EMPIRICAL RESEARCH

Enhancing Knowledge Transfer in Classroom Versus Online Settings: The Interplay Among Instructor, Student, Content, and Context

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ABSTRACT

This article integrates management education and organizational learning theories to identify the factors that drive the differences in student outcomes between the online and classroom settings. We draw upon theory on knowledge transfer barriers in organizations to understand the interlinking relationships among presage conditions, deep learning process, and product in the 3P model of student learning. We test our model in the context of undergraduate education and find that confidence in the instructor's expertise, perceived content relevance, and the social richness of the classroom learning environment enhance student enjoyment of the course. Confidence in instructor's expertise and perceived content relevance also contribute to greater understanding of causal relationships among course concepts. Enjoyment is positively associated with learning performance in the classroom, but not online, and student ability is positively associated with learning performance in the online context, but not in the classroom. Our results have implications for course designs in the traditional classroom context and the more innovative online environment.

Subject Areas: Deep Learning, Knowledge Transfer, Online Education, 3P Model, Student Enjoyment, and Student Performance.

INTRODUCTION

In a transition process that is changing the pedagogy and relational aspects of learning, universities are rushing to utilize the Internet as a tool for innovative education in order to reduce costs, expand geographic reach, and enhance capabilities. Over two-thirds of accredited universities offer online courses (Arbaugh, 2000a), and research into the influence of this new learning context on students' affective responses and learning outcomes has struggled to keep pace with the growth rate

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of implementation. To date, the literature has identified optimal course designs, subject matter, and technologies for online learning as well as comparative student outcomes between online and traditional classroom environments (e.g., Arbaugh, 2005a, 2005b; Arbaugh & Rau, 2007; Marks, Sibley, & Arbaugh, 2005). However, further research is still needed to build a deeper theoretical understanding of the factors that drive the differences in student outcomes between the two learning environments (Alavi & Leidner, 2001; Arbaugh, 2005a; Bilimoria, 1997).

We answer this call by developing a model of student learning performance that offers new insights regarding the variables affecting the differences between the more innovative online education environment and the more traditional classroom context. We integrate two bodies of literature that share common constructs but are not often synthesized: management education and organizational learning. We begin with the 3P model of educational learning developed by Biggs and Moore (1993), in which the component *presage* encompasses characteristics that exist prior to engagement in learning, *process* incorporates the student's learning experience, and *product* represents the student's learning outcomes. Consistent with a recent call for the use of mainstream organizational theory in education research (Arbaugh, 2005a), we integrate the 3P model with Szulanski's (1996, 2000) organizational learning theory on the barriers to knowledge transfer in firms, in order to create a deeper understanding of the relationships between the presage and process elements of student learning and the differences in learning process and product between the classroom and online settings. This integration effort allows us to explore how presage characteristics influence a student's propensity toward a deep learning process, in which motivation drives interest in the course material and understanding of relationships among concepts. Deep learning, in contrast to shallow learning based on memorization, is a key goal in higher education because it results in better demonstration of understanding and greater development of generic skills (Lizzio & Wilson, 2004; Trigwell & Sleet, 1990).

Our research makes several contributions to the field. First, our application of Szulanski's model from the organizational learning literature to education enables us to break new ground in innovative education research by exploring how student performance in both classroom and online contexts is associated with (1) presage characteristics of confidence in instructor expertise and perception of content relevance and (2) process characteristics of student enjoyment and understanding of causal relationships. Second, insights from the 3P model allow us to contribute to the organizational learning literature by identifying direct and contingent relationships among the barriers to knowledge transfer identified by Szulanski (1996, 2000). Research into such relationships is scarce (an exception is Szulanski, Cappetta, & Jensen, 2004). Finally, our integration of the 3P model with Szulanski's theory results in a comprehensive model contrasting the effectiveness of classroom and online contexts with regard to their pedagogical assumptions, communication richness, feedback, and support for triangulation and affiliation processes.

We start by reviewing the literature and presenting our hypotheses. Next, we describe the methods and results of a study that tested our model with a sample of undergraduate students in a large, accredited southwestern American university. Finally, we discuss our findings and identify implications for students, faculty members, and future researchers.

THEORETICAL DEVELOPMENT

The 3P model (Biggs & Moore, 1993) was developed to explain the factors affecting students' learning outcomes. Presage characteristics encompass such factors as the instructor, the course content, the learning environment, and the student's ability. Process characteristics focus on the student's motivation and learning. Deep learning, which is based on motivation driven by interest in the course material and understanding of relationships among concepts, is contrasted with shallow learning, which is based on motivation driven by desire to avoid failure and rote memorization of data (Kember, Briggs, & Leung, 2004). Presage and Process characteristics "intersect" to determine the product: learning effectiveness (Kember et al., 2004).

Cybinski and Selvanathan (2005) applied this model to compare statistics students in two different learning environments (online and traditional classroom settings). They considered (1) student attitudes toward subject matter, prior math experience, and learning environment as presage characteristics; (2) student enjoyment of the statistics course and test anxiety as process characteristics; and (3) exam scores as product characteristics or learning effectiveness. They found some evidence for a relationship between enjoyment and attitude toward learning statistics, as well as different levels of test anxiety between the online and classroom contexts.

We seek to build on this work by developing a more comprehensive set of presage factors, by expanding the process factors to address both dimensions of deep learning (enjoyment and causal understanding), and by building a richer understanding of how the presage and process factors interact to achieve learning effectiveness in the more traditional classroom setting and the more innovative Internet learning environment. We draw on Szulanski's model of barriers to the process of transferring knowledge from a source to a recipient, which he referred to as "stickiness factors" (Szulanski, 1996, 2000; Szulanski & Cappetta, 2003), in order to identify presage and process factors. We find the transfer of knowledge about best practices among individuals in organizations to be analogous to the transfer of course content knowledge from an instructor to a student within a university setting, primarily due to the fundamental similarity of the actors and issues involved in the exchange. Both involve two parties, one that recognizes a need for knowledge and another that possesses knowledge. Both are dependent on adaptability, individual characteristics, and group dynamics. In each situation the participants (students/knowledge recipients) share the common objective of acquiring and synthesizing new knowledge. Finally, both involve expectations of learning performance and satisfaction.

In Table 1, we summarize the analogies between Szulanski's (1996) stickiness factors and comparable learning barriers in higher education. We list each of the stickiness factors, altered from negative wording (impediment) to positive wording (facilitator). Four stickiness factors translate into a comprehensive assessment of presage characteristics and refer to instructor, course content, learning environment, and student. Szulanski's stickiness factor of knowledge source perceived reliability we identify as *confidence in the instructor's expertise*. The absorptive capacity of the knowledge recipient is analogous to *student learning*

Table 1: Szulanski's stickiness factors applied to educational learning.

Stickiness Factors to Best Practice Transfer	Stickiness Factor Description in Business Settings	Application in Higher Education
Source perceived reliability	Source perceived as reliable expert on knowledge content	Presage: Confidence in Instructor's Expertise
Content proven usefulness	Knowledge content perceived as useful	Presage: Content Relevance
Context relationship not arduous	Context ease of communication & quality of collaboration	Presage: Classroom versus Internet environments
Recipient absorptive capacity	Recipient able to learn	Presage: Student Learning Ability
Recipient motivation	Recipient wants to learn	Process: Student Enjoyment of Learning
Content not causally ambiguous	Relationships between cause & effect within knowledge content are understood	Process: Understanding of relationships in course content
Recipient retentive capacity	Recipient continues to use knowledge over long term	Excluded due to Szulanski's nonsignificant findings
Source motivation	Source willingness to share knowledge	Excluded: Instructor assumed to be willing to teach
Context not barren	Context is supportive of learning	Excluded: University assumed supportive

ability. Usefulness of knowledge content becomes student perceptions of the *relevance of the course material* to future business careers. Finally, Szulanski described the arduousness of the knowledge transfer context in terms of the ease and quality of communication and collaboration between source and recipient. We translate this into the difference between traditional classroom and online *learning environments*, which differ in the richness of the students' connections to the instructor and each other.

Two stickiness factors are related to the process variables associated with a student's deep learning: motivation to learn and understanding of causal relationships among concepts. The intrinsic motivation to learn was described by Kember et al. (2004, p. 278) as the student finding "the material interesting" and feeling "happy," while Cybinski and Selvanathan (2005, p. 270) and Koch, Verville, and Garza (2007, p. 354) spoke of student perception of the course subject as "enjoyable," "stimulating," or not "dull and boring." We define this aspect of intrinsic motivation related to experiencing joy or pleasure as *enjoyment* of the course and describe it in terms of its being "enjoyable," "fun," and "my favorite." In regard to the second stickiness factor, Kember et al. (2004) described the understanding of causal relationships as "constructing theories to fit . . . things together" and "understanding" the meaning; we follow Szulanski (1996) we define the student's understanding of cause-and-effect links as *understanding of relationships in the course content*.

Our integration of organizational learning and educational learning literatures leads to the adaptation of the 3P model of student learning shown in Figure 1. In our model, we identify instructor expertise, course content relevance, learning environment, and student learning ability as presage characteristics that have the potential to act as facilitators or barriers to the learning process. We argue that the process characteristics of enjoyment of the course and understanding of causal relationships are positively related to the absence of barriers to the learning process. We further argue that learning environment is a moderating factor in the relationships of presage and process variables with learning effectiveness.

Presage Factors as Antecedents of Process Factors

Confidence in instructor's expertise

Confidence in the instructor's expertise refers to the student's trust that the instructor is an expert and can be relied upon to transfer accurate knowledge. A student's perception of the instructor's expertise influences interest in and satisfaction with the course (Eom, Wen, & Ashill, 2006; Keller, 1983). Students are more receptive to ideas that originate from credible sources, and this receptivity is a core component of learning motivation and enjoyment (Driscoll, 1994; Szulanski et al., 2004). Moreover, resistance to learning occurs when the knowledge source is not considered reliable, hampering both the student's motivation and ability to understand the course material (Szulanski, 1996). Trust in the instructor's expertise increases the depth and richness of information exchanged and reduces barriers to the process of building understanding of causal relationships. Hence,

> *Hypothesis 1a:* Confidence in the instructor's expertise is positively related to student enjoyment of the course.

Figure 1: Model of enjoyment and learning performance.
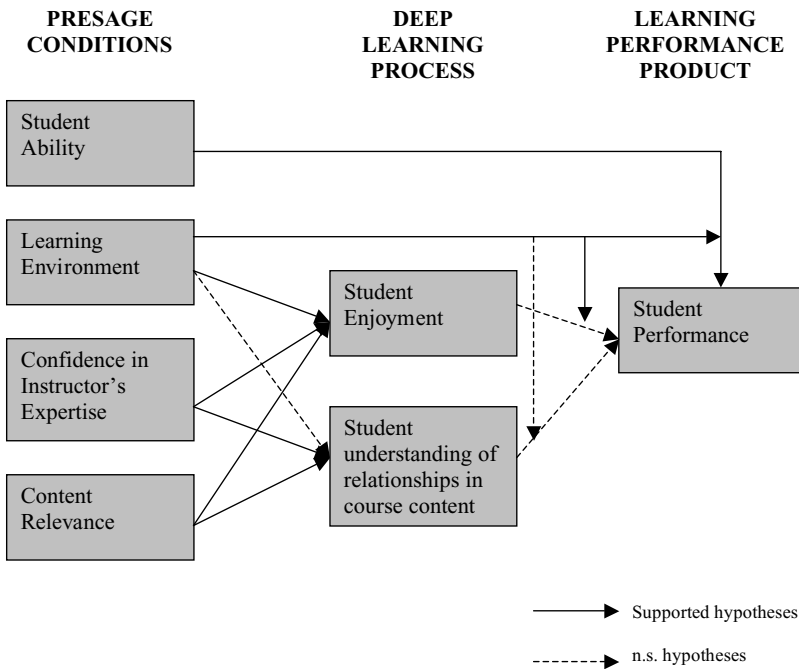
Hypothesis 1b: Confidence in the instructor's expertise is positively related to student understanding of relationships in the course content.

Content relevance

Characteristics of the knowledge content represent a potential barrier to the learning process—a barrier distinct from the expertise of the instructor (Szulanski, 1996; Zander & Kogut, 1995). Barriers to understanding causal relationships are likely to be lowered and learning motivation is likely to increase if students and teachers can cooperatively connect the classroom content with students' current interests and future career needs. In other words, students see applicable knowledge as more intrinsically interesting (Burke & Moore, 2003; Keller, 1983; Randolph & Posner, 1979) and are more likely to enjoy a learning process that includes this content. Knowledge that is perceived as irrelevant or useless is more difficult to transfer. Students are unlikely to invest the extra effort needed for deep learning and understanding of causal relationships when they do not see value in the information (Cybinski & Selvanathan, 2005). Hence,

Hypothesis 2a: Relevance of the course content is positively related to student enjoyment of the course.

Hypothesis 2b: Relevance of the course content is positively related to student understanding of relationships in the course content.

Learning environment

Students in an online setting take advantage of the flexibility and convenience of studying at their own pace, in their own space and time (Koch et al., 2007; Marks et al., 2005), but these scheduling and logistical benefits are not necessarily enough for students to actually enjoy the course. As an affective response, enjoyment is frequently associated with rich interactions. For example, Smith and Dillon (1999) associated the classroom context with higher levels of interactivity among teachers and students, feedback, and immediacy of interaction—all attributes that sustain student motivation.

Relative to an online course, the learning process within a classroom setting involves fewer and less cumbersome barriers. Classroom courses with extensive two-way communication and feedback between instructor and student, and among students, reflect a collaborative and cooperative context (Leidner & Jarvenpaa, 1995) that reduces the obstructions of the learning process and increases its enjoyment. The media naturalness theory argues that the face-to-face aspect of classroom communication includes nonverbal clues that may reduce both cognitive effort and ambiguity, thereby making the course more enjoyable to students and enhancing clarity of understanding (Koch et al., 2007). Furthermore, the need to understand and deal with the technology of the online setting is a learning barrier to consider (Arbaugh, 2000b).

Within the classroom context, the social and relational components of learning are more completely integrated into the knowledge transfer process (Elkjaer, 2003), which allows for a more fluid information exchange. Comparatively, and despite the increased use of e-mail, chat rooms, discussion boards, and audio and video, the more asynchronous nature of distance learning acts as a barrier that allows a primarily unidirectional content flow (Arbaugh, 2000a). Wilson and Fowler (2005) found that an environment characterized by cooperative peer learning lead to more deep learning in terms of higher interest in the course and understanding of relationships. These arguments suggest an advantage of the classroom over the online context: The social and relational aspects of the classroom experience enhance the flexibility and richness of information exchange and feedback. As learning barriers decrease due to these advantages, deeper learning will be characterized by greater student enjoyment and improved understanding of relationships in the course content. Hence,

Hypothesis 3a: Students in a classroom learning environment will enjoy the course more than students in an online learning environment.

Hypothesis 3b: Students in a classroom learning environment will build greater understanding of relationships in the course content than students in an online learning environment.

Presage Factors, Process Factors, and Learning Performance

In the previous section, we discussed how the presage factors regarding the instructor, course content, and learning environment influence the deep learning process factors of student enjoyment of the course and understanding of the relationships among concepts in the course content. Now we turn our attention to how the

process factors, and the presage factor of student learning ability, affect learning performance. In doing this, we build on past research supporting the view of performance as a function of motivation and ability (Cole, Feild, & Harris, 2004; George & Jones, 2002).

Student ability

Extensive research on postsecondary education has established a positive relationship between cognitive ability and learning performance across large numbers of students, multiple countries, and a wide range of disciplines (Anastasi & Urbina, 1997; Hopkins, 1998). Based on the strength of this evidence, we hypothesize a direct relationship between learning ability and learning performance in our model, rather than an indirect relationship through process factors. Hence,

> *Hypothesis 4:* Student ability is positively related to student learning performance.

Student enjoyment

Student enjoyment of the course has proven to be an integral component of classroom motivation because it is a precondition for effective learning (Cybinski & Selvanathan, 2005). When students have fun in class, they can develop a passion for learning based on intrinsic motivation. This intrinsic motivation cultivates creative thought and facilitates knowledge transfer, even in the absence of extrinsic motivation (Osterloh & Frey, 2000). The increased interest and effort resulting from greater enjoyment of a course promote stronger learning performance. Hence,

> *Hypothesis 5:* Student enjoyment is positively related to student learning performance.

Student understanding of relationships in course content

Understanding relationships among concepts in the course content is an element of deep learning. It indicates a "know-why" understanding: why things are done and why X leads to Y (Szulanski & Cappetta, 2003). The lack of causal understanding or ambiguity that can be characteristic of the shallower memorization of data builds learning barriers that hinder learning performance. Ambiguity can arise from knowledge tacitness or from an inability to translate known relationships to a new context (Akbar, 2003; Szulanski, 1996; 2000). Interpretable content connections build learning confidence (Burke & Moore, 2003; Keller, 1983). Understanding relationships facilitates learning performance by providing cognitive models against which new information can be compared and stored (Nadkarni, 2003). Hence,

> *Hypothesis 6:* Student understanding of relationships in the course content is positively related to learning performance.

Moderating Effects of Learning Environment

Student ability and learning performance

Learning environment also influences learning performance by moderating the effects of individual ability on learning performance. Students not only absorb knowledge transferred from the instructor, they also construct knowledge through synthesizing (Koppenhaver et al., 2007). In contrast to online contexts, the classroom setting provides superior support for the sense-making processes that contribute to learning by providing greater opportunities for students to triangulate and affiliate knowledge (Weick, 2001). As an example of triangulation, students in a classroom make sense of new course content by engaging in discussions about how it is applied in practice, asking questions that guide the instructor in explaining complex material in different ways, or receiving real-time feedback to opinions or presentations. In contrast, students in online settings tend to rely on a single, uncontradicted source of information, which can create a feeling of omniscience and difficulty in identifying flaws (Weick, 2001). Also, classroom students learn through affiliation when they compare their understanding with that of other students to achieve a shared interpretation. In contrast, the Internet learning experience tends to be a solitary one, offering less opportunity to build a social reality (Weick, 2001). In summary, the triangulation and affiliation of a classroom enhance and leverage learning performance over that in an online setting.

Online, the limited feedback and lack of interaction with instructors and fellow students results in learning performance that is more closely linked to individual abilities than in the classroom, where students with lower ability can ask clarifying questions to the instructor and self-correct misunderstanding of their readings by listening to group discussions. Classroom learning is more independent of individual ability; online students, on the other hand, are more dependent upon their own abilities. Hence,

> *Hypothesis 7:* The relationship between student ability and learning performance will be weaker among students in a classroom learning environment than among students in an online learning environment.

Enjoyment, understanding of relationships, and learning performance

Environment moderates the positive effects on learning performance of the deep learning process factors, resulting in decreased enjoyment for Internet students. Interaction with instructors and other students and feedback from others are important contributors to learning performance (Zhao, Lei, Yan, Lai, & Tan, 2005). Unfortunately, even when multimedia and electronic interaction (such as discussion boards) are easy to use, they are frequently underutilized in online courses due to asynchronicity, embarrassment, or lack of a self-perpetuating core of users (Shaw & Polovina, 1999). Lack of face-to-face interaction increases the difficulty of developing social ties and exchanging information, creating a barrier to student-to-student online interaction (Arbaugh, 2000a). Furthermore, in an Internet learning environment, students feel less close (transactional distance) to their instructors (Benson et al., 2005; Moore, 1991).

As a result of these factors, enjoyment is more likely to motivate Internet students to expend effort on privately reading course material than on using electronic means to interact with their instructors (Fung, 2004). Thus, enjoyment does not lead online students to engage more in the interactions with instructors and fellow students that increase learning performance. Media richness theories argue that task outcome qualities, such as learning performance, are better when richer media are used (Daft & Lengel, 1986). This suggests that the understanding of relationships in the course content will have a greater positive impact on learning performance when gained in the richer media environment of the classroom. Hence,

Hypothesis 8a: The relationship between student enjoyment of the course and learning performance will be stronger among students in a classroom learning environment than among students in an online learning environment.

Hypothesis 8b: The relationship between student understanding of relationships in the course content and learning performance will be stronger among students in a classroom learning environment than among students in an online learning environment.

METHOD

Sample and Procedure

We tested our hypotheses in an urban university in the southwestern United States with junior and senior undergraduate students taking a "Principles of Management" core course. The sample group for the main study ($N = 200$) was demographically diverse: 56% male, 7% African American, 43% Asian, 16% Hispanic, 29% Anglo Caucasian, and 5% other ethnicity. We created a quasiexperimental research design (Shadish, Cook, & Campbell, 2002) by offering students the choice of taking a classroom course or taking the same course in a distance-learning mode over the Internet, using WebCT software. About half of the students chose each context option. An ANOVA analysis showed that the students in the two settings did not differ significantly in gender, ethnicity, or SAT scores. We monitored the manipulation by taking attendance in class. All students were very familiar with the Internet technology involved; it is widely used throughout the university and WebCT enhancement is a required element of all courses in the business college. Using a design that compared a classroom course to an online course allowed us to isolate the role that classroom interaction plays in learning (Cybinski & Selvanathan, 2005). Both groups had the same instructor, used the same textbook, received the same lecture notes, case studies, and discussion questions, and took the same closed-book examinations. Both groups had access to the same course Web site that included lecture notes from the instructor and guest speakers, e-mail connection to classmates and instructor, course syllabus, chat rooms for informal communication, self-tests to drill on basic concepts, and discussion boards to facilitate collaborative analysis (primarily of case studies).

The learning experience between the two environments differed in that the classroom group received the lectures live from the instructor and guest speakers,

had the opportunity to ask questions and participate in classroom group discussions, and engaged in live case study analyses. The classroom group met in this socially interactive environment twice weekly (75-minute sessions) for 15 weeks. In contrast, the online learning group experienced an interactive classroom environment only on the first day of the semester to review the course syllabus. They reported to the classroom for three examinations to assess achievement of learning performance, but test taking was a solitary process without interaction with instructor or fellow students.

All students in the course were given the option of participating in the study or doing an alternate assignment of equivalent difficulty; however, only one student opted out of the research study. Missing data reduced the sample size to 158 students for the enjoyment model (79% final response rate) and 149 for the learning performance model (75% final response rate).

Data were collected with five instruments implemented on different days throughout the semester, using two different methods (online survey and paper exams). This research design minimized the effect of common source bias (Podsakoff, MacKensie, Lee, & Podsakoff, 2003). One online survey collected demographic data and perceptions of the instructor's expertise and course content from students in both groups. A separate online survey assessed student enjoyment. Three separate exams delivered in the classroom assessed the learning performance of students in both groups. Each instrument contained a student identification number, enabling the data to be linked. An independent research assistant, who was blind to the hypotheses, linked the data and then deleted the identifying codes to preserve student anonymity.

Measures

Measures for the dependent, independent, and control variables are outlined below; the appendix provides the items for all perceptual measurement scales. Seven-point Likert scales with the anchors "strongly disagree" and "strongly agree" are used. Context is dummy coded as 1 for classroom environment, 0 for online environment. We followed Hinkin's (1995) recommendations for developing the new measures. Items were developed deductively by one author and tested for construct validity by a different author through independent allocation of items to variables.

We developed scale items for student confidence in instructor's expertise, understanding relationships in course content, and content relevance were developed using Szulanski's (1996) guideposts of "source unreliability," "causal ambiguity," and "unproven knowledge measures," and adapting them for the university context. Scales for these three measures were validated and refined with a separate, large-scale pilot sample ($N = 410$, 75% response rate). The students in this pilot test were enrolled in two different classroom-based sections of the same course. The pilot group students used the same textbook and took the course on the same days as the students in the main study, but had a different instructor. Four items are excluded from the measurement scales (see appendix) due to cross-loading in the exploratory factor analysis of the pilot sample data. Results of a confirmatory factor analysis on the main study data using AMOS 5.0 show a close fit to the three-factor (relevance, understanding relationships, reliance on expertise)

structure ($\chi^2 = 65.4/df = 32$; CFI $= .97$; RMSEA $= .072$; 90% confidence interval for RMSEA is entirely below .10). (See Byrne, 2001, for explanation of fit measures.) Discriminant validity is evidenced by substantial deterioration in the model fit for two-factor and single-factor models ($\chi^2 = 122.0/df = 34$ and $\chi^2 = 339.7/df = 35$, respectively). All factor loadings are significant ($p < .05$) and exceed .65; all but two factor loadings exceed .70, suggesting good quality scales. The internal reliabilities exceed the minimum standard of .70 expected for new scales (Nunnally, 1978). Cronbach's alpha is .86 for reliance on instructor's expertise, .89 for content relevance, and .75 for content clear causality.

Test/retest reliability is assessed by comparing two sets of structural equation models for factor structure invariance; the first set compares models for the pilot study and main study groups, while the second set compares models for the classroom and Internet groups in the main study. This assessment requires comparison of (1) structural equation measurement models with unconstrained factor loadings and covariances among variables with (2) models in which the factor loadings and covariances are constrained to be equal for the two comparison groups. In both cases there are no significant differences in the fit statistics, indicating that the factor loadings for all items and covariances among perceptual variables are not significantly different among the pilot study group, the Internet main study group, or classroom main study group. These results indicate that the construct measures and their relationships are robust across different groups of students and insensitive to instructor.

The extent to which the student found the course enjoyable is measured using a 4-item scale developed deductively based on the literature on enjoyment and fun. Factor loadings exceeded .85. Cronbach's alpha is .87. Following Hinkin's (1995) recommendations, construct validity is assessed by comparing student enjoyment of the course to one variable with which it should be correlated, and to another variable with which it should not be correlated, to test whether it behaves as expected. Enjoyment is an aspect of intrinsic motivation, so we compare enjoyment to the statement "I am motivated to work hard in this class," expecting a positive correlation. We have no theoretical reason to expect a relationship between enjoyment and gender. Construct validity is supported with the expected positive relationship between enjoyment and motivation ($r = .363$, $p < .001$) and a nonsignificant relationship between enjoyment and gender ($r = -.05$, $p = .47$).

Student learning ability and learning performance were measured with objective rather than perceptual data. Student learning ability is measured using self-reported SAT scores divided by one hundred. Learning performance is measured using the average score on 343-item, multiple-choice examinations, covering knowledge content that the students were expected to learn in the course. Questions in the exams were drawn from the textbook publisher's test bank, so they were unbiased by the study's hypotheses. A sample exam question is, "Potential disadvantages of functional structures include all of the following EXCEPT: (1) difficulties in pinpointing responsibilities for cost containment, product or service quality, timeliness, and innovation; (2) provision for clear career paths; (3) tendency for sense of cooperation and common purpose to break down; (4) narrow view of performance objectives; (5) too many decisions referred upward in the

organizational hierarchy." The reliability of the average knowledge performance rating across the three exams (ICC2) is .71, indicating stability in ratings for this variable over time and good agreement levels for aggregation (James, 1982; Rosenthal & Rosnow, 1991).

Control variables

We control for two individual differences that may influence student learning. Existing research suggests that women learn more effectively in Internet learning environments than men and find these learning environments more enjoyable, although empirical results have not been universally consistent (Arbaugh & Rau, 2007; Cybinski & Selvanathan, 2005; Marks et al., 2005). We also expect that students will find the course material more enjoyable or relevant when it corresponds to their major field of study. Therefore, we control for gender with a dummy code (1 for male students) and for major field of study (dummy coded as 1 for management majors).

RESULTS

The means, standard deviations, and correlations for all study variables are shown in Table 2. Confidence in instructor's expertise, content relevance, and learning environment are positively correlated with student enjoyment. Confidence in instructor's expertise and content relevance are positively correlated with student understanding of relationships. Student ability is positively correlated with learning performance. Variance inflation factors are less than 2.6 and condition indices are less than 6 in all regression models, indicating that multicollinearity is not a significant concern in interpreting the results (Cohen, Cohen, West, & Aiken, 2003).

For hypotheses testing, we analyze the data using hierarchical regression. Table 3 shows regression results for the antecedents of student enjoyment and understanding of relationships. Models 1a and 1b include only the control variables and show no significant results. Models 2a and 2b show that students enjoy the course more and build greater understanding of relationships when they have higher confidence in the instructor's expertise ($\beta = .18$, $p < .05$; $\beta = .20$, $p < .01$), confirming hypotheses 1a and 1b. Also, students' perception of the course content as relevant to their future needs is positively related to both enjoyment and understanding ($\beta = .33$, $p < .001$; $\beta = .48$, $p < .001$), supporting hypotheses 2a and 2b. Hypothesis 3a is supported, as students in the classroom context report higher levels of enjoyment relative to students in the online context ($\beta = .22$, $p < .01$), but hypothesis 3b is not supported. The presage characteristics explain 25% of the variance in enjoyment and 36% of the variance in understanding.

Table 4 presents the regression results for learning performance. The continuous variables are centered as recommended by Cohen et al. (2003) for interaction analyses. Model 1 shows that neither of the control variables predicts student learning performance. We test the direct effects of ability, enjoyment, understanding, and context in model 2. As expected, students with higher SAT scores tend

Table 2: Means, standard deviations, and correlations.

Variable	Mean	SD	1	2	3	4	5	6	7	8
1. Gender	.56	.50	–							
2. Major	.09	.29	.11	–						
3. Confidence in expertise	6.55	.52	–.17*	–.13	–					
4. Content relevance	6.09	.91	–.15*	.06	.35***	–				
5. Learning environment	.53	.50	–.09	–.02	.13	.08	–			
6. Ability	10.85	1.36	.15	–.16*	–.11	.18*	–.07	–		
7. Enjoyment	6.22	.79	–.05	.08	.30***	.40***	.26**	–.03	–	
8. Understanding	5.98	.69	–.06	.06	.36***	.57***	.07	–.14	.36***	–
9. Performance	34.74	3.49	.00	–.08	.04	.07	.13	.23**	.10	.07

N = 158, *p < .05, **p < .01, ***p < .001.

Table 3: Regression results for student enjoyment and understanding.

Variables	Enjoyment		Understanding	
	Model 1a	Model 2a	Model 1b	Model 2b
Gender	−.06	.02	−.11	.02
Major	.08	.10	.09	.06
Confidence in instructor's expertise		.18*		.20**
Content relevance		.33***		.48***
Learning environment		.22**		.03
Student ability		.08		−.02
F	.78	8.26***	1.40	14.95***
R^2	.01	.25***	.02	.36***
Adjusted R^2	.00	.22***	.01	.34***

$N = 158$. Standardized coefficients are shown. $^*p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Table 4: Regression results for student learning performance.

| Variable	Model 1		Model 2		Model 3	
	B	*se*	B	*se*	B	*se*
Gender	.10	.60	−.12	.59	−.19	.58
Major	−.91	.99	−.53	.97	−.54	.97
Student ability			.72**	.22	1.36***	.33
Enjoyment			.25	.40	−.38	.48
Understanding			.23	.46	.25	.61
Learning environment			1.19†	.61	1.19†	.59
Context × ability					−1.15**	.43
Context × enjoyment					1.65*	.84
Context × understanding					−.33	.91
F	.42		2.76*		3.17**	
R^2	.01		.11*		.17	
Adjusted R^2	−.01		.07*		.12	

$^†p < .10$, $^*p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Note: $N = 149$. Unstandardized coefficients and standard errors are shown.

to perform better ($p < .001$), supporting hypothesis 4. Enjoyment and understanding are not significant predictors of learning performance, so hypotheses 5 and 6 are not supported. Direct effects explain 11% of the variance in learning performance.

Interaction effects are tested in model 3. The interaction between student learning ability and learning environment is significant and negative ($b = −1.15$, $p < .01$), supporting hypothesis 7. A simple slope analysis (Figure 2) shows that student ability is positively related to learning performance in the online context, while the relationship in the classroom context is not significantly different than zero. The interaction effect between student enjoyment and learning environment

Figure 2: Student ability and learning performance: Classroom versus online context.
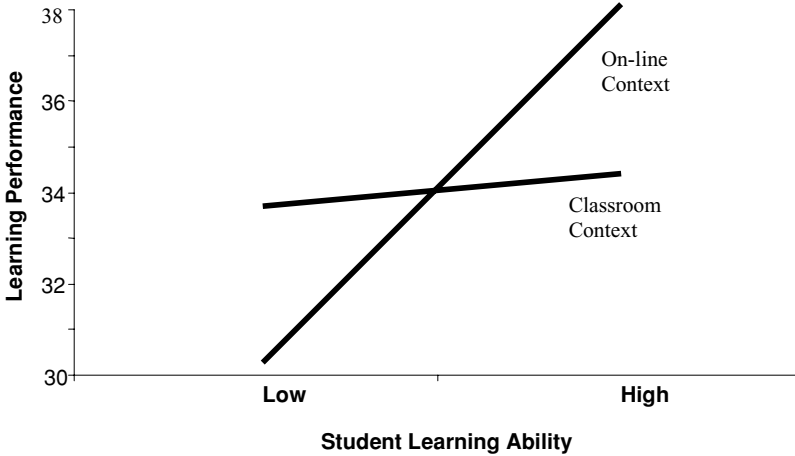
Figure 3: Enjoyment and learning performance: Classroom versus online context.
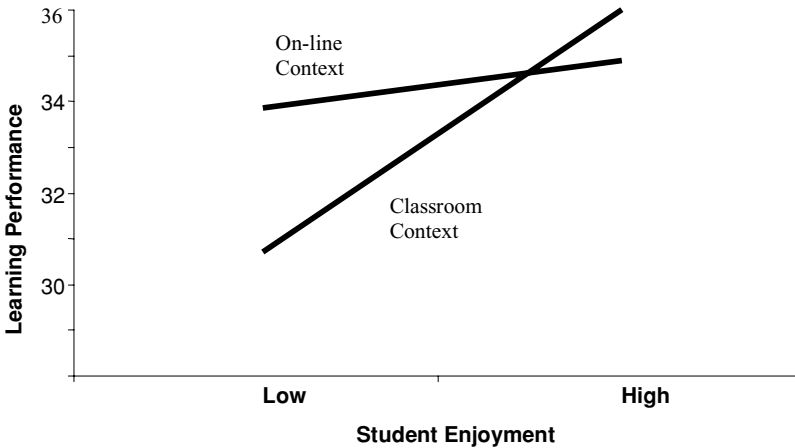
is significant and positive ($b = 1.65$, $p < .05$), supporting hypothesis 8a. A simple slope analysis (Figure 3) shows that enjoyment is positively related to learning performance in the classroom context, while in the online context the slope is not significantly different from zero. The interaction effect between understanding and learning environment is not significant, so hypothesis 8b is not supported. Interaction effects explain 6% of the variance in learning performance.

DISCUSSION

The four main findings of this study are that (1) the presage factors of student confidence in the instructor's expertise, perceived content relevance, and a classroom learning environment increase the process factor of student enjoyment, (2) confidence in the instructor's expertise and content relevance also increase the process factor of student understanding of relationships in the course content, (3) student enjoyment is more positively associated with learning performance in the classroom than in the online learning environment, and (4) student learning ability is less influential in learning performance in the classroom than in the online learning environment. The first two findings highlight the importance of reducing presage factors that act as barriers to a deep learning process. The second two findings offer insight into the role of the more socially interactive and traditional classroom context in leveraging enjoyment to improve learning effectiveness and in compensating for weaker individual abilities.

Our predictions are confirmed for the roles of the presage factors of confidence in the instructor's expertise and content relevance in increasing enjoyment and understanding of relationships essential for deep learning. The 3P model suggests that even if a student has a preference for shallow learning, a favorable combination of presage conditions may promote deep learning (Kember et al., 2004; Wilson & Fowler, 2005). By integrating the 3P model with concepts from the organizational learning literature, we offer new insights into the theoretical reasons behind linkages between presage factors and deep learning. Lowering barriers to learning related to the instructor and content enhances student enjoyment and understanding.

We obtained mixed support for our predictions regarding the effects of learning environment. We find that students in the classroom have higher levels of enjoyment than their counterparts in the online setting. This result supports the view that the richer social interactions, feedback, and information exchanges found in the more traditional classroom increase positive academic emotion (enjoyment). We do not, however, find support for the predicted relationship between learning environment and understanding of causal relationships. This suggests that, while the students may get more pleasure from the richer environment of the classroom, the online environment may be equally effective in encouraging students to understand relationships among constructs to bring deeper meaning to the course content. These results suggest both good news and areas of caution for professors and administrators incorporating innovative educational options, such as online learning, into course offerings. The classroom and online settings are both effective in enabling students' ability to grasp theoretical cause-and-effect relationships within the course content; however, the reduced enjoyment of learning in online contexts could have a negative effect on outcomes such as student retention that depend in part upon a positive affective response to the college experience.

Probing more deeply into relationships among the presage factors, we use an ANOVA analysis to compare students in the two learning environments, which shows that students in the classroom have higher levels of confidence in their instructor's expertise ($F = 3.124$, $p < .10$) than do online students. Thus, the face-to-face aspect of the classroom environment may affect student perceptions of

instructor expertise, possibly through body language and responses to questions. In contrast, we find no significant differences in student perceptions of the relevance of the course content in the two learning environments. This indicates that the value students perceive in knowledge content is less sensitive to media richness than instructor expertise perceptions.

Organizational learning research supports the idea of performance as a function of motivation and ability (Cole et al., 2004; Steers, Mowday, & Shapiro, 2004). The 3P model also predicts positive relationships between learning ability, motivation, understanding, and learning performance. When we consider only direct effects (Table 4, model 2), our results only partially support these theoretical models in that preexisting student ability predicts learning performance. Surprisingly, however, our predictions that deeper learning would be broadly associated with greater learning performance are not supported. Our results contribute to the broader literature on motivation and performance by identifying a potential boundary condition in learning environment because these overall results mask complexity that is revealed in the interaction analyses (Table 4, model 3). Enjoyment is a significant predictor of performance only when students are learning in a traditional classroom setting, whereas student ability is a significant predictor of performance only in the online context. Thus, our data provide some support for the primary model of performance (ability + motivation = performance), but identify a potential contingent influence of a live, social learning environment. These results suggest that the socially interactive aspects of the traditional classroom may offer avenues of knowledge transfer that are important in enhancing the learning performance of students with weaker ability. The results also imply that, when these social interaction opportunities and feedback are available, those students feeling greater joy in the learning experience will be more motivated to use such opportunities to leverage their learning performance.

We do not find either a direct effect or a contingent effect of student understanding of relationships in the course content on learning performance. This outcome may have been influenced by the instrument we used for assessing learning performance. Deep learning of conceptual relationships may not be as influential in performance on multiple-choice exams as in performance on group projects or essay exams. Further research with multiple learning performance assessment tools is needed to explore the potential moderating effect of assessment method in this predicted relationship.

Limitations

The main limitation of this study is representative of the tension between external and internal validity. We used a research design that controlled for instructor style and field of knowledge by focusing on a single instructor and course improved internal validity; however, this was accomplished at the cost of limiting generalizability of the findings (Shadish, Cook, & Campbell, 2002). Replication of this research with different instructors, in different cultural settings, and with different course content would be beneficial in establishing generalizability. In addition, it was ethically necessary to offer students a choice between the two learning contexts, thus precluding random assignment to conditions. However, we conducted

an ANOVA analysis and found the two groups to be homogeneous with respect to gender, race, ability, and major field of study, so we have no reason to believe that a random split would have yielded different results.

Implications and Future Directions

This study makes several contributions to the development of innovative education. First, our integration of the 3P model of student learning with Szulanski's (1996) work on best practice transfers in business units offers novel insights into how learning presage factors affect learning process. By considering the stickiness factors of knowledge source, recipient, content, and context, we look inside the black box of the academic learning process to identify how student confidence in an instructor's expertise, perception of content relevance, experience in the classroom versus online setting, learning ability, enjoyment of the course, and understanding of relationships intersect to impact learning performance.

Several findings from this theoretical integration are of particular interest for innovative course design. First, effective online education depends upon qualified instructors and relevant content to the same extent as the traditional classroom, so innovative online education should not be perceived as an opportunity to reduce costs by lowering the quality of instructor or course materials. Second, the student's motivation and ability are important factors in learning, which implies that, while some students may thrive in a well-designed virtual environment, other students may be better suited to a traditional classroom. Third, students in the online environment have less confidence in the *same* instructor's expertise on the *same* subject than classroom students, a fact that suggests virtual learning requires more explicit establishment of the instructor credentials in the field to build student trust. Fourth, the finding that levels of enjoyment are higher in the classroom setting than they are in the online setting hints at the difficulties in creating "excitement" and "fun" to motivate students in virtual learning.

A second contribution of this research is the contrast in the effectiveness of classroom and Internet learning contexts with regard to their pedagogical assumptions, communication richness, feedback, and support for the processes of triangulation and affiliation. As predicted, our data show that enjoyment had a stronger influence on learning performance in the classroom setting than in the online setting and that learning performance in the classroom setting was less dependent upon individual learning ability. These findings are particularly striking because the Internet condition in our quasiexperiment was designed to include the capability for online student collaboration and instructor interaction. This suggests that the use of basic online teaching tools such as discussion boards, chat rooms, practice drills, online professor office hours, and PowerPoint presentations is not enough and that further research and practice is needed to design virtual learning environments so that they are not only convenient in terms of time and space of learning, but achieve levels of learning performance that meet or exceed those in a classroom setting.

The third contribution is an extension of Szulanski's work by our analyzing the interrelationships among the stickiness factors. Informed by the 3P model, we position the recipient motivation stickiness factor as an intervening process

between stickiness arising from knowledge source, content, and context, and the output of knowledge transfer effectiveness. We find that students enjoy a course more when they perceive the knowledge content as relevant to their future needs and have confidence in their instructor's expertise. Our results support the case for continued crossfertilization efforts between the rich storehouses of theory in the fields of organizational learning and higher education.

Our fourth contribution is empirical. As part of this study, we developed a set of measures for confidence in instructor's expertise, knowledge relevance, understanding of relationships, and enjoyment. The measures are brief enough for convenient use in survey research and exhibit strong reliability and good factor structures across two reasonably large groups of respondents. We also provided insight into online learning in undergraduate core courses to complement the more extensive data available on online MBA courses. Given that undergraduate students have a less rich background of education and experience to draw upon than do graduate students, learning outcomes in the more independent context of the Internet may differ for the two groups. Since undergraduate Internet courses are growing in popularity, it is important to accumulate empirical data on this population also.

Our results also have important practical implications for educators interested in innovative practices. The students in our study performed better and found more enjoyment in the classroom than in the online setting; even so, the cost benefits for universities and greater convenience for students will result in the continuance of the online environment as an important avenue for education. Our results linking presage factors to enjoyment provide insights allowing educators to design courses emphasizing factors that make the student experience of courses more enjoyable. Creating perceptions among students that the instructor is an expert in her field and can be relied upon to provide accurate knowledge content for the course needs to be emphasized, especially in an online course where the student may not have face-to-face contact to establish that confidence. Student perceptions that the content of the course will be highly relevant to their future needs is a very important factor in enjoyment, suggesting the need to emphasize knowledge application, perhaps through case studies, field studies, or guest speakers from fields related to the students' expected careers.

The face-to-face aspect of the classroom makes it rich in enjoyment-enhancing opportunities, such as the emotion of a passionate debate or the animated body language and vibrant tone of voice of a dynamic instructor. Online course designers should be mindful of this and try to bring the same communication richness to students. This might be done by complementing the traditional PowerPoint presentations with multimedia, video, audio, and podcasts, and by providing timely feedback and creating more peer-to-peer and instructor–student interaction opportunities (Arbaugh, 2005b).

A challenge for future research will be to build on these study findings to develop instructional methods and designs for innovative education that mimic more closely the enjoyment and performance benefits of the more traditional classroom learning. This could be done using a research design that compares the impact of a variety of online course design features. Research could focus on comparing courses that differ in the degree to which they rely on collaborativism versus

objectivism, the richness of the communication media, and the extent to which they provide opportunities for triangulation and affiliation. For example, the effect of pedagogical assumptions might be analyzed by comparing courses that provide opportunities for online collaboration versus ones that require collaboration and reaching a shared view of reality to complete course assignments. A communication richness comparison might be made between courses that offer online PowerPoint slides of lectures and courses that offer broadband access to asynchronous streaming video of lectures. Another interesting comparison would be between a course with an available chat room where students can meet online with the instructor or other students and a course that requires participation in periodic online chat room discussions.

Another area for future research is further investigation of our finding that enjoyment influences learning performance in the classroom setting but is not a significant predictor of learning effectiveness in the online setting. A more fine-grained study of the relationships among student enjoyment, intrinsic motivation, and effort devoted to course work in both classroom and online contexts may be able to tease out the processes underlying the causality for this finding. For example, research that tracks the influence of enjoyment on student learning behaviors and study practices in online and classroom contexts would help to clarify the specific behaviors motivated by enjoyment in each context and their impact on learning performance.

CONCLUSION

Online education is a significant component of modern postsecondary education. Research into the unique pedagogical and relational challenges of this context has intensified, but has yet to catch up with the rapid growth of the phenomenon. In this article, we strive to contribute to this work by studying the latent processes affecting how and why learning occurs in classroom and more innovative virtual settings. By drawing from organizational learning theories developed in the business environment, we identify a complex interrelationship among instructor, content, student, and context that leads to more successful learning. We hope that our work serves as a springboard for further research in this important area of innovative higher education. Furthermore, we exhort authors in education and organizational learning to continue efforts to expand the literature bases from which they draw in order to advance the fields of learning and education as an integrated whole.

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APPENDIX
Survey Measures

Confidence in Instructor's Expertise
The instructor for this course is an expert on the topic.
I can rely on the information in the instructor's lecture notes.*
I trust this instructor to provide me with accurate information.
I can rely on this instructor to portray the topic like it really is.*
I trust this instructor's knowledge about the course content.

Content Relevance
The material I am learning in this course will be used often in my future career.
I can see how the theory I am learning in this class can be applied in "real life."
Most of the material we learn in this class can be applied on the job.*
I know I will be able to apply what I am learning in the class to future job situations.
This course is helping me to prepare for my career.

Student Enjoyment
This class has been enjoyable.
This was one of my favorite classes.
I had fun in this class.
I enjoyed many aspects of this class.

Student Understanding of Relationships in Course Content
I understand how specific management actions result in specific outcomes for firms.
I have a precise understanding of what managers do.
It is well known how particular actions by managers interact to result in firm performance.
I believe that there is a precise list of the skills, resources, and prerequisites necessary for successful management.*

*Items dropped from scale after analysis of the holdout sample.

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