG: the Orange Grove

**Definitions about dimensions** (adopted from the UTAUT, which are listed in Table 1)

Performance Expectancy: The degree to which an individual believes that using the system will help him or her to attain gains job performance.

Effort Expectancy: The degree of ease associated with the use of the system.



Social Influence: The degree to which an individual perceives that important others believe he or she should use the new system.

Facilitating Conditions: The degree to which an individual believes that an organizational and technical infrastructure exist to support use of the system.

Self-efficacy: Judgment of one's ability to use a technology (e.g., computer) to accomplish a particular job or task.

Others: It is used to capture the data that reflect the ways faculty use LOs and the Orange Grove, and the prediction about faculty use of LORs in the future.

**Definitions about categories** (Definitions about categories are based on UTAUT that is presented in Table 1, literature review results, and interview data analysis results)

Usefulness: The degree to which a person believes that using the Orange Grove would enhance his or her teaching or course designing performance.

Extrinsic Motivation: The perception that users will or will not want to use the Orange Grove because it is perceived to be or not to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance.

Teaching-fit: How the capabilities of the Orange Grove enhance a faculty member's teaching and course design performance.

Research-fit: How the capabilities of the Orange Grove enhance a faculty member's teaching and course design performance.

Advantages: The degree to which using the Orange Grove is perceived as being better than other sources or without using it.

Ease of Use: The degree to which a faculty member believes that using the Orange Grove would be free of effort.

Complexity: The degree to which the Orange Grove is perceived as relatively difficult to understand and use.

Subjective Norm: The faculty member's perception that most people who are important to him/her think he/she should or should not use the Orange Grove.

Social Factors: The faculty member's internalization of the reference group's subjective culture, and specific interpersonal agreements that the faculty member has made with others, in education situations.

Facilitating Conditions: Objective or technical facilitations that a faculty member acknowledges make using an LOR easy.

Behavioral Control: IT reflects perceptions of internal and external constraints on faculty using the Orange Grove behavior, including constraints on self-efficacy, resource facilitating conditions, and technology facilitating conditions.

Compatibility: The degree to which the Orange Grove is perceived as being consistent with existing values, needs, and experiences of potential adopters.

Intrinsic Motivation: The perception that a faculty member will want to use the Orange Grove for no apparent reinforcement other than the process of using it.

Self-efficacy: Judgment of a faculty member's ability to use the Orange Grove to accomplish an instruction or course design task.

Time: It consists past, present, and future.

Ways of Using OG: The ways faculty and instructional staff use the Orange Grove in their teaching and course design.

APPENDIX E  
IRB APPROVAL LETTERS



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OFFICE OF THE VICE PRESIDENT FOR RESEARCH AND ECONOMIC DEVELOPMENT  
February 10, 2010 Research Services

William Moen  
Department of Library and Information Sciences  
University of North Texas

Re: Human Subjects Application No. 10008

Dear Dr. Moen:

As permitted by federal law and regulations governing the use of human subjects in research projects (45 CFR 46), the UNT Institutional Review Board has reviewed your proposed project titled "Factors Affecting Faculty Use of Learning Object Repositories: A Case Study of Orange Grove and Wisc-Online ". The risks inherent in this research are minimal, and the potential benefits to the subject outweigh those risks. The submitted protocol is hereby approved for the use of human subjects in this study. **Federal Policy 45 CFR 46.109(e) stipulates that IRB approval is for one year only, February 10, 2010 to February 9, 2011.**

Enclosed is the consent document with stamped IRB approval. Please copy and **use this form only** for your study subjects.

It is your responsibility according to U.S. Department of Health and Human Services regulations to submit annual and terminal progress reports to the IRB for this project. The IRB must also review this project prior to any modifications.

Please contact Shelia Bourns, Research Compliance Administrator, or Boyd Herndon, Director of Research Compliance, at extension 3940, if you wish to make changes or need additional information.

Sincerely,

Patricia L. Kaminski, Ph.D.  
Associate Professor  
Chair, Institutional Review Board

PK:sb



**Dr. Susan A. May, President**

1825 N. Bluemound Drive, P.O. Box 2277 • Appleton, WI 54912-2277  
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December 14, 2010

Hong Xu  
University of North Texas  
1155 Union Circle  
Denton, TX 76203

Dear Hong Xu:

Enclosed please find the approved expedited review from the Fox Valley Technical College Institutional Review Board for your research entitled "Factors Affecting Faculty Use of Learning Object Repositories – A Case Study of Orange Grove and Wisc-Online."

This exempt research is subject to the FVTC IRB regulations including the provision that a continuing review of the project be conducted at the one year anniversary date of the project approval. You will be contacted to submit this information to the IRB Board Meeting that occurs prior to the anniversary date. Failure to submit the continuing review information will require any research involving FVTC to cease until approval is secured. If the research project concludes prior to the project approval anniversary date, please submit the research abstract with the findings of the research to the IRB Chair in order to properly close the project from the IRB open projects roster.

Please contact me if you have any questions during the course of your research with FVTC students. Good luck with your research project.

Sincerely,

Patricia B. Frohrib, Ph.D.  
Director of College Effectiveness  
FVTC IRB Chair

Enclosure



Office of Research and Sponsored Programs  
1 UNF Drive  
Jacksonville, FL 32224-2665  
904-620-2455 FAX 904-620-2457  
Equal Opportunity/Equal Access/Affirmative Action Institution

**MEMORANDUM**

**DATE:** May 25, 2010

**TO:** Dr. William Moen  
Hong Xu

**FROM:** Dr. Katherine Kasten, Chairperson  
UNF Institutional Review Board

**RE:** Review by the UNF Institutional Review Board IRB#10-062:  
"Factors Affecting Faculty Use of Learning Object Repositories - A Case Study of  
Orange Grove and Wisc-Online"

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This is to advise you that your project, "Factors Affecting Faculty Use of Learning Object Repositories - A Case Study of Orange Grove and Wisc-Online," has undergone "expedited, category #6 #7" review on behalf of the UNF Institutional Review Board and was approved.

This approval applies to your project in the form and content as submitted to the IRB for review. Any variations or modifications to the approved protocol and/or informed consent forms as they relate to dealing with human subjects must be cleared with the IRB prior to implementing such changes. Any unanticipated problems involving risk and any occurrence of serious harm to subjects and others shall be reported promptly to the IRB.

**Your study has been approved for a period of 12 months.** If your project continues for more than one year, you are required to provide a Continuing Status Report to the UNF IRB prior to **04/25/2011** if your study will be continuing past 05/24/2011. *We suggest you submit your status report 11 months from the date of your approval date as noted above to allow time for review and processing.*

Should you have questions regarding your project or any other IRB issues, please contact the Office of Research and Sponsored Programs at 904.620.2455.

Thank you,

Research Integrity Staff

UNF IRB Number: 10-062  
Approval Date: 5-25-10  
Revision Date: \_\_\_\_\_



**Research and Sponsored Programs**

11000 University Parkway, Bldg. 11  
Pensacola, FL 32514-5750

Ms. Hong Xu  
College of Information  
Discovery Park  
University of North Texas  
Denton, TX 76203

May 21, 2010

Dear Mr. Xu:

The Institutional Review Board (IRB) for Human Research Participant Protection has completed its review of your proposal titled "Factors Affecting Faculty Use of Learning Object Repository—A Case Study of Orange Grove and Wisc-Online" as it relates to the protection of human participants used in research, and has granted approval for you to proceed with your study. As a research investigator, please be aware of the following:

- You acknowledge and accept your responsibility for protecting the rights and welfare of human research participants and for complying with all parts of 45 CFR Part 46, the UWF IRB Policy and Procedures, and the decisions of the IRB. You may view these documents on the Office of Research and Sponsored Programs web page at <http://research.uwf.edu/internal/integrity/irb.cfm>. You acknowledge completion of the IRB ethical training requirements for researchers as attested in the IRB application.
- You will ensure that legally effective informed consent is obtained and documented. If written consent is required, the consent form must be signed by the participant or the participant's legally authorized representative. A copy is to be given to the person signing the form and a copy kept for your file.
- You will promptly report any proposed changes in previously approved human participant research activities to the Office of Research and Sponsored Programs. The proposed changes will not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the participants.
- **You are responsible for reporting progress of approved research to the Office of Research and Sponsored Programs at the end of the IRB approval period of May 1, 2011. Approval for data collection for this project begins May 20, 2010. Project Directors of research requiring full committee review should notify the IRB when data collection is completed.**
- You will immediately report to the IRB any injuries or other unanticipated problems involving risks to human participants.

Good luck in your research endeavors. If you have any questions or need assistance, please contact the Office of Research and Sponsored Programs at 857-6378.

Sincerely,

Dr. Terry Prewitt, Chair  
IRB for Human Research  
Participant Protection

Dr. Richard S. Podemski  
Associate Vice President for Research  
and Dean of Graduate Studies

CC: Dr. William Moen

Phone: 850.474.2824 Fax: 850.474.2082

Web: [research.uwf.edu](http://research.uwf.edu)  
An Equal Opportunity/Equal Access/Affirmative Action Employer

April 30, 2010

Hong Xu

Reference: Factors Affecting Faculty Use of Learning Object Repositories: A Case Study of Orange Grove and Wise-Online (SPC #2010-03)

Dear Hong,

St. Petersburg College's Research Review Committee has reviewed your request to conduct research for the study entitled "Factors Affecting Faculty Use of Learning Object Repositories: A Case Study of Orange Grove and Wise-Online."

We are pleased to inform you that your research request has been approved provided that the study is conducted in accordance with the Board of Trustees Rules and the policies of the institution.

This research authorization covers the time period of April 30, 2010 to April 29, 2011. This time frame should be adequately to satisfy your research based upon your application. If the research extends beyond this time frame, you will be required to contact the Research Review Committee for an extension of the authorization period.

Thank you for your interest in conducting research at St. Petersburg College and we look forward to receiving the results of your study.

Sincerely,

*Jesse Coraggio, Ph.D.*

Director, Academic Effectiveness and Assessment ([website](#))  
EpiCenter, Services 223  
727.341.3084



December 12, 2010

Dear Hong Xu,

In regards to IRB case #120610, I conducted an expedited review of the documents that you emailed to me on Wednesday, December 1st, titled Factors Affecting Faculty Use of Learning Object Repositories—A Case Study of Orange Grove and Wisc-Online. I received your documentation of IRB approval from UNT's Institutional Review Board. I am happy to submit my full review on the issue, if needed, but to summarize, the submitted protocol was considered exempt under 45 CFR 46.101 (b)(1) from all 45 CFR part 45 requirements, as research conducted in established or commonly accepted educational settings, involving normal educational practices.

It should be noted that your IRB protocol has only been approved through February 9, 2011 through UNT, so we will insist that any interviews that are to take place with SCF faculty take place prior to that time. Any alterations that are made to the project from this point forward would need to be cleared with the SCF IRB.

Best,

Cheri L. Kittrell, Ph.D.  
Associate Professor of Psychology  
Institutional Review Board, Chair  
State College of Florida  
5840 26th Street West  
Bradenton, FL 34207  
(941) 752-5499

## REFERENCES

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