A Model of Student Learning Outcomes of Information Literacy Instruction in a Business School

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This study presents and tests a research model of the outcomes of information literacy instruction (ILI) given to undergraduate business students. This model is based on expectation disconfirmation theory and insights garnered from a recent qualitative investigation of student learning outcomes from ILI given at three business schools. The model was tested through a web survey administered to 372 students. The model represents psychological, behavioral, and benefit outcomes as second-order molecular constructs. Results from a partial least squares (PLS) analysis reveal that expectation disconfirmation influences perceived quality and student satisfaction. These in turn affect student psychological outcomes. Further, psychological outcomes influence student behaviors, which in turn affect benefit outcomes. Based on the study's findings, several recommendations are made.

Introduction

The purpose of this study is to present and empirically validate a model explicating student learning outcomes of information literacy instruction (ILI) in a business school. Universities invest millions of dollars on subscriptions to various information resources, most of which are available online. Students also receive IL training to be able to fully utilize the available resources. Although there are insights into what the student learning outcomes of ILI are as well as the institutional and pedagogical factors that promote successful student learning outcomes (Julien & Boon, 2004), there is a lack of validated, empirically tested models that identify the salient factors affecting student learning outcomes. This study attempts to fill that void by generating both theoretical knowledge that may be used in future research and recommendations for practitioners (i.e., librarians involved in the development and delivery of ILI).

Information literacy refers to knowing when information is needed and the ability to effectively locate, evaluate, and use that needed information (Association of College and Research Libraries, 2006). In today's Internet-enabled world, this translates into being proficient and adept at using various information and communication technologies and multiple kinds of online information retrieval systems. Such skills are vital for success in today's business environment, where information has become one of the most valuable intangible assets (Detlor, 2010). As a result, more and more business schools today are offering, or starting to offer, ILI to their students as a means to better prepare their graduates for success (Bowers et al., 2009; Detlor, Julien, Willson, Serenko, & Lavallee, 2011). As such, many business schools are engaged in teaching students how to utilize information

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technology tools to access high-quality and relevant electronic business information sources; these tools are available to business students through their universities' online library resources (e.g., databases, indexes, journal suites, online catalogs, library websites).

The need to ensure that business professionals possess digital IL skills has recently reached paramount importance. Digital literacy—the ability to locate, organize, understand, evaluate, and create information using digital technologies in a knowledge-based society—is seen as a fundamental requirement for effective participation in the world's economy. Three forces driving global interest in digital literacy are the rise of global digital competence, the expansion of the service sector, and the increasing need for a flexible workforce (Information and Communications Technology Council, 2010). To remain competitive in the digital economy, digital information skills development must be fostered in all business students; postsecondary institutions must respond and provide digital skills training to students to help them function in the labor market of today and tomorrow. The extent to which current teaching methods can ensure that business students have the IL skills required in the digital economy is unknown; there is a crucial need to assess whether current pedagogical ILI approaches are satisfactory and what improvements can be made (Scott, 2010).

Five of the seven curricular standards for quality management education put forth by the Association to Advance Collegiate Schools of Business (AACSB) for undergraduate degree programs are closely tied to IL skills; namely, communication abilities, ethical understanding and reasoning abilities, analytical skills, use of information technology, and reflective thinking skills (Association to Advance Collegiate Schools of Business, 2009). As accreditation with the AACSB becomes a de facto standard vital to a business school's viability, international reputation, and long-term success, there has been movement within business schools to incorporate proper learning-outcome measurements as a means of demonstrating the achievement of learning goals—including measures of ILI student learning outcomes. The problem is that although there is recent insight into the factors potentially influencing student learning outcomes in business schools (Detlor et al., 2011), there is a lack of evidence explaining the relationships among these outcomes, their cause and effect on one another, and how student perceptions of the instruction received affect the learning outcomes themselves.

The purpose of this study is to address this gap by developing a model based on prior work and testing it via rigorous quantitative analysis techniques. The goal is to ascertain greater insight into the cause-and-effect relationships among the learning outcomes of ILI and how student perceptions of the ILI received influence these outcomes. Doing so not only sheds more light on the factors and relationships shaping the effects of ILI on student learning outcomes but also proffers recommendations for the improvement of instructional delivery.

Literature Review and Model Development

Expectation disconfirmation theory (Bhattacherjee, 2001b; Oliver, 1977, 1980) offers a good starting point to understand the formation of students' ILI perceptions. Expectation disconfirmation theory, which is based on cognitive dissonance theory (Festinger, 1957), was initially developed to understand various consumer-purchasing decisions. Subsequent research has demonstrated that this theory is robust; it may be applied to virtually any type of product or service, including tourism (Pizam & Milman, 1993), electronic commerce (Bhattacherjee, 2001a), and education (Lee, 2010).

According to expectation disconfirmation theory, prior to being exposed to ILI, students have their own *expectations* of the instruction process, key learnings, and potential benefits. The level of expectations is based on various factors including feedback from senior students, previous high-school experience, library website, promotions done by librarians, advice from the faculty, and information from course instructors. After one or more ILI sessions, students develop their actual perceptions of ILI, which they compare with their prior expectations. As a result of this comparison process, either a positive or negative *disconfirmation* occurs that in turn influences the students' levels of perceived quality and satisfaction with ILI. A positive disconfirmation takes place when students' actual ILI experience meets or exceeds their initial expectations, resulting in higher perceptions of quality and satisfaction. In sharp contrast, a negative disconfirmation occurs when students' ILI experience falls short of what they initially expected, which leads to lower perceptions of quality and satisfaction (Stach & Serenko, 2009; Yi, 1990). In other words, actual perceptions and prior expectations jointly determine the degree of perceived quality and satisfaction.

The application of expectation disconfirmation theory in the education domain is possible because students may be viewed as customers of their higher education institutions (Albanese, 1999; Bailey & Dangerfield, 2000; Baldwin & James, 2000; Driscoll & Wicks, 1998). Students voluntarily select their university or college, pay tuition, invest time, and enroll in programs that best meet their requirements (Halbesleben, Becker, & Buckley, 2003). Therefore, students and their educators develop a value-exchange relationship, and students always form a certain level of expectations before joining a program, taking a course, or attending an ILI session.

Perceived quality of ILI plays a critical role in the expectation disconfirmation–student satisfaction relationship. Perceived quality is defined as the students' evaluation of ILI based on their actual experience (Athiyaman, 1997). Prior research has demonstrated that there is a difference between objective and perceived service quality (Zeithaml, 1988). The term objective quality describes the measurable superiority of the service based on predetermined standards or criteria. In contrast, perceived quality refers to the service assessment based on students' subjective experience and opinion. In service quality studies, the assessment of quality

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should be approached from a perceptions vantage point. First, it is almost impossible to develop objective service quality measures (Maynes, 1976). Although several guidelines for measuring the quality of library services exist (Association of College and Research Libraries, 2010a; Reference and User Services Association, 2004), they still rely on somewhat subjective criteria. Second, perceptions play an important role in the application of service quality ratings (Zeithaml, 1988). Thus, it is more logical to measure student perceptions of ILI quality by directly asking students.

Prior research has demonstrated that the degree of expectation disconfirmation has a positive effect on student satisfaction. For example, in cases of positive expectation disconfirmation, students should be satisfied with ILI. In contrast, in cases of negative expectation disconfirmation, they are supposed to be unhappy about the service. This relationship, however, is partially mediated by perceived quality. In fact, the marketing and education literature has suggested that prior expectations have a positive effect on perceived quality that in turn positively influences satisfaction (Serenko, 2011; Turel & Serenko, 2006; Turel et al., 2006). *Student satisfaction*, defined as the overall students' reaction to the state of fulfillment of ILI that they received at a particular educational institution (Oliver, 1997), is a critical factor in the entire educational process that has been explored for decades (Feldman & Newcomb, 1969; Pascarella & Terenzini, 1978, 1991). Satisfaction became a major topic in education research after Ramsden and Entwistle (1981) proposed a link between student satisfaction and learning outcomes. Course evaluations, exit interviews, and alumni surveys are now considered de facto tools administered at most higher education institutions. Student satisfaction is influenced by various factors, especially by theoretical knowledge and practical skills acquired during the course. Fair grades, relevance of assignments, timely feedback, instructor availability, equipment quality, friendly campus environment, access to library resources, and networking opportunities also contribute to student satisfaction. With respect to the present study, it is proposed, consistent with the literature (e.g., see Fornell, Johnson, Anderson, Cha, & Bryant, 1996), that satisfaction is affected by both expectation disconfirmation and perceived quality.

Based on the earlier discussion, the following hypotheses are suggested:

H1: Expectation disconfirmation of ILI has a positive direct effect on perceived quality of ILI.

H2: Expectation disconfirmation of ILI has a positive direct effect on student satisfaction with ILI.

H3: Perceived quality of ILI has a positive direct effect on student satisfaction with ILI.

The literature has presented several consequences of perceived quality and student satisfaction with their educational experience, such as retention, loyalty, positive word-of-mouth, improved program reputation, the probability of financial donations in the form of scholarships, and personal intellectual development (Ewell, 1989; Lamport, 1993). In fact, most educators believe that there is a strong positive link between the quality of instruction and student satisfaction, which results from the retention of class material, higher grades, better job opportunities, and the ability to succeed in the workforce. For example, satisfied students tend to do well academically (Centra & Rock, 1971), and alumni who were satisfied with their higher education experience also are more satisfied with their present jobs (Pike, 1994). Although the causal relationship between satisfaction and academic or job success may be recursive, most scholars have emphasized the significance of student satisfaction in the education field.

In the present study, it is argued that it is important to understand the role of student perceptions of quality and satisfaction with ILI within a larger nomological network. Particularly, their effect on ILI outcomes should be clearly understood.

IL and educational assessment theories suggest that student learning outcomes consist of *psychological outcomes* (changes in attitudes or values), *behavioral outcomes* (changes in actions), and *benefit outcomes* (cognitive gains in knowledge, improved program-completion rates, and higher grades) (Boyer & Ewell, 1988; Lindauer, 2004; Sims, 1992). ILI assessments conducted in specific contexts have supported the existence of these outcomes. For example, Emmons and Martin (2002) found that students who receive ILI increase their searching effectiveness and are able to select more relevant information sources. In a study conducted in Canadian academic library settings, Julien and Boon (2004) reported that ILI outcomes include increased confidence, improved searching skills, and better attitudes toward libraries. Roldan and Wu (2004) conducted a study at San José State University with pre- and post-library-instruction surveys that showed a 16% decrease in the use of nonlibrary websites and greater confidence and self-efficacy among students after library instruction was received.

Recently, Detlor et al. (2011) conducted a qualitative investigation of the student learning outcomes from ILI given at three Canadian business schools through (a) a series of interviews with business school librarians, library administrators, course instructors, and business students; and (b) application and analysis of a standardized IL testing instrument, SAILS (https://www.projectsails.org). The schools differed with respect to their geographical location, AACSB accreditation histories, IL program components, enrollment, and ILI emphases. In total, 79 interviews (7 librarians, 4 library administrators, 16 teaching faculty, and 52 students) were conducted, taped, transcribed, and analyzed using grounded theory techniques to elicit recurring themes and patterns via constant comparative analysis and analytic inductive reasoning of the data, the emergent concepts, and relationships.

Results from Detlor et al. (2011) explained how certain key factors of the learning environment, IL program components, and student demographics affect ILI student learning outcomes. In terms of psychological outcomes, results have suggested that ILI leads to *decreased online library*

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anxiety, *increased online library self-efficacy*, *improved perceptions of librarians' value*, *improved perceptions of librarians' helpfulness*, *improved perceptions of the value of online libraries*, and *improved perceptions of the value of physical libraries*. With respect to behavioral outcomes, Detlor et al. concluded that ILI leads to *improved use of the online library* (i.e., selecting better online library resources, better use of online library features, better searching for information within the online library, better evaluation of information retrieved from the online library, better assessment of citations from the information retrieved from the online library, dealing better with economic, legal, and social issues pertaining to the information retrieved from the online library), *increased use of the online library* (i.e., using the online library more often), *improved use of librarians* (i.e., asking better, more appropriate, and more advanced questions of librarians), *increased use of librarians* (i.e., approaching librarians more often), *improved use of the physical library* (i.e., more efficient or more effective use of the resources available in the physical library), and *increased use of the physical library* (i.e., visiting the physical library more often). In terms of benefit outcomes, their results showed that ILI leads to efficiency gains in the form of *time savings* and *effort reduction*, and effectiveness gains in the form of *higher grades and coursework impact*, and *greater workforce preparation* upon graduation.

Importantly, Detlor et al. (2011) also suggested that a potential cause–effect chain of relationships may exist where psychological outcomes affect behavioral outcomes, which in turn influence benefit outcomes, warranting further investigation. Both the psychology and information systems literatures have advocated strong support of psychological outcomes (changes in perceptions) affecting behavioral outcomes (changes in action); for example, a person who develops positive perceptions toward a particular information system is more likely to use it (Ajzen, 1991; Davis, 1989; Fishbein & Ajzen, 1975). It also is reasonable to expect that positive changes in behavior (behavioral outcomes) will yield efficiency and effectiveness gains (benefit outcomes).

Note that the components constituting the various aspects of psychological outcomes, behavioral outcomes, and benefit outcomes represent distinct dimensions that are theoretically independent of one another. For example, consider the case of psychological outcomes. A decrease in online library anxiety may not correlate with perceptions of librarians' helpfulness. An increase in perceptions of online library value also is theoretically independent from perceptions of the physical library, especially for those students who mostly rely on online resources. Therefore, a change in one construct (e.g., perceptions of online library value) may not be accompanied by a similar change in the magnitude of another construct (e.g., perceptions of the physical library). When these personal and perceptual factors are combined under a uniform umbrella of psychological outcomes, they meet statistical and conceptual conditions of presenting the psychological outcomes construct as a second-order factor, composed of six independent, first-order constructs (Turel, Serenko, & Bontis, 2007, 2010). The same line of reasoning may be applied to the behavioral and benefit outcome constructs, which also are presented as the second-order factors. The behavioral outcome construct includes several components such as the use of an online library, librarians, and a physical library, which are conceptually independent. The benefit outcome construct includes time savings, effort reduction, improved grades, and better workforce preparation, which also are independent of one another. The presentation of these factors as higher order constructs helps us understand what role psychological, behavioral, and benefit outcomes play as a whole, in addition to identifying the actual contribution each first-order dimension makes to the overall second-order dimension. Based on the previous discussion, the following hypotheses are proposed (see Figure 1):

H4: Perceived quality of ILI has a positive direct effect on psychological outcomes of ILI.

H5: Student satisfaction with ILI has a positive direct effect on psychological outcomes of ILI.

H6-1: Decreased online library anxiety is an important part of psychological outcomes of ILI.

H6-2: Increased online library self-efficacy is an important part of psychological outcomes of ILI.

H6-3: Improved perceptions of librarians' value are an important part of psychological outcomes of ILI.

H6-4: Improved perceptions of librarians' helpfulness are an important part of psychological outcomes of ILI.

H6-5: Improved perceptions of the online library value are an important part of psychological outcomes of ILI.

H6-6: Improved perceptions of the physical library value are an important part of psychological outcomes of ILI.

H7: Psychological outcomes of ILI have a positive direct effect on behavioral outcomes of ILI.

H8-1: Improved use of the online library is an important part of behavioral outcomes of ILI.

H8-2: Increased use of the online library is an important part of behavioral outcomes of ILI.

H8-3: Improved use of librarians' services is an important part of behavioral outcomes of ILI.

H8-4: Increased use of librarians' services is an important part of behavioral outcomes of ILI.

H8-5: Improved use of the physical library is an important part of behavioral outcomes of ILI.

H8-6: Increased use of the physical library is an important part of behavioral outcomes of ILI.

H9: Behavioral outcomes of ILI have a positive direct effect on benefit outcomes of ILI.

H10-1: Efficiency gains in time savings are an important part of benefit outcomes of ILI.

H10-2: Efficiency gains in effort reduction are an important part of benefit outcomes of ILI.

H10-3: Effectiveness gains in higher grades and coursework impact are an important part of benefit outcomes of ILI.

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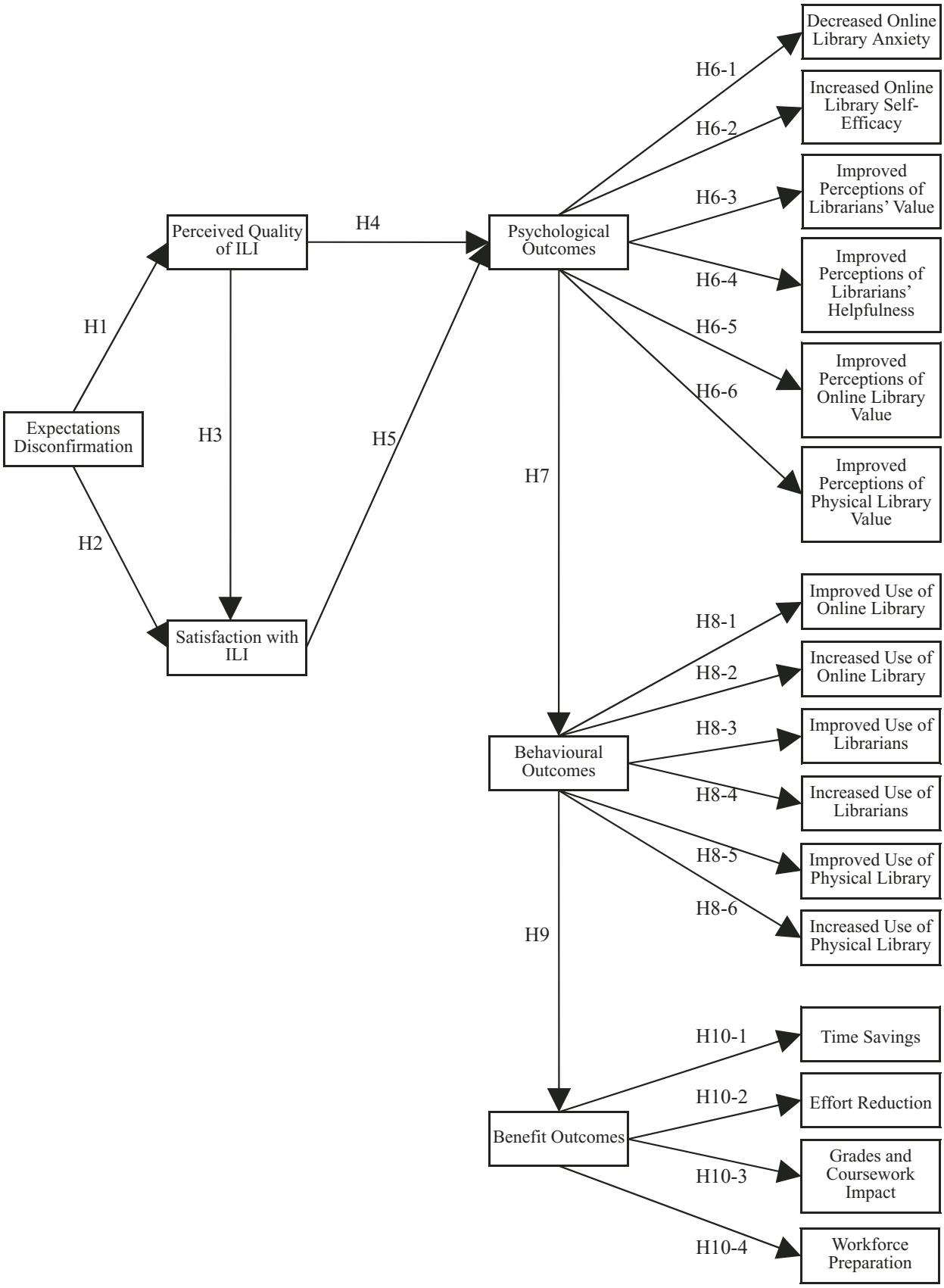

FIG. 1. The research model.

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H10-4: Effectiveness gains in greater workforce preparation are an important part of benefit outcomes of ILI.

Method and Results

To test the study's model and related hypotheses, a survey of full-time undergraduate business students of a Canadian university was conducted. This university was chosen because all undergraduate students are exposed to various forms of ILI beginning in their first year of studies. For example, librarians do presentations and teach tutorials as part of course curriculum, students submit assignments that require an extensive use of online and physical library resources, and instructors encourage students to utilize only credible information sources in their submissions. Specifically, ILI is given in six mandatory courses across all 4 years of the undergraduate program. This instruction has been given consistently in four of those courses for the last 7 years and in the two other courses for the last 3 and 4 years, respectively. In these courses, emphasis is placed in more junior years on teaching students how to access and search online business resources such as ABI-Inform, Business Source Complete, and Business Monitor Online for basic, general business-related information such as Standard Industry Classification (SIC) and North American Industry Classification System (NAICS) codes and descriptions. In more senior years, these sessions are used to instruct students how to use online business databases to access and find more in-depth information on competitors and business environments in local and international contexts. All six mandatory ILI sessions primarily concentrate on the following four IL skills: (a) selecting online library resources, (b) using online library resources, (c) searching for information using online library resources, and (d) retrieving information from online library resources. These skills adhere closely to four of the seven IL competency standards defined by the Association of College and Research Libraries (2010b). These courses offer little, if any, learning opportunities for students with respect to other IL competency standards as described by the Association of College and Research Libraries, such as evaluating information and dealing with economic, legal, and social issues. In addition, the library at the business school provides nonmandatory ILI sessions in which students learn how to access and use general news databases, bibliographic citation tools, and career-related websites as well as opportunities to tour library facilities and learn about library services and resources.

To measure the amount of ILI received by the students, one of the survey questions presented a 2×2 matrix, which listed all courses that had IL training and years when students took these courses. The information on ILI in each course was provided by the university librarians. Student responses were later converted into the overall duration of IL training received in the program. The results indicated that all students were exposed to ILI, with an average of 350 min of overall instruction per student (range = 40–680 min).

All 2,049 registered full-time commerce students were invited to complete the online survey through an e-mail invitation, followed by three follow-up reminders. To encourage the students, 100 randomly drawn gift certificates valued at $50 each were offered. In total, 372 usable responses were obtained (response rate = 18.2%). The results indicated that there were 51 and 49% of female and male students, respectively. As a breakdown by year, 26, 23, 31, and 20% of these students were enrolled in Years 1, 2, 3, and 4, respectively. Their distribution of major was accounting (36%), finance (20%), marketing (19%), human resources (7%), general management (2%), information systems (1%), and operations research (1%). Fourteen percent of the respondents were still undecided on their major. In terms of grades, 20% were in the A− to A+ range, 59% in the B− to B+ range, 16% in the C− to C+ range, and 4% preferred not to say. All students received ILI. Based on the information obtained from the Academic Program Office, the profile of the obtained sample is generally representative of the students enrolled in the commerce program at that school.

The items measuring expectation disconfirmation and satisfaction were adapted from Bhattacherjee (2001b), and perceived quality from Fornell et al. (1996). Items pertaining to the psychological, behavioral, and benefit outcome constructs were developed during this study. First, the IL literature and results from the prior IL project conducted by the research team (Detlor et al., 2011) were reviewed to identify all possible dimensions (i.e., first-order constructs) of each outcome and potential questionnaire items. Second, each first-order construct was operationalized with at least four items. Third, items were adjusted based on feedback from several IL researchers. Fourth, a comprehensive face-validity assessment of the draft instrument was done by consulting a team of 34 IL academics, practitioners (i.e., librarians), other experts, and potential survey participants. Based on their feedback, subsequent changes to the instrument were done. To minimize common method variance, 12 negatively worded items were included, which is a common approach in questionnaire design (Serenko & Turel, 2007). The survey instrument, which took about 20 min to complete, is available in Appendix A.

PLS Graph Version 3 was used to assess the measurement and structural models. PLS was selected because it is the best structural equation modeling tool that supports the use of second-order constructs (Wetzels, Odekerken-Schröder, & van Oppen, 2009). The second-order constructs were presented as molecular factors (Chin & Gopal, 1995), and they were operationalized by means of the repeated indicators approach (i.e., the hierarchical component model) (Lohmoller, 1989) that is acceptable in PLS. A molecular factor is a higher order construct which consists of a number of reflective indicators belonging to several distinct lower order factors. Molecular constructs were used for three reasons. First, from a theoretical perspective, it was argued that a molecular outcome construct represents the overall students' perceptions of IL outcomes (i.e., behavioral,

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psychological, or benefit) measured by a specific combination of perceptions of several first-order factors. A change in a student's perception of one first-order factor would mean that his or her overall perception of a particular second-order benefit factor also changes. Second, the correlations of first-order constructs were strong (i.e., averaging at 0.7), which justifies the employment of molecular second-order constructs from an empirical perspective. Third, the conceptualization of second-order constructs as molecular allows determining the relative importance of each first-order factor in reflecting a specific outcome because the contribution of each first-order factor is revealed in its β coefficient (Chin & Gopal, 1995).

An assessment of reliability and validity of the measurement model demonstrated an acceptable level of the psychometric properties of the constructs. Only three items were removed (see Appendix A): EFCR4 because its loading was below the cutoff value of 0.7, and EGTM3 and EGEF3 because they cross-loaded very highly on other constructs. After removing these items, the model was re-estimated. Appendix B presents the measurement model. The matrix of cross-loadings also was constructed. It demonstrated that each indicator loaded higher on its respective construct than it cross-loaded on different constructs, which demonstrates discriminant validity of the measures. The matrix of cross-loadings is available from the first author.

Bootstrapping with 250 re-samples was done to test the structural model. Bootstrapping is a re-sampling technique that is used to obtain *t* values for the proposed relationships, and 250 is a recommended value that is frequently used in PLS analysis (Chin, 1998). All hypotheses were supported at the 0.001 confidence level (see Figure 2).

The model reveals that the effect of expectation disconfirmation on student satisfaction with ILI is partially mediated through perceived quality of ILI. The significance of this mediation effect was tested in PLS Graph as suggested by Chin (personal communication, August 4, 2011). First, the number of re-samples was set at 1,000 in the bootstrapping function. Second, the pre-processing option of PLS was set to Output Raw Results (i.e., raw.out file). Third, bootstrapping was done on the PLS model, and the generated raw.out file was analyzed in MS Excel. Of three links that were used in the mediation effect (Expectation Disconfirmation–Perceived Quality, Perceived Quality–Student Satisfaction, and Expectation Disconfirmation–Student Satisfaction), none was zero or negative in the set of 1,000 resamples, which indicates that the partial mediation effect is supported at the $p < .001$ level.

Discussion

Summary

The purpose of this study was to suggest and empirically test a model describing the consequences of ILI in an undergraduate business program. During this project, 372 students completed an online survey, and the model was estimated by using PLS structural equation modeling techniques. Based on the findings, several important issues emerged from which key recommendations for theory and practice can be made. They include appropriate management of initial students' expectations, better overview of physical library facilities during IL sessions, explanation of online support functions, clear communication of the value of utilizing the latest academic findings when making critical managerial decisions, and the applicability of the proposed model to study the effect of ILI in various settings. The subsequent subsections discuss these issues in detail.

Theoretical Contribution

First, it was demonstrated that expectation disconfirmation theory may be fruitfully applied in the education domain to study IL outcomes. Specifically, it was found that the impact of expectation disconfirmation on student satisfaction with ILI is partially mediated by perceived quality of ILI. The overall strength of the expectation disconfirmation–student satisfaction relationship is 0.71 $[(0.34 + 0.67) \times 0.55]$. It also explains 67% of the variance in the satisfaction construct, which is considered very high in management research. A positive expectation disconfirmation—when students believe that ILI met or exceeded their initial expectations—facilitates positive quality perceptions and boosts satisfaction. At the same time, a failure to meet initial student ILI expectations may produce low-quality perceptions and dissatisfaction with the service, resulting in negative outcomes.

Second, perceived quality and student satisfaction with ILI led to several critical psychological outcomes. Of these, increased online library self-efficacy, improved perceptions of online library value, improved perceptions of librarians' value, decreased online library anxiety, and improved perceptions of librarians' helpfulness were highly important. Improved perceptions of the physical library value were a less significant contributor to the aggregate psychological outcomes component. It is possible that many students learned how to utilize physical libraries before joining the university, and they formed relatively stable perceptions of the physical library before attending ILI sessions. A visual inspection of Table B1 in Appendix B reveals that the means of the items belonging to the improved perceptions of the physical library value construct were lower than were those of the other psychological outcomes items. This suggests a lower effect of ILI on better perceptions of the physical library value. It is possible that some IL instructors underemphasized the value of the physical library in their sessions by mostly concentrating on online resources. At the same time, many older journal volumes are still unavailable in the electronic format, and the students potentially may be missing this critical body of knowledge. Therefore, more emphasis should be added to introduce the physical library facilities during ILI sessions.

Third, psychological outcomes have a very strong positive direct effect on behavioral outcomes ($\beta = 0.82$) that in

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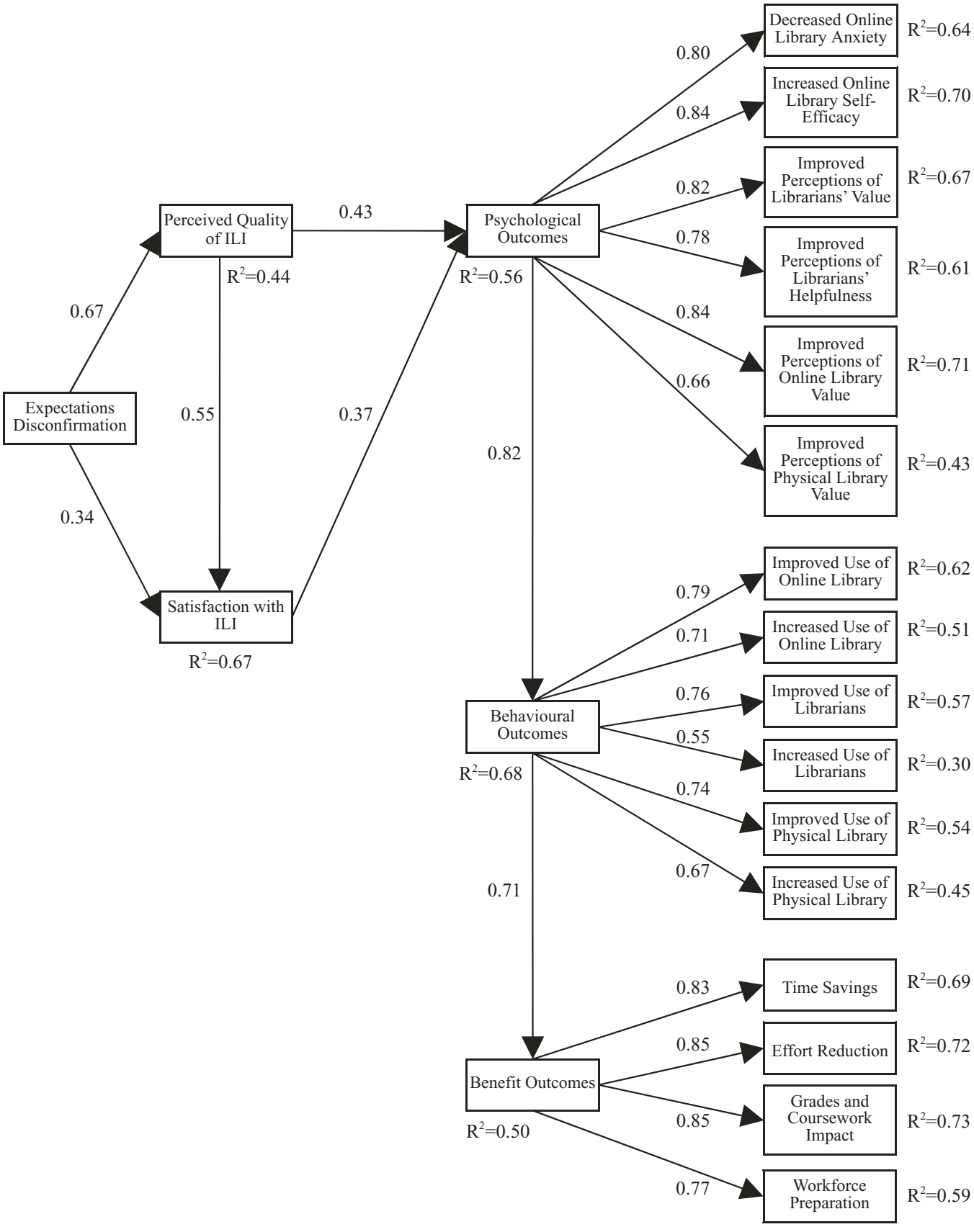

FIG. 2. The structural model (all relationships are significant at 0.001 level).

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turn affect benefit outcomes ($\beta = 0.71$). With respect to behavioral outcomes, improved use of online library was the most significant component, followed by improved use of librarians, improved use of physical library, increased use of online library, and increased use of physical library. Increased use of librarians was a less important behavioral outcomes component.

Fourth, efficiency and effectiveness gains such as a reduction in effort to locate library materials, positive impact on grades and coursework, and time savings are the key ILI benefit outcomes. At the same time, ILI contributes less to students' preparation for entering the workforce. It is possible that some students cannot predict how they may apply their IL skills at work. Those who had prior work experience probably noticed that even senior managers rarely employ academic or research materials in their decision making. On one hand, most managers perceive the academic body of knowledge as very useful and relevant to their needs (Booker, Bontis, & Serenko, 2008). On the other hand, they often tend to ignore it (Pearson, Pearson, & Shim, 2005).

Fifth, the total effect of perceived quality and student satisfaction with ILI on benefit outcomes was relatively strong. Therefore, we conclude that the suggested model is a good predictor of ILI outcomes, and that it can be used to understand the outcomes of ILI in undergraduate business programs.

These findings provide quantitative evidence of the psychological, behavioral, and benefit outcomes of ILI that prior qualitative studies in the IL and educational assessment literature have suggested. There are many positive outcomes, as listed earlier, of offering ILI to students. Business educators and academic librarians (the traditional providers of ILI in college and university settings) should rally behind these findings and use them to spearhead more ILI in their schools since there are ample positive student learning outcomes from offering ILI.

Practical Contribution

The results of this study have several implications for practice. First, many university libraries have implemented live online support for their students, referred to as the "virtual librarian." More emphasis should be added to inform the students about this service to ensure that all are aware of it and use it more often. Second, since many students are unable to see the utility of IL in the workplace, it is critical for a successful IL program to teach students how they may apply these skills after graduation. For instance, examples offered during ILI should relate not only to school assignments but also to potential tasks to which the students may be assigned at work. The value of utilizing the latest academic findings when making critical managerial decisions should be clearly communicated. Third, business educators should be aware of the causal effect of perceived quality and satisfaction with ILI on psychological outcomes, which further impact behavioral and benefit outcomes. If student efficiency and effectiveness benefit outcomes are what is ultimately sought through ILI, then steps should be taken to heighten positive student perceptions of, and positive student behaviors with, libraries, librarians, online library resources, and physical libraries. This could be accomplished through marketing campaigns and messages targeted to students that raise positive awareness of IL and the benefits that students may derive from IL skills both in academia and in the workplace.

Organizers of ILI in undergraduate business programs should accurately manage the initial expectations of their students. As such, they should provide students with a realistic overview of the ILI curriculum and its benefits, and never "oversell" what the instruction will offer. For example, some ILI organizers such as business librarians and administrators may be tempted to overemphasize the value of IL sessions for their students when they promote library services. On one hand, this strategy may bring more attendees to the IL tutorials, presentations, and instructional classes. Indeed, having a good level of IL skills is critical for succeeding in contemporary business programs. On the other hand, if some of the expectations of the students remain unmet, their perceptions of ILI quality and satisfaction with ILI will be low, resulting in lower levels of psychological, behavioral, and benefit outcomes. At the same time, setting the initial expectations of their students too low may discourage students from attending the sessions, thus missing assignments and ignoring the material. This important phenomenon needs to be considered by ILI promoters.

Given the importance that perceptions of quality have on the impacts of ILI, it would be useful and wise for IL practitioners to ensure they deliver high-quality, effective instruction. In this regard, related research by a subset of the author team may offer some helpful advice. Specifically, Detlor et al. (2011) suggested having IL instruction tied to an assignment, delivering instruction just in time when it is most needed, providing students with associated instructional and background reference materials, and keeping the length and amount of instruction within reasonable learning limits as ways to deliver more effective and higher quality ILI. Importantly, Detlor et al. recommended the incorporation of active learning techniques (e.g., the use of hands-on interactive training) in ILI over that of more passive teaching methods as a means to heighten and strength the quality of ILI that students receive.

Limitations and Future Research

Despite its contribution to both theory and practice, this study has several limitations. First, the generalizability of the proposed model should be further established. It potentially may exhibit different properties in cases of different ILI curriculum and content. Second, in this study, students were viewed as customers of their higher education institutions. However, students also may be considered citizens with certain rights, clients who need expert guidance, subjects with some responsibilities, coworkers in the educational venture, and clients in a professional/client

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relationship (Bailey, 2000; Franz, 1998; Halbesleben et al., 2003; Sharrock, 2000). This change in the metaphor may allow future researchers to apply a different theory or model to understand antecedents of ILI outcomes. Although expectation disconfirmation theory was proved to explain the phenomenon under investigation relatively well, this is not the only lens of analysis that may be employed in future research.

Third, the application of structural equation modeling allowed estimating causal relationships among the model's constructs. At the same time, it did not identify differences in learning outcomes between those who did and did not receive ILI. To answer this important question, future researchers may conduct an experiment by comparing multiple groups of respondents depending on their extent of ILI training, including a control group with no instruction. Fourth, this study relied only on self-reported perceptual measures, which may be affected by various factors such as social desirability bias (Crowne & Marlowe, 1960; Reynolds, 1982) and common method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). To reduce social desirability bias, the anonymity of survey respondents was retained. To decrease common method variance, a number of negatively worded items were included in the questionnaire, which is a common approach in survey design (Podsakoff & Organ, 1986). Nevertheless, despite these attempts, it is possible that some students provided somewhat inaccurate responses. Therefore, future researchers may consider conducting an experiment in which student learning outcomes are measured more objectively, for example, through direct observation or administration of IL tests.

Results from this quantitative investigation elicit an interesting finding: Students report both increased use and improved use of online and physical library resources after receiving IL instruction. This is a surprising finding in that one may not necessarily expect to see simultaneous increases and improvements in use across both online and physical library resources. For instance, improved and increased use of the online library as a result of receiving ILI may lead one to expect to see a corresponding decrease in usage and reliance on the physical library itself, and not the reverse. Unfortunately, our survey data did not capture sufficient detail to tease out a rationale or explanation for this finding. Such detail would have provided insight on how to better configure virtual and physical library spaces. Based on this, future research in this area should explore how students are using online and physical library resources after receiving ILI and what impact this should have on online and physical library configurations of space, use, and services.

Conclusions

The purpose of this study was to address the gap in the educational assessment and IL literatures that explains how student perceptions of ILI affect student learning outcomes, the relationships among the various types of student learning outcomes of IL instruction (i.e., psychological, behavioral, benefit outcomes), and their cause and effect on one another. This was accomplished by developing a model based on prior work, testing it via administration of a web survey to commerce students, and analyzing the data collected through rigorous quantitative PLS techniques. The results yielded several findings and recommendations, as described earlier.

This work is important since it furthers our theoretical understanding and knowledge about the learning outcomes of IL instruction and provides recommendations for practice. This work is highly relevant to the information systems academic community because a large part of ILI involves the adoption and use of ICT tools, information retrieval systems, and online library resources (e.g., databases, indexes, journal suites, online catalogs, library websites) and the training of these systems to end users. We hope that business librarians, administrators, and educators will be able to employ the recommendations presented in this investigation to improve the promotion and delivery of ILI in their schools. Future researchers also should ensure the applicability of the suggested model in other settings.

This work also is important in that it provides insight on how to promote digital IL. Governments worldwide have recognized the economic benefits in training a competent and capable, digitally skilled business workforce, and have made specific calls to academia to train students to become digitally literate (Clement, 2010; Industry Canada, 2010). To help academia accomplish this task, there is a strong and urgent need to understand the factors that promote successful student learning outcomes when students are given ILI, the relationships among these outcomes, and how student perceptions of the instruction that they receive affect the learning outcomes themselves. Doing so will ensure that students not only receive instruction in a way that promotes successful learning outcomes but also in a manner that helps them attain the requisite digital information skills required in today's global digital economy.

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Appendix A

Online Questionnaire

In what year of study are you?
1. 1st year
2. 2nd year
3. 3rd year
4. 4th year or higher
5. Prefer not to say

What is your gender?
1. Male
2. Female
3. Prefer not to say

While you are in school, in what area do you plan to major or concentrate your business studies?
1. Accounting
2. Finance
3. General Management
4. Human Resources
5. Information Systems
6. Marketing
7. Operations Research
8. Strategy
9. Not Listed Above
10. Undecided/Not Sure/Prefer not to say

How well do you typically perform academically at university?
1. In the A– to A+ range
2. In the B– to B+ range
3. In the C– to C+ range
4. In the F to D+ range
5. Prefer not to say

Please select cells within the matrix that correspond to the courses you have taken and the year in which you have taken these courses.

	Year 1	Year 2	. . .	Year 6
Course 1				
Course 2				
. . .				
Course 6				

Note: All items below were measured on 7-point agree/disagree Likert-type scale.

The following asks you to assess the degree to which the library instruction you received from the librarians met your original expectations.

Expectation Disconfirmation (ED)
Compared to my initial expectations, the library instruction I received from the librarians was:
ED1. more effective than I originally expected.
ED2. better than I originally expected.
ED3. of higher quality than I originally expected.
ED4. above my initial expectations.

The following asks you to assess your general satisfaction with the library instruction you received from the librarians.

Satisfaction with IL Instruction (SAT)
In terms of the library instruction I received from the librarians, I feel:
SAT1. satisfied.
SAT2. pleased.
SAT3. frustrated. (negatively worded)
SAT4. happy.

The following asks you to assess your perceptions of the quality of content and delivery of the library instruction you received from the librarians.

Perceived Quality of ILI (PQ)
In terms of the library instruction I received from the librarians, I feel the quality:

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PQ1. was high.
PQ2. met my personal requirements.
PQ3. was consistent across all the library instruction sessions.
PQ4. was poor. (negatively worded)

The following asks you to assess changes in your use and perception of online library resources as a result of the library instruction you received from the librarians.

Improved Use of Online Library Resources (IMPR)
As a result of the library instruction I received from the librarians:
IMPR1. I select online library resources better (e.g., I know better which specific online library resources to use, such as the library web site, library catalogue or a database like Business Source Complete, to find the information that I need).
IMPR2. I use online library resource features better (e.g., I know better how to use the various functions within a specific online library resource, such as the library web site, library catalogue or a database such as Business Source Complete, to find the information that I need. Examples of features include mail, printing, saving, exporting, sorting, refining results using limits such as language, date, publication type, etc.)
IMPR3. I search for information using online library resources better (e.g., I know better how to conduct an advanced search, subject headings, etc.)
IMPR4. I retrieve information from online library resources better (e.g., I know better how to extract and acquire information from an online library resource, such as a journal article, book, etc.)
IMPR5. I evaluate the information I retrieve from online library resources better (e.g., I know better how to assess the relevance, reliability, validity, bias and timeliness of the information I retrieve from online library resources).
IMPR6. I assess citations of the information I retrieve from online library resources better (e.g., based on the references that I retrieve from online library resources, I can better decipher if the information pertains to a book, a book chapter, or a journal article).
IMPR7. I deal with the economic, legal & social issues surrounding the use of online library resources better (e.g., I am better aware of issues around the use of the information I retrieve from online library resources such as copyright, privacy, and censorship).

Increased Use of Online Library Resources (INCO)
As a result of the library instruction I received from the librarians, I use online library resources:
INCO1. more often for my course work.
INCO2. more often in general.
INCO3. more frequently overall.
INCO4. less often. (negatively worded)

Anxiety with Using Online Library Resources (ANXD)
As a result of the library instruction I received from the librarians, I feel:
ANXD1. less anxious using online library resources.
ANXD2. more comfortable using online library resources.
ANXD3. more at ease using online library resources.
ANXD4. more uncertain using online library resources. (negatively worded)

Self-Efficacy with Using Online Library Resources (SELF)
As a result of the library instruction I received from the librarians, I feel:
SELF1. more competent using online library resources.
SELF2. more confident using online library resources.
SELF3. less capable using online library resources. (negatively worded)
SELF4. more knowledgeable about using online library resources.

Perception of Online Library Resources Value (PVOR)
As a result of the library instruction I received from the librarians, the online library resources at our university seem:
PVOR1. more useful.
PVOR2. more important.
PVOR3. more valuable.
PVOR4. more essential.

The following asks you to assess changes in your use and perception of librarians as a result of the library instruction you received from the librarians.

Improved Use of Librarians' Services (IMPN)
As a result of the library instruction I received from the librarians, when I approach the librarians at our university for help:
IMPN1. I ask better questions.
IMPN2. I ask basic questions less often.
IMPN3. I ask more advanced questions.
IMPN4. I phrase my questions more appropriately.

Increased Use of Librarians' Services (INCN)
As a result of the library instruction I received from the librarians, I approach the librarians:
INCN1. more often for help with my course work.
INCN2. more often in general.
INCN3. more frequently overall.
INCN4. less often. (negatively worded)

Perceptions of Librarians' Helpfulness (PLNH)
As a result of the library instruction I received from the librarians, the librarians seem:
PLNH1. more approachable.
PLNH2. more available to ask for help.
PLNH3. more helpful.
PLNH4. less concerned about helping students. (negatively worded)

Perceptions of Librarians' Value (PLNV)
As a result of the library instruction I received from the librarians, the librarians seem:
PLNV1. more useful.
PLNV2. more important.
PLNV3. more valuable.
PLNV4. more essential.

The following asks you to assess changes in your use and perception of the physical libraries at our university as a result of the library instruction you received from the librarians.

Improved Use of Physical Library (IMPY)
As a result of the library instruction I received from the librarians, I use the resources available in the physical libraries at our university:

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IMPY1. more efficiently.
IMPY2. more effectively.
IMPY3. more competently.
IMPY4. not as well. (negatively worded)

Increased Use of Physical Library (INCY)
As a result of the library instruction I received from the librarians, I visit the physical libraries at our university:
INCY1. more often for my course work.
INCY2. more often in general.
INCY3. more frequently overall.
INCY4. less often. (negatively worded)

Perceptions of Physical Library's Value (PRVY)
As a result of the library instruction I received from the librarians, the physical libraries at our university seem:
PRVY1. more useful.
PRVY2. more important.
PRVY3. more valuable.
PRVY4. more essential.

The following asks you to assess the benefits obtained as a result of the library instruction you received from the librarians.

Efficiency Gains in Form of Time Saving (EGTM)
As a result of the library instruction I received from the librarians, the information I need for my course work:
EGTM1. takes me less time to find.
EGTM2. is faster for me to find.
EGTM3. takes me more time to find. (negatively worded)-**REMOVED**
EGTM4. is quicker to search for.

Efficiency Gains in Form of Effort Reduction (EGEF)
As a result of the library instruction I received from the librarians, the information I need for my course work:
EGEF1. is easier for me to find.
EGEF2. takes me less effort to find.
EGEF3. takes me more effort to find. (negatively worded)-**REMOVED**
EGEF4. requires less energy on my part to find.

Effectiveness Gains in Form of Course Work Benefits (EFCW)
As a result of the library instruction I received from the librarians,
EFCW1. my grades have improved.
EFCW2. I am better positioned to succeed in my course work.
EFCW3. I am a better student.
EFCW4. my academic performance is stronger.

Effectiveness Gains in Form of Career Impact (EFCR)
As a result of the library instruction I received from the librarians,
EFCR1. I am better prepared to enter the workforce.
EFCR2. I am better positioned to succeed in my career.
EFCR3. I am more able to succeed in my first job upon graduation.
EFCR4. I am less prepared for my career of choice. (negatively worded)-**REMOVED**

Appendix B

The Measurement Model Assessment

TABLE B1. Item statistics, reliability and validity assessment.

Item	*M*	*SD*	Loading	Residual variance	Item-total correlation	Cronbach's α	Internal consistency (AVE)
ED1	5.26	1.19	0.922	0.151	0.86	0.95	0.962 (0.862)
ED2	5.17	1.21	0.950	0.097	0.91		
ED3	5.13	1.25	0.919	0.156	0.86		
ED4	5.17	1.27	0.924	0.147	0.87		
PQ1	5.46	1.10	0.888	0.211	0.77	0.84	0.889 (0.668)
PQ2	5.44	1.10	0.862	0.257	0.73		
PQ3	5.44	1.12	0.733	0.463	0.59		
PQ4	5.65	1.14	0.776	0.398	0.59		
SAT1	5.58	1.09	0.904	0.183	0.78	0.86	0.901 (0.697)
SAT2	5.41	1.13	0.910	0.172	0.81		
SAT3	5.42	1.11	0.766	0.413	0.61		
SAT4	4.93	1.14	0.745	0.445	0.60		
Psychological outcomes (second-order construct)							
ANXD1	5.19	1.24	0.803	0.356	0.67	0.88	0.918 (0.737)
ANXD2	5.52	1.09	0.927	0.142	0.84		
ANXD3	5.45	1.09	0.923	0.149	0.83		
ANXD4	5.50	1.18	0.771	0.406	0.62		
SELF1	5.47	1.09	0.918	0.157	0.83	0.88	0.920 (0.744)
SELF2	5.43	1.10	0.915	0.163	0.82		
SELF3	5.50	1.15	0.757	0.427	0.61		
SELF4	5.48	1.08	0.851	0.276	0.73		

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TABLE B1. *(Continued)*

Item	*M*	*SD*	Loading	Residual variance	Item-total correlation	Cronbach's α	Internal consistency (AVE)
PLNV1	5.53	1.07	0.940	0.117	0.89	0.96	0.966 (0.876)
PLNV2	5.44	1.11	0.953	0.092	0.92		
PLNV3	5.51	1.11	0.958	0.082	0.92		
PLNV4	5.37	1.16	0.893	0.203	0.82		
PLNH1	5.47	1.06	0.909	0.173	0.83	0.90	0.932 (0.774)
PLNH2	5.55	1.01	0.934	0.127	0.88		
PLNH3	5.56	1.04	0.905	0.182	0.83		
PLNH4	5.68	1.19	0.761	0.421	0.60		
PVOR1	5.70	1.02	0.898	0.194	0.81	0.93	0.947 (0.818)
PVOR2	5.50	1.11	0.907	0.178	0.84		
PVOR3	5.66	1.03	0.935	0.126	0.88		
PVOR4	5.49	1.14	0.877	0.231	0.79		
PRVY1	5.30	1.26	0.941	0.114	.902	0.97	0.975 (0.907)
PRVY2	5.26	1.24	0.960	0.079	.929		
PRVY3	5.29	1.24	0.976	0.047	.955		
PRVY4	5.22	1.30	0.932	0.132	.881		
Behavioral outcomes (second-order construct)							
IMPR1	5.59	1.28	0.831	0.309	0.76	0.92	0.932 (0.665)
IMPR2	5.49	1.30	0.869	0.245	0.80		
IMPR3	5.57	1.22	0.870	0.243	0.81		
IMPR4	5.52	1.26	0.869	0.245	0.82		
IMPR5	5.17	1.28	0.838	0.297	0.79		
IMPR6	5.16	1.39	0.707	0.500	0.64		
IMPR7	4.88	1.32	0.705	0.502	0.62		
INCO1	5.39	1.36	0.825	0.319	0.66	0.86	0.905 (0.704)
INCO2	4.69	1.42	0.848	0.280	0.73		
INCO3	4.90	1.35	0.896	0.197	0.80		
INCO4	5.33	1.26	0.783	0.387	0.64		
IMPN1	4.84	1.26	0.840	0.294	0.71	0.88	0.914 (0.726)
IMPN2	4.83	1.27	0.820	0.327	0.70		
IMPN3	4.84	1.23	0.896	0.198	0.82		
IMPN4	4.90	1.21	0.851	0.276	0.75		
INCN1	4.49	1.52	0.871	0.241	0.76	0.89	0.922 (0.747)
INCN2	4.29	1.43	0.895	0.199	0.80		
INCN3	4.20	1.47	0.915	0.162	0.84		
INCN4	4.63	1.43	0.768	0.410	0.62		
IMPY1	5.09	1.24	0.959	0.081	0.91	0.93	0.952 (0.832)
IMPY2	5.14	1.22	0.964	0.072	0.92		
IMPY3	5.10	1.22	0.954	0.091	0.90		
IMPY4	5.25	1.29	0.756	0.429	0.61		
INCY1	5.05	1.45	0.873	0.237	0.77	0.89	0.925 (0.756)
INCY2	5.00	1.42	0.915	0.163	0.84		
INCY3	4.96	1.42	0.912	0.169	0.84		
INCY4	5.24	1.34	0.769	0.409	0.59		
Benefit outcomes (second-order construct)							
EGTM1	5.38	1.22	0.948	0.101	0.88	0.92	0.950 (0.863)
EGTM2	5.42	1.16	0.952	0.093	0.89		
EGTM4	5.31	1.17	0.884	0.218	0.76		
EGEF1	5.44	1.12	0.886	0.214	.72	0.85	0.912 (0.775)
EGEF2	5.31	1.16	0.924	0.146	.80		
EGEF4	5.02	1.21	0.829	0.313	.66		
EFCW1	4.25	1.21	0.842	0.291	0.76	0.91	0.926 (0.758)
EFCW2	4.99	1.21	0.843	0.290	0.71		
EFCW3	4.58	1.24	0.888	0.212	0.82		
EFCW4	4.48	1.20	0.908	0.176	0.87		
EFCR1	4.38	1.32	0.948	0.102	0.89	0.95	0.967 (0.908)
EFCR2	4.31	1.28	0.968	0.063	0.93		
EFCR3	4.37	1.27	0.943	0.112	0.88		

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TABLE B2. Construct correlations and square root of AVE (along the diagonal).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1-ED	**.928**																		
2-PQ	.665	**.817**																	
3-SAT	.707	.779	**.835**																
4-ANXD	.510	.596	.605	**.858**															
5-SELF	.518	.655	.616	.801	**.863**														
6-PLNV	.460	.572	.535	.491	.516	**.936**													
7-PLNH	.461	.560	.548	.474	.525	.732	**.880**												
8-PVOR	.500	.606	.580	.683	.708	.615	.530	**.904**											
9-PRVY	.346	.382	.441	.360	.421	.494	.460	.424	**.952**										
10-IMPR	.479	.545	.555	.694	.680	.454	.397	.604	.342	**.815**									
11-INCO	.397	.487	.481	.644	.643	.406	.326	.588	.298	.617	**.839**								
12-IMPN	.501	.506	.489	.457	.537	.481	.477	.455	.441	.481	.447	**.852**							
13-INCN	.255	.276	.291	.240	.236	.416	.384	.276	.385	.233	.218	.396	**.864**						
14-IMPY	.432	.450	.500	.418	.488	.489	.508	.439	.583	.378	.360	.509	.389	**.912**					
15-INCY	.336	.326	.374	.335	.417	.366	.357	.396	.711	.320	.302	.435	.389	.534	**.869**				
16-EGTM	.480	.560	.534	.640	.660	.459	.449	.591	.417	.616	.537	.438	.268	.412	.334	**.929**			
17-EGEF	.418	.500	.485	.569	.611	.446	.409	.526	.420	.559	.499	.444	.283	.437	.345	.834	**.880**		
18-EFCW	.375	.404	.396	.431	.470	.408	.323	.438	.419	.466	.421	.506	.354	.369	.389	.506	.579	**.871**	
19-EFCR	.346	.309	.308	.348	.361	.354	.249	.393	.400	.363	.361	.458	.327	.376	.347	.436	.431	.680	**.953**

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