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Learning Computing Topics in Undergraduate Information Systems Courses: Managing Perceived Difficulty

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ABSTRACT

Learning technical computing skills is increasingly important in our technology driven society. However, learning technical skills in information systems (IS) courses can be difficult. More than 20 percent of students in some technical courses may dropout or fail. Unfortunately, little is known about students' perceptions of the difficulty of technical IS courses and how students cope with the perceived difficulty of technical content in IS courses. This paper explores how students perceive the difficulty of technical IS courses and how difficulty perceptions influence learning outcomes and perceptions. Learning technical topics may be particularly difficult for students from non-IS majors, yet this is only speculative. The extent to which non-IS majors are disadvantaged in technical IS courses is also explored. To explore these issues, this paper adopts a mixed-method approach. First, a grounded theory is developed from secondary data to explain difficulty perceptions and the successful management of those perceptions. Second, a quantitative test is conducted to validate the grounded theory. Finally, the grades of IS and non-IS majors are compared.

Keywords: Web design and development, Security, Grounded theory, Student perceptions

1. INTRODUCTION

Increasingly, employees are expected to use information systems (IS) to complete work-related tasks (Aasheim et al., 2012). The ubiquity of IS in the workplace has created a demand for employees who are capable of using technology in effective and secure ways (Sauls and Gudigantala, 2013). Today, job seekers who cannot use technology to perform job-related tasks are disadvantaged in their pursuit for employment (Johnson, 2010). Therefore, teaching undergraduate students to use technology is essential for their career development (Flowers and Pascarella, 2000; Grubb and Lazerson, 2005; Privateer, 1999).

Although technical computing courses are important, teaching and learning technical computing topics can be difficult (Moura and van Hattum-Janssen, 2011; Verginis et al., 2011). Many studies have proposed curricular advancements for technical IS courses, but little is known about how these advancements help students cope with the perceived difficulty of technical IS courses. Further, little is known about how difficulty perceptions influence learning outcomes and learning perceptions. The lack of research on difficulty perceptions and difficulty management is an oversight given that more than 20 percent of students in some computing courses dropout or fail (Bennedsen and Caspersen, 2007). Therefore, this study seeks to understand how undergraduate students cope with perceived difficulty in technical IS courses. In this paper, *technical IS courses* refer to courses offered by information systems departments that require students to interface with technology through hands on exercises. This paper asks: *how do students cope with perceived difficulty in technical IS courses? And what characteristics of the learning environment influence students' abilities to cope with perceived difficulty in technical IS courses?*

Learning in technical IS courses may be particularly difficult for students from non-IS majors who seek exposure to technical IS skills. However, no study to our knowledge examines how students from non-IS majors learn in technically oriented courses or whether non-IS majors are disadvantaged in technical IS courses. In addition to exploring how students cope with the perceived difficulty of content in technical IS courses, this study also compares the performance of IS and non-IS majors. This paper asks: *how do IS and non-IS majors perform in technical IS courses?*

To answer these research questions, a mixed-methods approach was employed. 285 students were studied across six IS classes in a large university in the South-Eastern US over a two and a half year period. In total, 185 IS majors and 100 non-IS majors participated. First, student's qualitative feedback of a website design and development course across three semesters was examined. Using the grounded theory approach (Corbin and Strauss, 1990), a conceptual model was developed to identify what factors contribute to learning technical IS topics. Developing IS-specific theories is an important endeavor for the IS discipline (Gregor, 2006; Leidner and Kayworth, 2006; Webster and Watson, 2002) and should be extended to research regarding IS education. Second, the grounded theory model was validated with an online survey of students in three classes during a fourth semester. Last, the performance of IS and non-IS majors was compared.

The remainder of this paper continues as follows. First, a brief literature review is provided to highlight current knowledge about teaching and learning in technical IS courses. Second, using the grounded theory approach, a grounded theory about how students cope with perceived difficulty in technical IS courses is presented. Third, the methods used to validate the grounded theory are described and the results of the quantitative analysis are provided. Fourth, the grades of IS and non-IS majors in a website development course are compared to determine if differences in performance exist. Last, the results of the study are discussed and insights for teaching technical IS courses to undergraduate students are presented.

2. TEACHING AND LEARNING TECHNICAL IS TOPICS

A number of research studies examine how technology can assist in teaching a variety of topics across academic disciplines (Altarawneh, 2011; Benchicou et al., 2010; Najmul, 2011). Far fewer studies, however, examine successful teaching strategies that assist students in learning technical computing topics (Greer, 2002; Mabrito, 1999; Zhang et al., 2013). Even fewer studies examine students' perceptions and behavior in the context of technical computing courses (Govender, 2009). This study contributes to the latter area of research.

Studies that examine technical computing courses introduce teaching tools and teachings methods (Greer, 2002; Mabrito, 1999), examine student perceptions and performance (Govender, 2009; Law et al., 2010), and compare teaching tools and methods (Zhang et al., 2013). Each of these major streams of research is crucial to developing sound teaching tools and methods. Appropriate attention should be given to each research stream because each stream contributes to the improvement of IS courses in different ways.

Several IS studies introduce teaching tools or methods to be used in technical computing courses. For example, What you see is what you get (WYSIWYG) editors have been proposed as a way to minimize the amount of coding required in website design courses (Greer, 2002; Mabrito, 1999). Similarly, computer processing unit (CPU) simulators have been identified as tools to teach computer architecture (Patti et al., 2012). Ultimately, researchers introduce new teaching tools and methods to alter the learning environment and improve learning outcomes.

Although teaching tools and methods are designed in an effort to improve learning outcomes, researchers should be careful to design tools and methods that actually accomplish this objective. Student's perceptions of the classroom environment and course content influence their learning outcomes (Govender, 2009; Law et al., 2010). Thus, designing tools to assist students in learning technical IS topics can be difficult and unreliable if proper attention is not given to student perceptions. The design of new tools and methods should be grounded in an understanding of students' perceptions and behaviors. However, much is still unknown about students' perceptions and behaviors in technical IS courses (Govender, 2009). Thus, a deeper understanding of student perceptions and behavior is needed to assist in the design and improvement of teaching tools and methods.

Although fewer studies examine student perceptions and behaviors, studies have found that students' attitudes toward technical content influence learning outcomes (Law et al., 2010). Further, students' perceptions of the learning context influence their learning behaviors in technical courses (Govender, 2009). Some studies identify student behaviors that ensure successful learning outcomes. Cooperative group learning behaviors, for example, help students succeed in technical courses (Hwang et al., 2012). Similarly, students who engage with real world problems and community partners exhibit positive perceptions toward course material and are motivated to learn technical topics (Hettche and Clayton, 2013; Moura and van Hattum-Janssen, 2011). Understanding students' perceptions and attitudes toward technical IS courses may help instructors develop courses that promote positive learning outcomes.

This paper seeks to build on studies that examine teaching and learning in technical IS courses by exploring student perceptions and behavior. In particular, this study examines students' perceptions of the difficulty of course content and how students cope with that difficulty. Other than examining dropout rates, few studies explore how students manage difficulty perceptions and how difficulty perceptions influence learning outcomes (Bennedsen and Caspersen, 2007). This, this study provides a new insight to teaching technical IS courses. This study also seeks to examine whether performance differs for IS and non-IS majors in technical IS courses which is an understudied topic.

3. QUALITATIVE METHODS

This study employed the grounded theory approach to understand the factors that influence students' perceptions of learning outcomes (Corbin and Strauss, 1990). The grounded theory approach allows researchers to extract rich insight from data to identify themes and relationships between themes. Thus, the grounded theory approach can develop contextually grounded theories of a phenomenon. Context is crucial to developing an understanding of learning in technical courses (Govender, 2009). The contextual nature of the grounded theory method is fitting for this study. Developing IS-specific theories is a fundamental endeavor of the IS discipline (Gregor, 2006; Webster and Watson, 2002). This endeavor should include the development of theory related to teaching and learning IS courses.

The grounded theory approach uses several coding methods to arrive at a conceptual model. First, the researcher codes the data in detail to identify the topics, events, activities, and settings in the data. This is known as open coding (Corbin and Strauss, 1990). Then, the researcher examines the codes created through open coding to identify broader concepts and themes. This is known as axial coding (Corbin and Strauss, 1990). Finally, the researcher examines the data for patterns of influence between the major themes to construct a conceptual model. These steps were followed to create the model of learning in technical IS courses.

3.1 Research Design

To develop the grounded theory, secondary data was analyzed. The secondary data consisted of student feedback that was naturally documented in written form by students in a 100-level undergraduate website design and development course during three consecutive semesters. Conducting content analysis on secondary data is a useful analysis method (Harris, 2001). Secondary data analysis is often underutilized and can provide important insights into phenomena (Straub et al., 2002). Additionally, analyzing secondary data can provide less biased data than the analysis of primary data sources (Alvarez et al., 2012). The grounded theory approach of Corbin and Strauss is designed to provide a systematic analysis of qualitative data that minimizes researcher bias (Corbin and Strauss, 1990). Thus, analyzing secondary data assists in the effort to minimize bias.

The qualitative data consisted of the end-of-semester evaluations for the website design and development course and of anonymous feedback forms distributed weekly to the students by the instructor throughout the duration of the course. The end-of-semester evaluations produced 18 pages of single spaced text. Appendix A provides the qualitative questions asked of students on the end-of-semester evaluations. The weekly feedback forms were also coded, which included hundreds of anonymous responses about what information was valuable and what the students' struggled to understand. Appendix A also provides the primary questions presented on the weekly feedback forms. In Spring 2012, 55 of the 60 students in the course completed the end-of-semester evaluation. In Fall 2012, 55 of the 58 students in the course completed the evaluation. In Spring 2013, 31 of the 34 students in the course completed the evaluation. Thus, the feedback represents comments from a strong majority of the students in the courses. The qualitative data represents the perspectives of more than 140 students.

To minimize researcher bias in the interpretations of the data, the second author reviewed the themes and relationships developed by the first author. The second author then examined the qualitative data to find counter-examples of the themes and relationships developed by the first author. Further, the second author examined the quotes to ensure that all of the statements were fairly represented.

3.2 The Course

A brief description of the university, the course, and the students is now provided to assist readers in understanding the context of the website design and development course. The classes used for data collection were taught during the Spring 2012, Fall 2012, and Spring 2013 semesters at a large university in the South-Eastern US. The IS department grants Bachelor's, Master's, and Doctoral degrees in information systems management. The IS department is housed in the school of business and economics. The IS department teaches courses such as: business processes and IT, database design, website design and development, programming I, systems analysis and design, and information systems security. Advanced programming courses are only available through the computer science department. The courses offered by the IS department are less technical than those offered by the computer science department.

The website design and development course is an introductory undergraduate course offered to students throughout the university. At the time of the study, the course consisted of quizzes, lab practices, website planning projects, a midterm and final exam, an individual project, and a team project. For the team project, students worked with a community partner to develop a website for the partner. The course outline included topics such as: an introduction to cascading style sheets (CSS), understanding CSS inheritance, using divs (an important hypertext markup language (HTML) tag used to structure web pages) and CSS for page layout, creating site navigation, working with graphics, implementing third-party JavaScript and Flash tools, and programming for the web with PHP. Because the course did not center on learning a particular website editing program (e.g., Dreamweaver), the instructor was able to introduce a variety of editing programs to the students, many of which did not include WYSIWYG editors.

At the time of the study, the course was required for students majoring in IS as well as for students minoring in IT; however, it was open to students who were not IS majors or information technology (IT) minors. In the three semesters analyzed, 61 percent of the students had officially declared IS majors, 28 percent had declared IT minors, and 11 percent had declared neither. Only 1 of the 152 students had not declared a major. Table 1 presents the breakdown of students by declared major.

Major	Count	Percent
Information Sys	92	60.5
Business Admin	38	25.0
Accounting and Finance	7	4.6
Economics	6	3.9
Other Majors	9	6

Table 1. Students by Major

4. A GROUNDED THEORY OF COPING WITH PERCEIVED DIFFICULTY IN TECHNICAL IS COURSES

After coding the end-of-semester evaluations and feedback forms, several major themes emerged from the data, including: students' perceptions of the difficulty of course content, students' abilities to manage the perceived difficulties, and students' perceptions of learning outcomes. Additionally, the learning context (i.e., students' perceptions of the instructor and classroom environment) and characteristics of the students emerged as major themes. This section examines these themes in greater detail and how they relate to one another. Based on the insight extracted from the qualitative data, the model in Figure 1 emerged. Qualitative analysis is ideal for generating process models (Maxwell, 2013). Thus, the model represents the process of learning technical content grounded in the context of the website design and development course.

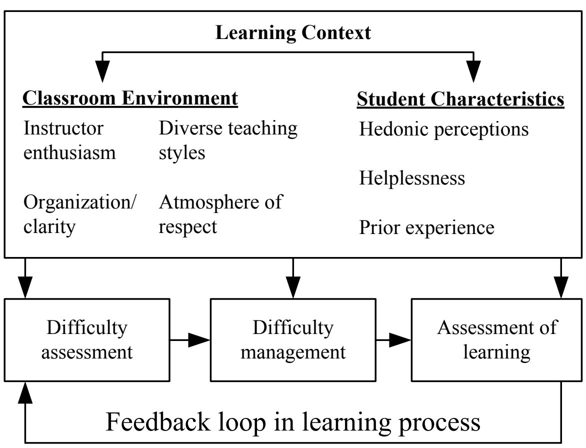

Figure 1. Process of Learning Technical Content

4.1 The Learning Context

The explication of the grounded theory begins with a discussion of the learning context. The data pointed to two primary characteristics of the learning context, including characteristics of the classroom environment and of the students. The data also suggested some relation between the classroom environment and student characteristics.

4.1.1 Classroom environment: In the data, students discussed several aspects of the classroom environment that influenced the learning process. The characteristics can broadly be classified as characteristics of the instructor and characteristics of the instruction and instruction mechanisms. Some regularly occurring characteristics of the instructor included perceptions of the instructor's fairness, organization, presentation skills, and enthusiasm. Table 2 presents the number of occurrences for each code.

Code	Number of Occurrences
Instructor fairness	108
Instructor enthusiasm	28
Instructor organization skills	38
Instructor presentation skills	65

Table 2. Code Occurrence for Instructor Codes

Characteristics of the instruction and instruction mechanisms were also represented in the data. The major themes in the data included: the existence of an atmosphere of respect between the instructor and students and the use of diverse teaching styles. Most students felt respected by the professor and by their peers. Most students also found the different teaching styles (i.e., lecture, guided examples, and self-guided lab practices) to be an important part of the classroom environment. Students' perceptions of the classroom environment influenced the learning process as described later. Table 3 presents the number of occurrences for each code.

Code	Number of Occurrences
Atmosphere of respect	22
Diverse teaching styles	126

Table 3. Code Occurrence for Classroom Environment Codes

4.1.2 Student characteristics: Student characteristics also emerged as an important theme in the data. Although several student characteristics were evident, the most prominent and the most influential to the learning process were: students' hedonic perceptions of the course content, students' proneness toward feeling helpless, and students' prior experience with the course content. These factors influenced the learning process as described later. Perceptions of feeling helpless did not occur regularly, however, these perceptions were accompanied by strong language. Table 4 presents the numbers of occurrences for each code.

Code	Number of Occurrences
Student enjoyment	67
Student helplessness	5
Student prior experience	18

Table 4. Code Occurrence for Student Codes

4.1.3 Relationships between contextual factors: Several of the contextual factors (i.e., characteristics of the classroom environment and students) related to each other. For example, perceptions of the diverse teaching styles were related to enjoyment of the course material. This is evidenced in comments such as:

> *The lecture/lab format was very effective for me. It allowed me to learn the material while getting some hands-on experience to solidify the ideas and*

methods that my brain would otherwise dump after the course.

Similarly, the instructor's enthusiasm influenced students' own enjoyment in the course. This is evidenced in quotes, such as:

The professor was very intriguing. He knew the material well and drove me to want to learn. I would say he was the most enthusiastic teacher I have had so far which made me want to learn.

4.2 Difficulty Assessment

Students' assessments of the difficulty of course content were a major theme in the data. Difficulty perceptions were mentioned 93 times throughout the data. Throughout the duration of the course, students assessed the difficulty of the course content. This is apparent from comments made in the end-of-semester evaluations and in the weekly feedback surveys. Students developed two primary perceptions of the difficulty of the content. The content was either assessed as easy or difficult. Students' comments about the ease of learning course content were far fewer than their comments about the relative difficulty of learning the course content. Two students noted the following about the ease of the course content:

The material in this course has been very easy to me but that is because I have done a bit of web development in the past.

As an ISOM major I found the course quite simple after learning more complicated languages such as VB and SQL.

Although some students felt the content was easy, most of the students assessed the course content to be difficult. Students frequently made comments such as:

I thought the course work was difficult because I do not have a background in HTML and CSS.

For me, the course material was difficult because I have never done anything like this before.

In one of the more extreme comments about the difficulty of the course content, a student noted on a weekly feedback form:

I am struggling with literally every aspect of this course. I have almost no idea what is going on. I didn't know how to do a single thing on this quiz. I might as well be learning Egyptian.

4.2.1 The dynamics of difficulty assessment: A clear progression of the material from easier to progressively harder topics existed as the semester progressed. Students said the following about the progression of the material:

I thought the information was laid out week-to-week in a manner that progressively stepped through the many techniques used in CSS from simple to the more difficult.

Course material increased as the time moved forward. The increase in material was good and not too stressful.

Although the difficulty of the content increased throughout the semester, many students perceived the relative difficulty of the harder topics to be more manageable as time passed. That is, students' perceptions of difficulty decreased as the students became familiar with the content area. This is evidenced in comments such as:

It was hard at first because I had no prior experience. After the labs and the project, the class became easier.

The labs helped me greatly by making the projects easier, so I do not feel that this course was difficult.

These quotes show that through experience in labs and class, perceptions of the difficulty of course content decreased relative to the difficulty perceptions that students held at the beginning of the semester. This created a feedback loop in the learning process as depicted in Figure 1. As students applied concepts in lab practices and projects, they developed experience with the content that caused them to reassess their perceptions of difficulty.

4.2.2 Influence of the learning context on difficulty assessment: As seen in the previous quotes, the perceived difficulty of the content was influenced by elements of the learning context. The previous quotes show how students' characteristics, namely students' prior experience with technical information systems topics, influenced the assessment of difficulty. Students who had prior experience with technical information systems topics felt the course content was easy, while students with no prior experience with technical topics felt the course was more difficult.

Perceptions of difficulty were also influenced by characteristics of the classroom environment. For example, the organization of the instructor and the clarity of class presentations influenced the learning process. This is evidenced by quotes such as:

The instructor did a really great job of presenting the topic we were learning in a way that was easy to understand and the class was organized really well.

4.3 Difficulty Management

Difficulty management was another major theme in the data. After assessing the difficulty of the course content, students either managed the perceived difficulty in a proactive way or they did not. Students noted:

Difficult but manageable.

For students who have never touch the subject, it's quite hard but manageable.

Much of the qualitative feedback pointed to the importance of managing the perceived difficulty of the course content to avoid feeling overwhelmed or bored with the content. Students managed the perceived difficulty of the content in several ways. Difficulty management consisted of requesting adjustments to the course structure, asking questions of the instructor, working closely with peers, engaging in self-directed research, and experimenting with new content.

In the weekly feedback forms, students who managed their difficulty perceptions sought to change the course structure to facilitate their learning. This can be seen in the following request made in a feedback form:

> *This class is fast-paced and it takes a little more time for me to grasp concepts fully. I have no web designing experience, so I'm learning from scratch. Would it be possible to post solutions to labs so we can see what we got wrong or couldn't get?*

Unless students' requests conflicted with the teaching philosophy adopted in the class, the requests were granted. Students also managed perceived difficulty through asking regular questions. This is evidenced in the following quote:

> *[The instructor] was very knowledgeable and always willing to help when I had questions. Making sure we learned the material.*

Students were encouraged to work with and learn from their peers on their lab practices and team projects. Students who worked with their peers were able to better manage perceived difficulty. Students noted:

> *There was an atmosphere that I felt like we could work together at all times.*

> *I loathe group projects, as studies have shown depending on group size that 1-2 people end up doing 90% of the work… That being said I enjoyed the projects IN THIS CLASS, they were fun to develop and work with someone on to design and implement changes that had an immediate result.*

The instructor regularly encouraged students to engage in self-directed learning through research and experimentation. Students who followed this direction perceived that they were better able to manage the perceived difficulty. For example, one student noted:

> *For me, the course material was difficult because I have never done anything like this before. The text book helped me figure out some of the material, but most of the time I went online and researched what do to.*

Although most of the data focused on students who perceived the content to be difficult, difficulty management was also important for students who perceived the content to be easy. Students who felt the course was easy had to engage in extra activities to avoid boredom. This is evidenced in the following quote:

> *This class was easy, but because it was easy people ended up trying to do extra or more work if they could.*

Not all students managed the difficulty equally well. A small number of students felt that the difficulty of the content was unmanageable. Two students noted:

> *The class was difficult and was geared towards students who already had experience in web design. Students who had no experience in web design were often lost and too much was expected.*

> *This course was very hard for me and very stressful because I didn't understand the content or what I needed to do. I think the course book reads like stereo instructions and was not helpful to me at all for this class.*

Some students also felt the class was too easy and did nothing to manage their perceptions of the lack of difficulty. This is evidenced in the following quote:

> *The difficulty of the course material is non-existent. HTML is basically English with brackets. You don't learn to code by learning from this class. That being said I am not sure this should even be a class since I could have learned what we covered in this class in probably 2-3 weeks or so just coding some simple HTML pages.*

4.3.1 Influence of the learning context on difficulty management: Difficulty management was influenced by the classroom environment and student characteristics. Again, the perceived organization and presentation skills of the instructor influenced students' efforts to manage the perceived difficulty of the content. This is evidenced in the following quote:

> *I didn't find the course material that difficult for myself. I thought the instructor tried to make the material easy for us to understand so we could do the required assignments.*

Another important characteristic of the classroom environment that emerged from the data was the existence of an atmosphere of respect between the instructor and students. Students who felt respected tied their perceptions of the classroom atmosphere to their curiosity with the subject and their willingness to ask questions. These activities helped to manage the perceived difficulty of the content as described earlier. The following quotes show the importance of developing an atmosphere of respect:

> *[The instructor's] personality made the class really enjoyable and did not make me feel inferior when I had questions or concerns that were simple misunderstandings.*

I am a slow learner and [the instructor] never once made me feel inadequate and was very encouraging of my work.

An important student characteristic that influenced difficulty management was hedonic perceptions of the course content. Students who expressed hedonic enjoyment with regard to the course material were more likely to feel that the perceived difficulty of course content was manageable. This is evidenced by the following quotes:

The material that we learned this semester was very overwhelming at first, but the professor made the class enjoyable and I looked forward to learning the material that he was teaching us.

Some of it was hard, but it was interesting to me, so I think that helped a lot.

A student characteristic that negatively influenced difficulty management was helplessness. The weekly feedback surveys offer an interesting perspective on students' perceived helplessness and difficulty management. Students were regularly asked what they were struggling with and what the instructor could do to help them. Students who managed the difficulty provided feedback on what they were struggling with and provided suggestions to the instructor about how to solve the issue. However, students who felt a sense of helplessness simply talked about their difficulties in the course without discussing what the instructor could do to help them. One student who expressed a sense of helplessness wrote:

I am struggling with literally every aspect of this course. I have almost no idea what is going on. I didn't know how to do a single thing on this quiz. I might as well be learning Egyptian.

4.4 Assessment of Learning

Students' assessments of learning outcomes were also a major theme in the data. Students who engaged in difficulty management had positive perceptions of their learning experience and felt that they learned and gained experience related to the course content. Students who did not engage in difficulty management, however, had negative perceptions of their learning experience and felt that they learned little in the course. Evidence of the link between difficulty management and positive learning perceptions can be seen in the following quotes:

For students who have never touch the subject, it's quite hard but manageable. Keep the difficulty the same since it helps the learning process.

Difficult material, but extremely *useful*

In general, there was enough challenge to be interesting while causing students to learn.

Similarly, the following quotes show how the lack of difficulty management led to negative perceptions of learning.

The difficulty of the course material is non-existent. HTML is basically English with brackets. You don't learn to code by learning from this class. That being said I am not sure this should even be a class since I could have learned what we covered in this class in probably 2-3 weeks or so just coding some simple HTML pages.

This course was very hard for me and very stressful because I didn't understand the content or what I needed to do. I think the course book reads like stereo instructions and was not helpful to me at all for this class.

Based on the data, students engaged in an assessment of the difficulty of the content, which lead some students to seek for ways to manage the difficulty. Students who engaged in activities to manage their perceptions of the difficulty of the content experienced positive learning outcomes from course assignments and activities as well as from proactive endeavors to teach themselves. Figure 2 presents a tree that depicts the steps in the learning and difficulty management process.

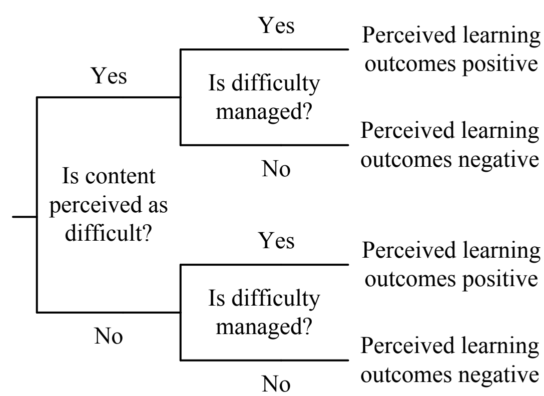

Figure 2. Outcomes of Difficulty Perceptions and Difficulty Management

4.4.1 Influence of the learning context on experience development: The data suggests that the learning context affects learning outcome assessments. For example, the instructor's enthusiasm for the subject influenced students' perceptions of learning outcomes. Students who perceived the instructor to be enthusiastic felt motivated to complete their work and develop experience with the content. For example, students noted:

I think [the instructor] certainly presented the information in a way to excite students and encourage them to work hard.

The professor was very intriguing. He knew the material well and drove me to want to learn. I would

say he was the most enthusiastic teacher I have had so far which made me want to learn.

Other characteristics of the classroom environment also affected learning development. The diverse teaching styles, for example, provided students with opportunities to develop their skills and have positive learning experiences. Students noted:

I thought the classroom presentation and subject matter organization was very well planned out. I thought the PowerPoints helped explain the material and the labs helped me learn the material hands on.

He does a good job of combining instruction time and hands on time. The structure of this class reflects on my performance. The way he organizes and presents info to the class is a major help.

Similarly, creating opportunities to work on real-world projects with community partners also provided learning experiences that enhanced students' knowledge and provided necessary motivation. For example, one student noted:

Personally, I would state that [the instructor] developed a highly effective course that was informative, as well as, very hands on which helped further your knowledge by applying the information to real world scenarios.

Student characteristics also influenced assessments of the learning experience. Students' hedonic perceptions of the course content increased positive learning experiences. Students with technical experience who found enjoyment in the content also devised ways to enhance their learning by engaging in extra learning experiences. These quotes demonstrate the importance of hedonic perceptions:

Coming into the class I already has great computer knowledge and prior HTML and website coding experience so the class was easy for me, but still very enjoyable.

All of the material was very easy to me. I just love web design. Anything dealing with web design is very interested. I could sit and do so all day long.

5. TESTING THE GROUNDED THEORY

After analyzing the qualitative data and developing a model of the learning process, the model was tested with a quantitative survey methodology. The quantitative study was conducted to validate the model and to begin to test the generalizability of the model. The data was collected through an online survey and was cross-sectional in nature. To accommodate the cross-sectional nature of the data, the process model developed with the grounded theory approach was converted to a variance model.

The process model suggests that contextual factors (i.e., characteristics of the student and classroom environment) influence difficulty assessments, difficulty management, and assessments of learning. Thus, at any point in time, students' perceptions of the contextual factors may influence their perceptions of the difficulty of the course and their engagement in difficulty management activities. In summary:

Hypothesis 1: An increase in the positive characteristics of a student (i.e., hedonic perceptions and prior experience with course content) decreases the student's perceptions of the difficulty of the course content.

Hypothesis 2: An increase in the positive characteristics of a student (i.e., hedonic perceptions and prior experience with course content) increases the student's engagement in difficulty management activities.

Hypothesis 3: An increase in the positive characteristics of a student (i.e., hedonic perceptions and prior experience with course content) positively influences the student's perception of the classroom environment (i.e., respectful atmosphere, diversity of teaching styles, and instructor organization and enthusiasm).

Hypothesis 4: A student's positive perceptions of the classroom environment (i.e., respectful atmosphere, diversity of teaching styles, and instructor organization and enthusiasm) decrease the student's perceptions of the difficulty of the course content.

Hypothesis 5: A student's positive perception of the classroom environment (i.e., respectful atmosphere, diversity of teaching styles, and instructor organization and enthusiasm) increases the student's engagement in difficulty management activities.

Further, the conceptual model suggests that students' difficulty perceptions and engagement in difficulty management activities influence the students' learning perceptions. Learning perceptions are the output of the difficulty assessment and difficulty management processes. Thus, at any point in time, students' perceptions of the difficulty of the course and their engagement in difficulty management activities may influence their perceptions of learning outcomes. In summary:

Hypothesis 6: A student's perceptions of the difficulty of the course content decrease the student's positive perceptions of learning outcomes.

Hypothesis 7: A student's engagement in difficulty management activities increases the student's positive perceptions of learning outcomes.

The effect that negative student characteristics (i.e., proneness toward feeling helpless) exert on the other constructs was not tested, because the measures of helplessness cross-loaded too highly with difficulty perceptions (i.e., cross-loadings higher than 0.70). Thus, helplessness was dropped from the model. Figure 3 presents the variance model tested with the survey methodology.

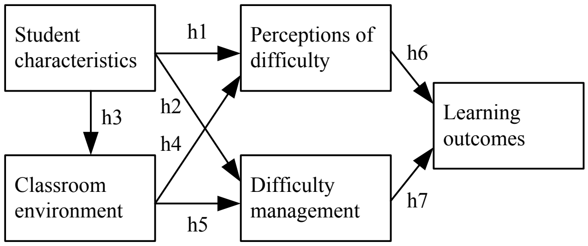

Figure 3. Conceptual Model for Empirical Testing

5.1 Research Design

To test the hypotheses, an online survey was distributed to students in three classes offered by the IS department at the same university where the qualitative data was collected. Each class had between 55 and 63 students. The survey was distributed near the end of the Spring 2014 semester to ensure that the instructors had covered most of the course content. The classes consisted of two sections of the 100-level website design and development course and one section of a 300-level information systems security course.

To improve the generalizability of the findings, the survey was distributed to three classes taught by different instructors, with two different topics (i.e., the web development and information security), and two sections of a course (i.e., the web development course) taught with differing levels of technicality. The sections of the website design and development course were taught by the second author and another instructor. The first author taught the information systems security course. The two sections of the website development course were taught differently during the Spring 2014 semester. The technicality of the section taught by the second author was reduced. Instead of teaching HTML, CSS, and Javascript coding, the course focused primarily on using a WYSIWYG editor (i.e., Dreamweaver) to develop a website. The technicality of the other section remained much the same as previously described. The instructor of the other section taught HTML, CSS, and Javascript coding. Further, the instructor of the other section of the website design and development course included a lab on setting up WordPress, a popular content management system, on a server.

5.2 Instrument

To develop the instrument, wording was adapted from the qualitative data to ensure strong content validity for each construct. The instrument was then pre-tested for readability, errors, and content validity. After pre-testing, a pilot study was conducted on the students in the first author's information systems security course. The instrument demonstrated strong psychometric properties. A full study was then conducted by examining data from the two sections of the website design and development course. Because no major changes to the instrument were made after pilot testing, the data from the information systems security class was included with the data from the website design and development classes. A dummy coded variable was included in the data as a control variable to ensure that the data collected during the pilot study was not statistically different from the data collected for the full study. No statistically significant evidence exists to suggest that the pilot study data differed from the full study data. Appendix B presents the survey instrument.

5.3 Respondents

The respondents were undergraduate students enrolled in IS courses in a large university in the South-Eastern US. 42 of the 55 students in the section of the website design and development course taught by the second author responded to the survey. 48 of the 58 students in the other section of the website design and development course responded to the survey. 53 of the 63 students in the information systems security course responded to the survey. Thus, response rates were high and were relatively consistent across the three classes. Nine responses were removed due to unlikely response patterns (for instance, answering the same to every question). In total, 134 responses were analyzed. The respondents were predominantly males between 18 and 25 who were in their junior and senior years of school. 70 percent of the students in the courses were IS majors. Table 5 presents the demographic information of the respondents in greater detail.

Demographic Item		Count	Percent
Age	18-20	33	24.6
	21-25	77	57.5
	26-30	10	7.5
	31-35	6	4.5
	36-40	4	3.0
	41-45	0	0.0
	46+	4	3.0
Exchange student	Yes	9	6.7
	No	123	93.3
Gender	Male	94	70.1
	Female	40	29.9
IS major	Yes	93	69.4
	No	41	30.6
Status	Freshman	9	6.7
	Sophomore	13	9.7
	Junior	48	35.8
	Senior	64	47.8

Table 5. Demographic Information of Students

6. QUANTITATIVE ANALYSIS AND RESULTS

The model was analyzed using partial least squares structural equation modeling (PLS-SEM) with SmartPLS (version 2.0.M3) (Ringle et al., 2005). PLS-SEM allows researchers to examine measurement models and structural models simultaneously. PLS-SEM is also useful for complex models and provides similar results to covariance-based SEM, such as LISREL, when more than 90 data points are analyzed (Goodhue et al., 2012). Thus, the sample size of 134 students is large enough to gain insight from a PLS-SEM analysis.

6.1 Measurement Model

Two of the constructs, positive student characteristics and positive perceptions of the classroom environment, were modeled as second-order reflective constructs consisting of

the major codes derived from the grounded theory coding process. The first-order constructs of the positive student characteristics construct were: a student's prior experience with the course content and the student's hedonic perceptions of course content. The first-order constructs of the positive perceptions of the classroom environment construct were: the diversity of teaching styles used in the classroom, perceptions of respect in the classroom, the instructor's enthusiasm for the course content, and the organization of the instructor. Negative student characteristics, namely feelings of helplessness, were dropped from the model. Measures for helplessness cross-loaded too highly with difficulty perceptions (i.e., cross-loadings greater than 0.70). Thus, helplessness was dropped from the model.

Because the model included second-order constructs, the measurement properties of all first-order constructs were analyzed first (Wetzels et al., 2009). Each construct exhibited high composite reliability scores (i.e., greater than 0.80), suggesting internal consistency (Fornell and Larcker, 1981). All item loadings exceeded the 0.70 cutoff and the average variance extracted (AVE) for each construct was above the 0.05 cutoff (Chin, 1998; Fornell and Larcker, 1981). The high factor loadings and high AVE values suggest that the measures exhibit convergent validity. Table 6 presents AVE and composite reliability scores for the first-order constructs.

First-order Construct	AVE	Composite Reliability
Perceived difficulty (DIF)	0.7919	0.9193
Diversity of teaching styles (DIV)	0.7355	0.8920
Instructor enthusiasm (ENT)	0.7913	0.9190
Prior experience (EXP)	0.8312	0.9366
Hedonic perceptions (HED)	0.8522	0.9453
Learning perceptions (LRN)	0.7004	0.9210
Difficulty management (MGT)	0.8250	0.9339
Instructor organization (ORG)	0.9474	0.9730
Atmosphere of respect (RES)	0.7295	0.8899

Table 6. AVE and Composite Reliability for First-order Constructs

To test for discriminant validity, cross loadings were examined. All cross loadings were no greater than 0.60, excepting one item, and the square root of AVE for each construct was greater than the associated latent variable correlations (Gefen and Straub, 2005). One ORG item was dropped because it cross-loaded highly on several constructs. Further, all of the loadings were greater than 0.70, suggesting that the measures exhibit convergent validity. Table 7 presents the loadings and cross loadings for the first-order constructs.

Values of the square root of AVE for each construct were also substantially higher than all associated latent variable correlations. The low cross loadings and comparisons of AVE and latent variable correlations suggest the measures exhibit discriminant validity (Chin, 1998; Gefen and Straub, 2005). Table 8 presents latent variable correlations with the square root of AVE on the diagonal.

The second-order constructs also demonstrated high composite reliability scores. Composite reliability for perceptions of the classroom environment (CLS) and positive student characteristics (STU) were 0.9096 and 0.8468, respectively. The loadings of the first-order constructs on the second-order constructs were all above 0.70 and were statistically significant ($p < 0.01$). Thus, the first-order and second-order constructs demonstrated good measurement qualities.

6.2 Structural Model

The structural model was also examined with SmartPLS (Ringle et al., 2005). Several control variables were examined, including: whether the student was an IS major, the class section the student attended and the type of class attended (i.e., website design and information security), the student's undergraduate status, and the student's age and gender.

No statistical evidence exists to suggest that a student's positive characteristics influenced the student's difficulty perceptions ($\beta = -0.0184$; $p > 0.05$). Hypothesis 1 was not supported. Evidence exists to suggest that positive student characteristics increase student engagement in difficulty management ($\beta = 0.2250$; $p < 0.05$). Evidence also exists to suggest that positive student characteristics increased the students' positive perceptions of the classroom environment ($\beta = 0.2581$; $p > 0.05$). Thus, support for hypotheses 2 and 3 exists. The effect size for the relationship between positive student characteristics and students' perceptions of the classroom environment was small ($R^2 = 0.0666$).

Evidence exists to suggest that students' positive perceptions of the classroom environment decreased the students' difficulty perceptions ($\beta = -0.3806$; $p < 0.01$). Evidence also exists to suggest that students' perceptions of the classroom environment increased the students' engagement in difficulty management activities ($\beta = 0.2978$; $p < 0.01$). Thus, hypotheses 4 and 5 are supported. Student characteristics and perceptions of the classroom environment explained 14.9 percent of the variance in students' perceptions of difficulty and 17.4 percent of the variance in

	DIF	DIV	ENT	EXP	HED	LRN	MGT	ORG	RES
DIF1	**0.8867**	-0.3386	-0.2367	-0.0904	-0.0332	-0.3966	-0.3256	-0.3412	-0.2067
DIF2	**0.8496**	-0.2067	-0.2575	-0.0862	-0.0002	-0.3647	-0.2903	-0.3252	-0.1935
DIF3	**0.9315**	-0.3483	-0.2698	-0.1481	-0.1294	-0.5740	-0.4853	-0.3227	-0.2511
DIV1	-0.2908	**0.9036**	0.4598	0.1263	0.3161	0.4810	0.2579	0.4522	0.4202
DIV2	-0.3065	**0.9223**	0.4421	0.1149	0.2882	0.5155	0.2974	0.4577	0.4063
DIV3	-0.2815	**0.7346**	0.4125	0.0462	0.1456	0.3836	0.2812	0.4208	0.4817
ENT1	-0.2588	0.4169	**0.8680**	-0.0053	0.1266	0.2589	0.1411	0.2447	0.4965
ENT2	-0.2611	0.4662	**0.9537**	0.0119	0.2190	0.2817	0.2278	0.2028	0.5197
ENT3	-0.2573	0.5444	**0.8432**	0.0035	0.1815	0.3286	0.0819	0.3015	0.4624
EXP1	-0.1290	0.0741	-0.0375	**0.9113**	0.2097	0.0769	0.1342	0.0752	-0.1209
EXP2	-0.1252	0.1282	0.0548	**0.9310**	0.0742	0.0794	0.1362	0.0801	-0.0418
EXP3	-0.0570	0.1094	-0.0196	**0.8924**	0.0924	0.0504	0.0435	0.0992	-0.0779
HED1	-0.0785	0.3221	0.2067	0.1562	**0.9326**	0.4304	0.3301	0.1642	0.2979
HED2	-0.0991	0.2937	0.2199	0.1102	**0.9223**	0.4945	0.2618	0.2339	0.3120
HED3	-0.0282	0.1820	0.1306	0.1351	**0.9144**	0.3342	0.2721	0.0764	0.2205
LRN1	-0.4458	0.4818	0.2882	0.0336	0.3442	**0.8779**	0.4604	0.5435	0.5572
LRN2	-0.3828	0.3789	0.2591	-0.0473	0.3833	**0.8436**	0.4670	0.4778	0.5009
LRN3	-0.5248	0.4909	0.2232	0.1023	0.3480	**0.8628**	0.4710	0.5127	0.4227
LRN4	-0.4908	0.4634	0.3022	0.0896	0.3520	**0.8370**	0.4225	0.4709	0.3653
LRN5	-0.3225	0.4478	0.2365	0.1814	0.4919	**0.7582**	0.3906	0.3937	0.2928
MGT1	-0.3219	0.3396	0.1662	0.1274	0.3219	0.4904	**0.9298**	0.2314	0.3123
MGT2	-0.3078	0.1858	0.1476	0.0562	0.2765	0.3313	**0.8880**	0.1096	0.2818
MGT3	-0.5059	0.3370	0.1995	0.1592	0.2639	0.5736	**0.9066**	0.3009	0.3685
ORG1	-0.3798	0.4863	0.2604	0.0868	0.1431	0.5656	0.2760	**0.9819**	0.4934
ORG2	-0.3264	0.5349	0.2388	0.0842	0.1986	0.5550	0.1989	**0.9648**	0.5132
RES1	-0.1852	0.5197	0.5694	-0.0380	0.1524	0.3940	0.2250	0.4642	**0.8205**
RES2	-0.2197	0.4386	0.3942	-0.0721	0.4017	0.4694	0.3547	0.4517	**0.8630**
RES3	-0.2255	0.3792	0.4978	-0.1058	0.1714	0.4487	0.3154	0.4135	**0.8777**

Table 7. Loadings and Cross Loadings for First-order Constructs

	DIF	DIV	ENT	EXP	HED	LRN	MGT	ORG	RES
DIF	**0.8899**								
DIV	-0.3436	**0.8576**							
ENT	-0.2864	0.5127	**0.8896**						
EXP	-0.1280	0.1117	0.0055	**0.9117**					
HED	-0.0746	0.2916	0.2021	0.1468	**0.9231**				
LRN	-0.5201	0.5396	0.3122	0.0810	0.4542	**0.8369**			
MGT	-0.4313	0.3278	0.1921	0.1336	0.3152	0.5301	**0.9083**		
ORG	-0.3667	0.5198	0.2579	0.0879	0.1707	0.5757	0.2500	**0.9733**	
RES	-0.2485	0.5108	0.5536	-0.0879	0.3007	0.5168	0.3595	0.5147	**0.8541**

Table 8. Latent Variable Correlations for First-order Constructs with Square Root of AVE on the Diagonal

students' engagement in difficulty management activities. These R^2 values correspond to Cohen's f^2 values of 0.1748 and 0.2105, which are medium effect sizes (Cohen, 1988, 1992).

Finally, the evidence suggests that students' perceptions of the difficulty of course-content decreased students' positive perceptions of learning outcomes (β = -0.3635; p < 0.01). Evidence also exists to suggest that students' engagement in difficulty-management activities increased students' positive perception of learning outcomes (β = 0.3798; p < 0.01). Thus, the data supports hypotheses 6 and 7. All control variables had no statistically significant effect on positive learning outcomes. Again, this suggests that students from nontechnical majors may not be disadvantaged in technical IS courses. The model explained 40.8 percent of the variance in positive learning outcomes. This R^2 value corresponds to a Cohen's f^2 value of 0.6880 that represents a large effect size (Cohen, 1988, 1992). Table 9 presents the statistical support for the hypotheses.

Hypothesis				p-value	Supported
h1:	STU	→	DIF	p > 0.05	No
h2:	STU	→	MGT	p < 0.05	Yes
h3:	STU	→	CLS	p < 0.05	Yes
h4:	CLS	→	DIF	p < 0.01	Yes
h5:	CLS	→	MGT	p < 0.01	Yes
h6:	DIF	→	LRN	p < 0.01	Yes
h7:	MGT	→	LRN	p < 0.01	Yes

Table 9. Statistical Support for Hypotheses

7. COMPARING THE ACADEMIC PERFORMANCE OF IS AND NON-IS MAJORS

Beyond understanding how students cope with perceived difficulty in technical IS courses, this study also seeks to understand whether non-IS majors are disadvantaged in technical IS courses. Thus, the performance of IS and non-IS majors was compared. To assess the performance of the IS and non-IS majors, the final scores of 152 students were analyzed from the website design and development course across the same three semesters that were examined in the qualitative assessment. These three semesters were examined because they were all taught by the same instructor and in the same fashion. Thus, the likelihood of confounding variables, such as differences in the instructor and course content, is diminished.

A MANOVA was used to compare students' grades based on students' majors, whether the students had declared a dual major or a minor, the semester in which the data was collected, the students' gender, and interaction effects between the students' declared majors and the other variables. Data from the 92 IS majors and 60 non-IS majors was analyzed. Wilk's lambda was analyzed in the MANOVA. In all cases, the Wilk's lambda statistic and subsequent p-values were not statistically significant, suggesting that grades did not differ for students from IS and non-IS majors or for any other of the demographic factors. Table 10 presents the results of the analysis. The results provide evidence that non-IS majors in IS courses may not be disadvantaged. Similarly, the results also provide evidence that IS majors are not necessarily more capable of assimilating technical material than non-IS majors.

Variable	Lambda	F-value	d.f.	p-value
Major	0.9846	0.49	4, 125	0.7406
Semester	0.9867	0.84	2, 125	0.4342
Dual major	0.9943	0.71	1, 125	0.3997
Minor	0.9999	0.01	1, 125	0.9361
Gender	0.9993	0.09	1, 125	0.7632
Major*semester	0.9751	0.46	7, 125	0.8651
Major*dual major	0.9977	0.15	2, 125	0.8640
Major*minor	0.9889	0.47	3, 125	0.7061
Major*gender	0.9840	0.68	3.125	0.5686

Table 10. Results of MANOVA Comparison of Grades

8. DISCUSSION

This paper examines how students cope with perceived difficulty in technical IS courses. The paper also explores whether non-IS majors are disadvantaged in technical IS courses. Using the grounded theory approach, a conceptual model is developed to explain students' difficulty management behaviors. The conceptual model is tested with a quantitative survey. The grades of IS and non-IS majors in a technical website design and development course are also compared.

The qualitative and quantitative analyses suggest that students, IS and non-IS majors, in technical IS courses engage in the same difficulty management process. Additionally, no statistically significant evidence exists to suggest that final grades differ for students from IS and non-IS majors. Thus, non-IS majors may be able to cope with difficulty in technical IS courses as well as IS majors. It should be noted, however, that the study was conducted over three semesters of a website design and development course. Studying non-IS majors in other technical IS courses may provide different results.

These results provide initial evidence that IS departments may be able to increase the technical difficulty of their courses without negatively influencing non-IS majors who take IS courses to gain exposure to IS topics. This study also provides encouragement for non-IS majors. Students who are willing to engage in difficulty management activities can succeed in technical IS courses. Instructors should develop classroom environments that facilitate difficulty management activities, such as developing an atmosphere of respect, demonstrating enthusiasm for the topic, using diverse teachings styles, and carefully organizing course materials.

This paper identifies a general difficulty management process that students engage in while learning in technical IS courses. The study shows that students develop perceptions of the difficulty of the course content as they are exposed to the content. After developing these perceptions, they either engage in activities to manage the difficulty, or fail to do so. Through coping activities, students learn new skills and material that causes them to reevaluate their learning experience. This reevaluation leads students to reconsider their difficulty perceptions. Thus, the process is cyclical and

occurs throughout the semester. The study also shows that the teaching environment influences students' willingness and ability to adopt coping strategies to handle their perceptions of difficulty. The teaching environment includes students' characteristics (e.g., prior experience with technical topics, hedonic perceptions of the course content, and perceptions of helplessness), the instructor's characteristics (e.g., enthusiasm and organization), and the characteristics of the course structure and environment (e.g., diverse teaching approaches and an atmosphere of respect).

Difficulty management is important for students who perceive the content to be easy and difficult. Students who perceive the content to be difficult need an environment conducive to difficulty management to cope with the perceived difficulty of the technical content. Students who do not engage in difficulty management activities feel less supported by the learning environment, causing feelings of helplessness. Students who experience feelings of helplessness become overwhelmed with the content and develop negative perceptions of the course and course content. This confirms other studies that find that students' attitudes are important to learning technical topics (Law et al., 2010). Students who perceive the content to be easy must also engage in difficulty management activities to experience positive learning outcomes, but for a different reason. Students who perceive content to be easy may experience boredom, causing them to lose interest. However, by managing their perceptions of the lack of difficulty, these students are more likely to engage in self-directed inquiry that extends beyond their existing knowledge, resulting in positive perceptions of the learning experience.

These findings provide important insights for instructors who teach technical IS courses to undergraduate students. First, instructors should engage students in diverse activities. Other studies have suggested the importance of incorporating lecture with hands-on activities (Depradine and Gay, 2004). Based on the results, diverse teaching styles help students to manage difficulty perceptions, avoid boredom, and experience enjoyment with the content. Instructors should make every attempt to highlight the practical, real-world application of the skills developed in the course. Where possible, instructors should develop assignments that engage students with real projects from community partners. Prior research has also highlighted the importance of engaging students with community partners (Hettche and Clayton, 2013). Finally, students seem to need time to experiment and become comfortable with a topic area before feeling capable of engaging in more difficult tasks. Decreasing the weight of grades for early assignments may create a risk-free environment where students can experiment with the content in the beginning stages of a course.

The model in this paper is based on data grounded in the experiences of students in a website design and development course at a particular university. It is important to consider the context of the study. First, the course was hands-on. Thus, the paper is scoped to technical IS courses. The model in this paper may not be relevant to lecture-based classes. This idea could be examined in future research. The data was collected from a website design and development course. Although website design topics can feel difficult, coding HTML, CSS, and Javascript is not as difficult as programming in C or other programming languages. Although the study also examined an information systems security course in the quantitative validation, the model needs to be tested on other technical courses. Finally, the data was collected in a large university that grants Bachelor's, Master's, and Doctoral Degrees. The students who enroll at the university may be different than the students who enroll at other institutions. The results may not hold for students in smaller universities or community colleges or in highly prestigious universities. These ideas should be explored in future research.

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APPENDIX A: QUALITATIVE EVALUATION QUESTIONS

The qualitative questions on the end-of-semester evaluation included:
1. Comment on the effectiveness of the instructor's classroom presentation and subject matter organization.
2. Comment on the difficulty of the course material.
3. Comment on the grading/grading procedure.
4. Did the instructor generate interest in the subject and stimulate your intellectual curiosity? Was there an atmosphere of mutual respect and understanding between the instructor and the students? Was the instructor concerned that the students learned the course material? In what ways was this concern, or lack of it, exhibited?
5. Please give your thoughtful evaluation of this course as an educational experience. Comment on any aspects of the course material or the instructor's performance you thought were either outstanding or unsatisfactory. Do you have any specific constructive suggestions for the instructor as to how he/she can improve the course?

The primary questions presented in weekly surveys included:
1. What was the most valuable part of the class and lab from the previous week?
2. What are you currently struggling with and how can I help you?

APPENDIX B: SURVEY INSTRUMENT

Construct	Item	Question
Difficulty perceptions (DIF)	1	The class material is very difficult to learn
	2	The class material is very complicated
	3	Learning the class material is difficult for me
Diversity in teaching style (DIV)	1	The instructor of this class uses multiple teaching styles to teach the topics presented in class
	2	The instructor of this class uses different teaching methods to help us learn the class material
	3	The instructor of this class uses more than lecture to help us learn the class material
Instructor enthusiasm (ENT)	1	The instructor seems genuinely interested in the topics presented in class
	2	The instructor presented the class material in a way that excited me to learn
	3	The instructor teaches the class material in an enthusiastic way
Prior experience (EXP)	1	Prior to this class, I knew a lot about the topics presented in the class
	2	Prior to this class, I had acquired knowledge related to the topics presented in the class
	3	Prior to this class, I had learned about the topics presented in the class
Hedonic perceptions (HED)	1	I look forward to learning the material in the class
	2	Learning the material in the class is enjoyable
	3	The material in the class was interesting to me
Learning outcomes (LRN)	1	I have learned a lot in this class
	2	I have developed skills in this class that I didn’t have previously
	3	I am glad that I took this class
	4	I am happy with my learning in this class
	5	I would take this class again because it was so enjoyable
Difficulty management (MGT)	1	I have found ways to manage the difficulty of the class material
	2	I have found ways to cope with the difficulty of the class material
	3	I am able to manage the difficulty of the class material
Instructor organization (ORG)	1	The class material was well organized
	2	The instructor was well organized
Atmosphere of respect (RES)	1	The instructor has developed at atmosphere of respect in the classroom
	2	The instructor does not make me and others feel inadequate when we are struggling
	3	The instructor shows me and the other students respect