MOTIVATION TO LEARN AND COURSE OUTCOMES: THE IMPACT OF DELIVERY MODE, LEARNING GOAL ORIENTATION, AND PERCEIVED BARRIERS AND ENABLERS

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This naturally occurring quasi-experiment examined how learning goal orientation (LGO), delivery mode (classroom vs. blended learning), and the perception of barriers and enablers related to motivation to learn and course outcomes. Study participants were 600 students enrolled in either classroom or blended learning courses. As hypothesized, learners in the blended learning condition, high in LGO, and who perceived environmental features as enablers rather than barriers had significantly higher motivation to learn. Motivation to learn, in turn, was significantly related to course outcomes (satisfaction, metacognition, and grades). The mediation hypotheses received partial support. Finally, exploratory analyses revealed 3 significant interactions between delivery mode, LGO, and perceived barriers and enablers on motivation to learn and course satisfaction.

Advances in information technology are changing all aspects of human resource management. In the area of training and development, these changes are most evident in the delivery of instruction. According to the 2004 Training Industry Report (Dolezalek, 2004), 89% of surveyed companies reported using the Internet to some extent for the delivery of
instruction. This study contributes in several ways to the growing empirical literature on the effectiveness of technology-delivered instruction. First, it provides a direct comparison between blended distance learning and classroom instruction in a naturally occurring quasi-experiment. Second, training motivation theory is used to help understand the relative effectiveness of these delivery modes. Specifically, this study examines motivation to learn as a mediator of the relationships between delivery mode, learning goal orientation (LGO), and perceptions of barriers and enablers and course outcomes.

Distance learning refers to any instructional approach in which the instructor/trainer and learner are separated by time, space, or distance (Driscoll, 2002; Verduin & Clark, 1991). The “instructor” may be a person or instruction may be delivered without any human interaction using the Internet, CD-ROM, videoconferencing, or other instructional media. Distance learning has evolved to include more human interaction due to technological advances and learner preferences. We use the term Web-based distance learning to distinguish distance learning via the Internet from other forms of distance learning (e.g., videoconferencing and correspondence courses). Web-based distance learning can incorporate course management systems that include interactive video, bulletin boards, chat rooms, e-mail, instant messaging, and document sharing systems (Martins & Kellermanns, 2004). The growing use of Web-based distance learning can be attributed to its potential advantages, which include the ability to deliver consistent instruction to geographically dispersed learners, provide learners greater control over when and how the instruction occurs (e.g., the pace and presentation of materials and exercises), provide learners with the opportunity to collaborate and share information with each other and subject matter experts, and offer links to other learning resources including course materials and Web sites (Brown & Ford, 2002; Clark & Mayer, 2003; Galagan, 2000; Noe, 2005).

Learner preferences for synchronous instruction and face-to-face contact with the instructor and other learners have resulted in an increased use of blended learning. Blended learning refers to the use of distance learning along with traditional face-to-face instruction in different forms or combinations to facilitate instruction and learning (Duhaney, 2004). Blended learning can take many different forms because of the different types of distance learning and the various ways distance and traditional instruction can be combined. Blended learning is defined here as specifically referring to situations where an instructor personally interacts with learners during occasional face-to-face meetings, but the vast majority of learning occurs via Web-based distance learning where the learner interacts with course materials, the instructor, and other trainees using Web-based electronic media. Blended learning uses technology to expand the physical boundaries of the classroom, providing access to learning
content and resources and enhancing the instructor’s ability to receive feedback on learners’ progress (Leidner & Jarvenpaa, 1995).

Researchers and trainers have suggested that blended learning maximizes the benefits of both Web-based distance learning and face-to-face instruction (e.g., Dos Santos & Wright, 2001; Masie, 2002; Parikh & Verma, 2002; Zielinski, 2000). Studies in management education, for example, have suggested that Web-based distance learning is valuable but insufficient for teaching complex analytical, conceptual, and interpersonal skills for several reasons including a lack of communication richness, reluctance of some on-line students to interact with others, and giving individuals with busy work schedules the opportunity to more easily delay, fail to complete, or poorly perform on learning activities (e.g., Bigelow, 1999; Salmon, 2000). In a meta-analytic study, Sitzmann, Kraiger, Stewart, and Wisher (2006) found that blended learning was more effective than either classroom or Web-based instruction for teaching both declarative and procedural knowledge.

This study makes three unique and important contributions to the literature. First, this study contributes to the growing empirical literature on the effectiveness of technology-enhanced instruction by providing a direct comparison between blended learning and classroom delivery in a naturally occurring longitudinal quasi-experiment. In doing so, this study directly addresses the call for more rigorous comparisons of instructional delivery methods, specifically focuses on the role of motivation to learn, examines an important learner characteristic (LGO), and statistically controls for other potential confounds (e.g., Clark, 1983, 1994; Sitzmann, Kraiger, Stewart, & Wisher, in press). Second, previous studies comparing blended learning (or Web-based distance learning) to classroom instruction have generally not attempted to understand why or under what conditions one method may be more effective than the other. This study uses training motivation theory to focus on the learning process, rather than the technology, to understand the relative effectiveness of these delivery methods. Sitzmann et al. (2006) concluded that studies have not tested theories that might be helpful for understanding why technology-enhanced delivery methods would be more effective than classroom instruction. The final contribution of this study is the use of a unique combination of variables based on motivation theory to investigate how and why blended learning may be more effective than classroom instruction. Few studies have examined how learner and situational characteristics affect technology-delivered instruction (Phipps & Merisotis, 1999; Welsh, Wanberg, Brown, & Simmering, 2003). Although prior research has examined the effect of perceived barriers and enablers, LGO, and motivation to learn on training outcomes, previous research has not examined these three constructs together or for the purpose of understanding the differential effectiveness of alternative instructional delivery methods.
The conceptual framework for this study, shown in Figure 1, integrates training motivation theory, which is based on the Colquitt, LePine, and Noe (2000) meta-analytic path analysis of 20 years of training research and Brown and Ford’s (2002) input-process-output (IPO) model of learning. Training motivation theory recognizes that motivation to learn has a direct effect on learning outcomes. In addition, individual characteristics and situational factors are recognized as having direct and indirect effects on motivation to learn and learning outcomes (Colquitt et al., 2000). The IPO model suggests that the delivery mode–learning outcome relationship is mediated by active learning states including motivation to learn. The IPO model suggests that delivery modes (such as classroom instruction and blended learning) may differentially impact motivation to learn and subsequent learning outcomes. Specifically, the model presented in Figure 1 shows that course outcomes are a direct result of motivation to learn. Motivation to learn is influenced by learner characteristics, instructional characteristics, and perceived barriers and enablers. Perceptions of barriers and enablers are themselves influenced by learner and instructional characteristics. Specific hypotheses for each of the relationships shown in Figure 1 are presented and supported below.

Motivation to Learn

The centrality of motivation to learn in Figure 1 reflects its importance for any training or development program. Motivation to learn refers to the desire of the trainee to learn the content of a training program (Noe, 1986). It is a key determinant of the choices individuals make to engage in, attend to, and persist in learning activities. Past research indicates that motivation to learn is a robust predictor of course outcomes and is influenced by both individual and situational characteristics (Colquitt et al., 2000; Noe, 1986; Tannenbaum & Yukl, 1992).
Instructional Characteristics

The instructional characteristic of interest in this study is delivery mode. In classroom instruction, participants generally attend training in a centralized location with other learners and interact face-to-face with the trainer. With distance learning, trainees and instructors are seldom in the same location, and in the case of Web-based distance learning, material is presented through electronic media. Aspects of Web-based distance learning are thought to both enhance and inhibit trainee motivation to learn relative to classroom instruction. One reason to suspect that learner motivation may be adversely affected in Web-based distance-delivered courses is the higher drop out rates compared to classroom courses (Bonk, 2002; Moshinskie, 2001; Phipps & Merisotis, 1999). Two explanations for reduced motivation to learn in distance learning courses are the potential for distractions and interruptions while learning and the lack of face-to-face interaction (Knowles, 1990; Noe, 2005). The theory of instructor immediacy suggests that the ability of the instructor to engage in nonverbal and verbal communications with learners enhances the learning experience and increases learner motivation (e.g., Christophel, 1990; Knowles, 1990). Alternatively, there are also several inherent pedagogical features of Web-based distance learning that may facilitate motivation to learn, including a greater overall level of interaction both among learners and between instructors and increased learner control over the pace of instruction, when they learn, where they learn, and access to additional instructional material (Lawless & Brown, 1997; Oblinger, Barone, & Hawkins, 2001). Consistent with self-determination theory (Gagne & Deci, 2005), the increased learner control inherent in distance-delivered courses likely results in greater learner motivation (Kinzie & Sullivan, 1989).

Blended learning courses appear to provide learners with the positive features of both classroom and distance learning while minimizing the negative features of each (Hysong & Mannix, 2003). In comparison to classroom delivery, blended learning provides increased learner control, self-directedness, and requires learners to take more responsibility for their learning, all factors consistent with the recommendations of adult learning theory (Knowles, 1990). Relative to pure Web-based distance learning, blended learning provides more face-to-face social interaction and ensures that at least some of the instruction is presented in a dedicated learning environment. Although some of these instructional principles are more often discussed as facilitating learning, rather than motivation to learn, we believe learner control, responsibility, and immediacy result in learning because they impact the choices learners make to engage in, attend to,
and persist in learning activities (i.e., motivation to learn). Although no prior published research has directly assessed the relationship between blended learning and motivation to learn, there is some indirect empirical evidence to support this linkage. Prior studies have shown that the level of knowledge acquisition for students in blended learning courses is superior to students in either distance or classroom courses (Hysong & Mannix, 2003; Sitzmann et al., 2006). In addition, instructional characteristics other than delivery mode (such as trainer expressiveness and organization) have been shown to affect trainee motivation to learn (e.g., Towler & Dipboye, 2001). As a result, we predict motivation to learn to be greater for learners receiving blended learning than learners receiving classroom instruction.

**Hypothesis 1:** Learners in the blended learning condition will have higher motivation to learn compared to learners in the classroom condition.

**Learner Characteristics**

LGO was chosen for examination in this study because research has shown that an LGO can have a strong effect on learning and the allocation of effort during learning (Fisher & Ford, 1998). As highlighted by DeShon and Gillespie (2005), goal orientations have been defined in a variety of different ways (e.g., as goals, traits, and beliefs), have been conceptualized as having different configurations of distinct facets, and have been examined at varying levels of stability (i.e., situationally specific, domain specific, and trait). In this study, we treat goal orientation as domain specific, with academics being the specific achievement domain of interest, and we only focus on the mastery approach facet or LGO. That is, we are concerned with the pattern of cognitions and actions that result from the chronic pursuit of a mastery approach goal over time in academic achievement settings (DeShon & Gillespie, 2005).

We only examine LGO because this orientation has demonstrated the strongest and most consistent relationships with motivation to learn and course outcomes. We chose to examine domain-specific LGO rather than state or trait LGO for two reasons. First, research has shown that LGO is susceptible to environmental influences and that a LGO state is easily induced (Button, Mathieu, & Zajac, 1996; Duda & Nicholls, 1992; Dweck, 1989; Elliot & Harackiewicz, 1996; VandeWalle, Cron, & Slocum, 2001). Second, findings concerning domain-specific LGO would be more stable across time in the examined context and be more generalizable across learning contexts than state LGO. We still view domain-specific LGO as a learner characteristic, given that it is more a function of the person than
the situation and based on empirical evidence that domain-specific LGO is heavily influenced by trait LGO (e.g., Breland & Donovan, 2005).

High LGO learners focus on gaining competence, developing new skills, learning from experience, and achieving a sense of mastery (Ames, 1992; Dweck, 1986; VandeWalle et al., 2001). The behavioral manifestation of these characteristics is an adaptive motivational pattern in which individuals seek out challenges, exert effort to reach goals, and persist in the face of obstacles (Button et al., 1996; Dweck, 1986). Research has shown LGO to influence how trainees approach learning tasks and allocate their effort during learning (Brown, 2001; Fisher & Ford, 1998; Towler & Dipboye, 2001). Based on this conceptual and empirical evidence, we expect LGO to be positively related to motivation to learn.

Hypothesis 2: LGO will be positively related to motivation to learn.

Perceived Barriers and Enablers

Although usually not considered a characteristic of the learner, learners’ perceptions regarding barriers and enablers also impact their motivation to learn. Perceived barriers and enablers are environmental events or conditions that are believed to exist or be encountered and thought to impede (barriers) or facilitate (enablers) progress (Lent, Brown, & Hackett, 2000). It is important to distinguish perceived barriers and enablers from objective performance constraints. “Perceived” barriers and enablers are not necessarily based on actual events or conditions. Yet, people act on the basis of those perceptions, regardless of whether those perceptions have any basis in reality. Objective performance constraints (e.g., lack of time, materials, or information) impact performance directly by preventing the effort that results from motivation from translating into performance (Peters, O’Conner, & Eulberg, 1985). Perceived barriers and enablers affect performance indirectly by impacting motivation itself. When learners perceive barriers, they become frustrated, lower their motivation to learn, and reduce their effort because they do not believe that additional effort will translate into improved performance (Mathieu, Tannenbaum, & Salas, 1992). Perceived enablers have the opposite effect (Noe & Wilk, 1993). Because learners believe that their efforts will be facilitated rather than hindered, they become more motivated. Learners are less likely to strive for an outcome when they perceive that their efforts will be impeded and are more likely to do so when they perceive that their efforts will be aided. Perceived barriers and enablers are thought to impact motivation both through influencing intentions or goals as well as the translation of intentions into action (Lent et al., 2000).
Previous studies have tended to focus exclusively on either barriers or enablers. However, in many cases, the same feature can be viewed as either a help or a hindrance by different individuals, or as a combination of both by a single learner. Therefore, this study examines features as being perceived as a barrier, enabler, or both. Perceived barriers and enablers have been previously examined as determinants of motivation to transfer as well as motivation to learn. Although both involve predicting motivation in training and development contexts, the conceptual placement (and operational measurement) of barriers/enablers and some of the specific environmental features of interest differ depending on whether one is trying to predict learning or transfer. Because this study focuses on motivation to learn, perceived barriers and enablers to learning, rather than transfer, were identified and were assessed at the beginning of the course.

Prior research has examined perceived barriers and enablers in both Web-based distance learning and classroom settings. Hillesheim (1998) concluded that external barriers in Web-based instruction included time constraints, the learner–instructor relationship, and technology-related concerns. Mathieu et al. (1992), in a classroom delivery context, examined information, time, equipment, and authority as perceived barriers and found a weak negative relationship between perceived constraints and motivation to learn. Research on the adoption of new technology is also relevant as perceived barriers and enablers have been shown to impact attitudes toward and the use of new technology. Attitudes toward technology are influenced by its perceived utility, ease of use, and availability of technical and personal support (Griffith, 1996; Martins & Kellermanns, 2004). Studies have also found that the perceived usefulness and availability of technology is related to learner receptiveness to Web-based distance learning (Christensen, Anakwe, & Kessler, 2001; Thompson & Lynch, 2003; Webster & Hackley, 1997). We therefore expect the extent to which environmental features as a whole are perceived as barriers or enablers will impact motivation to learn.

Hypothesis 3: The extent to which learners view features as enablers rather than as barriers will be positively related to motivation to learn.

Learner and instructional characteristics can influence the likelihood that a feature will be perceived as a barrier or enabler. Because of the additional complexities involved with the Web-based distance delivery components in a blended learning course, learners receiving instruction via blended delivery should be less likely to perceive features as enablers than learners receiving classroom instruction. In support of this assertion, instructional characteristics have been found to be important potential barriers relating to the persistence of distance learning students (Garland, 1993). LGO is also likely related to perceptions of enablers and barriers.
High LGO individuals can be expected to view challenges as opportunities and persist in the face of any difficulties encountered because they view their abilities as malleable and because of the resulting adaptive motivational pattern. We therefore expect that learners high in LGO will be more likely to view features as enablers than barriers than low LGO learners. The proposed pattern of relationships suggests that learner and instructional characteristics may influence motivation to learn at least partially through perceptions of features as barriers and enablers.

Hypothesis 4a: Learners in the blended learning condition will be less likely to perceive features as enablers than learners in the classroom condition.

Hypothesis 4b: LGO will be positively related to the perception of features as enablers.

Hypothesis 5: The effects of LGO and delivery mode on motivation to learn will be partially mediated by perceived barriers and enablers.

Course Outcomes

Research indicates that there are robust positive relationships between motivation to learn and course outcomes (e.g., Colquitt et al., 2000; Noe & Schmitt, 1986; Quinones, 1995). In this study, one affective and two cognitive learning outcomes are examined. The affective outcome is course satisfaction, reflecting learner reactions to the course in terms of its pace, format, organization, and amount learned. Affective reactions are an important course outcome (Alliger, Tannenbaum, Bennett, Traver, & Shotland, 1997; Brown, 2005; Kirkpatrick, 1994; Kraiger, Ford, & Salas, 1993) and were assessed in this study because (a) they are indicators of instructional delivery quality, (b) learner satisfaction is a highly valued outcome in the context examined, and (c) Colquitt et al. (2000) reported a significant corrected meta-analyzed correlation between motivation to learn and affective reactions ($r_c = .45$).

The other two course outcomes examined in this study assess cognitive learning as defined by Kraiger et al. (1993). The first of these, metacognition, refers to the extent to which learners thought about, monitored, and controlled their learning activities (Flavell, 1979). Metacognition reflects how much individuals planned, monitored, and revised their behavior (Ford, Smith, Weissbein, Gully, & Salas, 1998). The more motivated the learner, the more time and cognitive effort allocated to monitoring progress, planning improvements, and adjusting learning strategies, suggesting a positive motivation to learn–metacognition relationship. Metacognition was examined as an outcome in this study because differences in this construct have been consistently demonstrated in Web-based distance learning research (e.g., White, 1997). The second
cognitive learning outcome of interest is declarative knowledge (i.e.,
the acquisition of factual information presented in the course). Declara-
tive knowledge is a relevant outcome in this study as the primary objective
of the examined courses was to facilitate knowledge acquisition. More
motivated learners should make choices and engage in behaviors result-
ing in greater knowledge acquisition. The motivation to learn–learning
relationship is well established in both traditional learning contexts and
Web-based distance learning environments (Guzley, Avanzino, & Bor,
2001). For example, without directly assessing motivation to learn, Brown
(2001) showed that learners who invested more time and effort into com-
pleting the online materials learned more. Colquitt et al. (2000) reported
a significant corrected meta-analyzed correlation between motivation to
learn and declarative knowledge ($r_c = .27$).

**Hypothesis 6:** Motivation to learn will be positively related to course
outcomes including (a) course satisfaction, (b) metacognition, and (c)
declarative knowledge.

**Mediating Role of Motivation to Learn**

Consistent with past research (e.g., Colquitt et al., 2000), motivation to
learn is predicted to partially mediate the effects of delivery mode, LGO,
and perceived barriers and enablers on course outcomes. The above hy-
potheses provide support for the relationships between the independent
variables and the mediator and between the mediator and the dependent
variables. The expected relationships between the independent (delivery
mode, LGO, and perceived barriers and enablers) and dependent (course
outcomes) variables are described below. For LGO, consistent positive
relationships have been found between LGO and course outcomes includ-
ing knowledge acquisition (e.g., Chen, Gully, Whiteman, & Kilcullen,
2000; Fisher & Ford, 1998) and metacognition (e.g., Schmidt & Ford,
2003). For delivery mode, the Sitzmann et al. (2006) meta-analysis found
that blended learning was 13% more effective than classroom instruction
for teaching declarative knowledge, whereas White (1997) found that dis-
tance learners engaged in greater metacognition than classroom learners.
In regard to perceived barriers and enablers, Mathieu et al. (1992) demon-
strated that perceptions of performance constraints are negatively associ-
ated with learning. Delivery mode, LGO, and perceived barriers/enablers
are thought to affect course outcomes, in part, because they impact mo-
tivation to learn. It is partially through the choices individuals make to
engage in, attend to, and persist in learning activities that these factors
impact training outcomes. A number of studies have shown that individ-
ual and situational characteristics impact course outcomes through the
intervening mechanism of motivation to learn (e.g., Baldwin, Magjuka,
We are predicting that motivation to learn partially mediates rather than completely mediates the relationship between learner and instructional characteristics and learner outcomes based on meta-analytic path analysis results supporting a partially mediated model of training motivation (Colquitt et al. 2000).

*Hypothesis 7*: The effects of learner characteristics, perceived barriers and enablers, and delivery mode on course outcomes will be partially mediated by motivation to learn.

Finally, this study, in an exploratory manner, examines potential interactions between delivery mode, LGO, and perceived barriers and enablers on motivation to learn and course outcomes. Although there was insufficient theoretical support to articulate-specific hypotheses, we did feel the examination of such interactions was warranted for several reasons. If blended learning has a differential impact on motivation for learners who differ in LGO or perceived barriers and enablers, the study hypotheses would not capture those relationships. Individual differences may play a larger role in affecting training outcomes in blended learning than in classroom settings because learners have more control, have to assume more responsibility, engage in self-regulation to a greater degree, and have to complete more of the work independently (Brown, 2001). Schmidt and Ford (2003) similarly suggested that metacognition may be particularly important in less structured learning settings. Research further suggests that learners do not always use their control effectively or apply the needed strategies for self-regulation (Brown, 2001; Porras-Hernandez, 2000).

*Method*

*Participants*

The participants in this naturally occurring quasi-experiment were drawn from undergraduate students enrolled in six different business courses offered at the regional campuses (blended delivery condition) and three parallel courses offered at the main campus (classroom condition) of a large midwestern university. Courses were considered parallel if the same course was taught by the same professor at the same time (i.e., during the same term), had the same course content, and used identical assessments. Students registered for either the blended learning or classroom delivered course based on their geographic location. These courses were only open to business majors and the admission requirements into the business program are the same across all of the campuses. Thus, the students
in the examined courses were expected to be comparable in terms of academic ability across conditions. The authors were not associated with the delivery of any of these courses.

Data collection occurred over three consecutive 10-week terms during a single academic year. Redundant participants (i.e., students enrolled in more than one of the examined courses) were eliminated using the following decision rules (all multiple enrollments were within the same condition). First, if a student was enrolled in multiple courses over multiple terms, data from the earliest term was used. If a student was enrolled in multiple courses during the same term, and provided more complete data for one course than the other, the data from the course with the most available data were used. Finally, if the amount of data provided during the same term was equivalent, the course used was chosen at random. After eliminating redundant students, a total of 1,107 unique students were enrolled in these nine classes. Of those unique students, 600 responded to at least one survey for a participation rate of 54%. The average age of those participants was 23 years \( (SD = 6.39) \), 56% were women, and 85% were White.

**Task and Design Conditions**

The task was students’ academic performance in the six different business courses. Those courses were introduction to business, international business, principles of marketing, organizational behavior, introduction to operations management, and corporate finance. The first three of these courses were taught at both the main (classroom delivered) and regional (blended learning) campuses. Parallel courses were not available for the other three courses, so only data from the blended learning sections were used. This was done to increase the available sample of learners receiving instruction via blended learning. Course and instructor were perfectly confounded in this study as the same instructor taught both versions of the same course, but no instructor taught more than one course. The design used in the study was a pretest–posttest quasi-experimental design (Cook & Campbell, 1983). The design is quasi-experimental because participants were not randomly assigned to conditions. Rather, the conditions were determined based on participants attending courses in different locations. Of the 1,107 unique students in these courses, 20% were enrolled in the blended learning courses, 80% in classroom courses. Among the 600 participants providing data, 438 (73%) were in the classroom condition and 162 (27%) in the blended learning condition.

Across the parallel courses, the instructor, text, course outlines, lectures, assignments, assessments, and grading standards were consistent.
The two conditions differed in how the majority of the course content was delivered. Students in the blended learning condition, offered at the regional campuses, met once a week with a facilitator (not the professor), but the majority of learning occurred through students individually interacting with course material, the professor, and other students via the Internet. All but one of the six courses used WebCT™ as the course management system. The one course that did not taken by students in both conditions used a substantially similar course management system that provided similar features to students. In the blended learning condition, approximately 80% of course content (excluding assigned readings) was delivered through the Internet and the course management system (streamed videos, PowerPoint, animation, spreadsheets, examples, self-tests, external links, discussion boards, and chat rooms). Students in the classroom condition, offered at the main campus, met twice a week where a lecture format was used. The classroom courses also used the Internet and course management systems but did so only to support classroom activities (e.g., posting the syllabus, grades, and notices from the instructor). Approximately 90% of course content (excluding assigned readings) was delivered face-to-face by the professor in the classroom condition.

Procedure

Students were recruited to participate in this research through course Web pages and instructor announcements. Participation was voluntary and no incentives or extra course credit was offered in return for participation. The study was presented to students as part of a program evaluation and continuous improvement effort. Students in these courses were asked to complete three separate questionnaires administered via the Internet. The first questionnaire, assessing background and demographic information, LGO, perceptions of barriers and enablers, and initial motivation to learn, was available for students to complete during the first 2 weeks of the academic term. The second survey, available during weeks 5 and 6, assessed motivation to learn. Course satisfaction and metacognition were assessed on the third questionnaire, available during the final 2 weeks of the term (weeks 9 and 10). At the end of the term, course grades were obtained from instructor records. The average response rate across the three surveys was 35% of the 1,107 unique students enrolled in the courses. The average response rate was 49% among students in the blended learning condition and 32% for the classroom condition. Although the participation rate differed across conditions, the attrition rates over the three surveys were very similar. In the classroom condition, 64% of respondents completing the first survey also completed the second survey and 65% of those
participants completed the third survey. Those percentages were 65% and 63%, respectively, for students in the blended learning condition.

Measures

Delivery mode. Participants enrolled in the blended learning condition were dummy coded 1, those in the classroom condition were coded 0.

Learning goal orientation. To assess domain-specific LGO, the 5-item subscale of the instrument presented by VandeWalle (1997) was modified to reflect an academic rather than a work domain. Participants rated their agreement with each item (e.g., “I am willing to select challenging courses that I can learn a lot from”) using a 5-point Likert scale. The internal consistency reliability estimate for this scale in this study was .91.

Perceived barriers and enablers. To measure perceived barriers and enablers, participants were presented with a list of 15 items reflecting different environmental features that could be viewed as either helping or hindering their course performance. These items were adapted from Hillesheim (1998), Mathieu et al. (1992), and Tsay, Morgan, and Quick (2000) to assess a range of environmental features thought to be most relevant for this setting. Sample items include “The time I have available for school,” “My access to Internet connectivity,” “Access to school representatives for advice and counsel,” “The ability to get assistance from the instructor,” and “The opportunity for social interaction with other students.” Because each item could be viewed as a barrier, enabler, or both, a Likert scale assessing level of agreement with each statement was not appropriate. Instead, respondents were asked to indicate the extent to which each item was a barrier, enabler, or both using a 5-point rating scale that ranged from $-2 = \text{will definitely hinder my performance}$ to $2 = \text{will definitely help my performance}$ with 0 being the neutral middle rating. When attempting to measure a bipolar dimension, the use of a rating scale with only positive numbers has the potential to bias respondents because it creates a unipolar frame (Schwarz, 1999). A rating scale that ranges from negative to positive numbers best conveyed the potential perceived positive or negative effects on performance that we were interested in measuring. Consistent with Mathieu et al. (1992), a single composite was formed representing each learner’s overall assessment of the extent to which they perceive situational factors as likely to help or hinder their achievement in the course. Given the response format used, the higher the score, the more environmental features were viewed as enablers rather than as barriers. The internal consistency reliability estimate for this scale in this study was .88.

Motivation to learn. Motivation to learn was assessed using Noe and Schmitt’s (1986) eight-item scale. Participants rated their agreement with
each item (e.g., “I am trying to learn as much as I can from this course”) using a 5-point Likert scale. Initial motivation to learn was measured on the first survey to assess any preexisting differences between the conditions. Motivation to learn was also included on the second survey, and that second measure was used in evaluating the hypotheses to provide temporal separation between the proposed antecedents and consequences of motivation to learn. The internal consistency reliability estimate for this scale in this study was .94 for both administrations of the scale.

**Course satisfaction.** Learner satisfaction with the course was assessed using a 5-item scale. The items for this affective outcome were adapted from prior research (Hantula, 1998; Johnson, 1999). Sample items included “How satisfied are you with the course format?” and “How satisfied are you with the amount you have learned in this course.” The internal consistency reliability estimate of this scale in this study was .91.

**Metacognition.** Metacognition was measured with the scale developed by Ford et al. (1998). Participants rated their agreement with 10 items (e.g., “I revised my tactics for how to best learn the material presented in this course”) using a 5-point Likert scale. The internal consistency reliability estimate for this scale in this study was .90.

**Course grades.** The other cognitive outcome, declarative knowledge, was operationalized as course grades. Course grades do not always adequately represent declarative knowledge, but in this sample, grades largely reflected the learners’ mastery of the material covered in the course. Although the specific grading criteria differed from course to course, on average, 68% of course grades were based on tests assessing substantive course content. The specific percentage of grades based on tests for the six courses were 100%, 85%, 73%, 70%, 60%, and 20%. These examinations were either entirely multiple choice or a combination of multiple choice and either short answer essay questions or application problems. The remaining assessments were a combination of team projects (e.g., case reports) and individual written assignments. In none of these courses did simply attending or turning in assignments on time factor into final grades, suggesting that course grades in this sample did largely reflect learner mastery of course material. In the parallel courses, identical assessments, procedures, and criteria were used across the two conditions. At the end of the term, course grades were obtained from instructor records. The numeric equivalent of the earned letter grade (e.g., A = 4.00; A− = 3.67; B+ = 3.33; B = 3.00) was used as the measure of course grades.

**Control variables.** Because this was a quasi-experimental design, we also measured several demographic and experience variables to assess the initial comparability of the learners in the two conditions, as any such differences would be confounded with delivery mode. Specifically, we
examined age, number of prior college courses taken, prior self-reported cumulative grade point average (GPA), and the number of hours worked each week.

**Results**

**Initial Analyses**

Means, standard deviations, correlations, and alpha reliabilities are presented in Table 1. Because we were not able to randomly assign participants to delivery mode conditions, several mean comparisons were conducted to establish the initial equivalency of the two conditions. The two groups did not differ significantly in terms of number of prior courses taken \((M = 29.91\) (blended, \(n = 134\)) vs. \(29.22\) (classroom, \(n = 250\)); \(F = .20,\) n.s.; \(d = .05\)) or GPA \((M = 3.22\) blended vs. \(3.26\) classroom; \(F = 1.27,\) n.s.; \(d = .11\)). There were, however, significant differences observed in both age and hours worked per week with participants in the blended learning condition being older \((M = 26.69\) vs. \(21.21; F = 76.08, p < .01; d = .59)\) and working more hours per week \((M = 28.06\) vs. \(14.13; F = 106.48, p < .01; d = .92)\) than participants in the classroom condition. Both age and hours worked were therefore included as control variables in our analyses. Prior GPA was also included as a control variable in our analyses, even though GPA was comparable across conditions, to eliminate this potential alternative explanation for observed relationships among other variables. Finally, the two delivery mode conditions did not differ significantly in terms of initial motivation to learn \((M = 4.09\) blended vs. \(3.99\) classroom; \(F = 1.35,\) ns; \(d = .10)\) or LGO \((M = 3.88\) blended vs. \(4.00\) classroom; \(F = 2.76,\) ns; \(d = .17)\).

Because one of the included courses used a different course management system, we also compared the responses of students in that course to the responses of students in the other courses to make sure the different course management system was not a confound. There were no significant differences between the students in that course and those in the other five courses in terms of perceived enablers or barriers, LGO, motivation to learn, metacognition, or grades. There was a significant difference in satisfaction with the course, which is more likely due to the course topic/instructor than the course management system. To account for any potential instructor or course effects, five dummy-coded variables representing the six possible instructors/courses were also used as control variables. Given that the two conditions did not differ significantly in terms of initial motivation to learn, LGO, prior number of courses, or GPA, it does not appear that the differential sample size or response rates across conditions created a differential response bias.
# Table 1

**Means, Standard Deviations, Intercorrelations, and Reliabilities**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th></th>
<th></th>
<th></th>
<th></th>
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<td>1. Prior GPA</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<td>–</td>
<td>–</td>
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<tr>
<td>2. Age</td>
<td>382</td>
<td>23.10</td>
<td>6.39</td>
<td>.11*</td>
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<td>–</td>
<td>–</td>
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<td>–</td>
<td>–</td>
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<td>3. Hours worked</td>
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<td>19.01</td>
<td>14.23</td>
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<td>.28**</td>
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<td>–</td>
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<td>-.06</td>
<td>.41**</td>
<td>.47**</td>
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<td>–</td>
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<td>5. Learning goal orientation</td>
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<td>.72</td>
<td>.10*</td>
<td>.07</td>
<td>-.08</td>
<td>-.09</td>
<td>(91)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<td>6. Perceived barriers/enablers</td>
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<td>.02</td>
<td>-.12*</td>
<td>-.22**</td>
<td>-.23**</td>
<td>.37**</td>
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<td>–</td>
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<td>7. Initial motivation to learn</td>
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<td>.03</td>
<td>.15**</td>
<td>-.01</td>
<td>.06</td>
<td>.43**</td>
<td>.33**</td>
<td>(94)</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<td>8. Motivation to learn</td>
<td>428</td>
<td>3.73</td>
<td>.84</td>
<td>.02</td>
<td>.18**</td>
<td>.02</td>
<td>.15**</td>
<td>.22**</td>
<td>.24**</td>
<td>.68**</td>
<td>(94)</td>
<td>–</td>
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<td>9. Course satisfaction</td>
<td>355</td>
<td>3.32</td>
<td>1.10</td>
<td>-.18**</td>
<td>.01</td>
<td>-.13</td>
<td>-.02</td>
<td>.06</td>
<td>.38**</td>
<td>.30**</td>
<td>.48**</td>
<td>(91)</td>
<td>–</td>
</tr>
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<td>10. Metacognition</td>
<td>355</td>
<td>3.48</td>
<td>.73</td>
<td>-.04</td>
<td>.08</td>
<td>.04</td>
<td>.16**</td>
<td>.14*</td>
<td>.15*</td>
<td>.19**</td>
<td>.46**</td>
<td>.31**</td>
<td>(90)</td>
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<tr>
<td>11. Course grades</td>
<td>600</td>
<td>3.05</td>
<td>.98</td>
<td>.49**</td>
<td>.15**</td>
<td>-.14**</td>
<td>-.14**</td>
<td>.16**</td>
<td>.02</td>
<td>.12*</td>
<td>.00</td>
<td>-.11*</td>
<td>-.03</td>
</tr>
</tbody>
</table>

*Note. N = 198–600. Parenthetical numbers on the diagonal are coefficient alpha reliability estimates.

*p < .05, **p < .01.
**Tests of Hypotheses**

Hypotheses 1 and 2 predicted that delivery mode and LGO would be significantly related to motivation to learn. Hierarchical multiple regression was used to examine these relationships. The set of control variables (age, hours worked, prior GPA, and the five dummy variables representing course/instructor) were entered in an initial hierarchical step followed by delivery mode and LGO in a second hierarchical step. Prior to conducting the regression analyses, we scale centered all predictor variables to reduce the possibility of multicollinearity (Cohen, Cohen, West, & Aiken, 2003). The results of this analysis, presented in Table 2, indicate that LGO and delivery mode explained a significant amount of incremental variance in motivation to learn ($\Delta R^2 = .07, p < .01$) beyond the 13% explained by the control variables. The beta weights for LGO and delivery mode were both statistically significant and in the expected direction supporting the first two hypotheses.

Hypothesis 3 predicted that the extent to which features were viewed as enablers rather than barriers would be positively associated with motivation to learn. When motivation to learn was regressed on perceived barriers and enablers, after first entering the set of control variables, a significant amount of incremental variance ($\Delta R^2 = .07, p < .01$) in motivation to learn was again explained (see Step 2 of the second model in Table 2). Hypothesis 3 was thus supported.

The next set of hypotheses (Hypotheses 4a and 4b) concerned the effects of delivery mode and LGO on perceived barriers and enablers. With perceived barriers and enablers as the dependent variable, delivery mode and LGO were entered as a second hierarchical step, after first entering the control variables. As shown in Table 3, delivery mode and LGO as a set explained a significant amount of incremental variance ($\Delta R^2 = .16, p < .01$) in perceived barriers and enablers. The beta weights for both delivery mode and LGO were statistically significant and in the expected directions, supporting Hypotheses 4a and 4b. Learners in the blended learning condition and learners low in LGO were more likely to view environmental features as barriers rather than enablers to learning than learners in the classroom condition or high in LGO.

**Perceived Barriers and Enablers as Mediators**

Hypothesis 5 predicted that the perception of features as barriers/enablers would partially mediate the effects of LGO and delivery mode on motivation to learn. Kenny, Kashy, and Bolger’s (1998) three-step approach was used to test hypotheses predicting mediation. The first step requires demonstrating that the independent variables predict the
dependent variable. Those relationships were established in testing Hypotheses 1 and 2. The second step involves demonstrating that the independent variables predict the mediator. Those relationships were examined and supported in testing Hypotheses 4a and 4b. The final step of the Kenny et al. (1998) approach involves examining whether the independent variables predict the dependent variable when controlling for the mediators. This last step also allows for an assessment of whether the relationship between the independent and dependent variables disappears (suggesting full
mediation) or is reduced (indicating partial mediation) when controlling for the mediators.

To evaluate these relationships, motivation to learn was regressed on perceived barriers and enablers in a second hierarchical step followed by LGO and delivery mode in a third hierarchical step. These results are reported in the second model in Table 2. As reported in testing Hypothesis 3, perceived barriers and enablers accounted for a significant incremental 7% of the variance in motivation to learn. Delivery mode and LGO, entered in the final step, accounted for an additional, statistically significant, 5% of the variance in motivation to learn (vs. 7% when entered without the perceived barriers and enablers as shown in the first model in Table 2). The beta weights for delivery mode and LGO both remained significant. The magnitude of the beta for LGO was reduced (from .27 to .19) with the inclusion of perceived barriers and enablers but the magnitude of the beta weight for delivery mode was not. It can therefore be concluded that perceptions of barriers and enablers partially mediated the LGO–motivation to learn relationship but did not mediate the delivery mode–motivation to learn relationship. Hypothesis 5 was thus only partially supported.

**Motivation to Learn and Course Outcomes**

Hypothesis 6 predicted that motivation to learn would be positively related to (a) course satisfaction, (b) metacognition, and (c) course grades. The results of the regression analyses examining these relationships are provided in Table 4 (see Step 2 of each model). Hypothesis 6 was fully supported as motivation to learn accounted for a significant amount of incremental variance in course satisfaction ($\Delta R^2 = .13, p < .01$), metacognition ($\Delta R^2 = .14, p < .01$), and course grades ($\Delta R^2 = .02, p < .01$). Interestingly, the zero-order correlation between motivation to learn and course grades was not significant (see Table 1), whereas a significant, albeit small, relationship was evident when accounting for the control variables.

**Motivation to Learn as a Mediator**

Hypothesis 7 predicted that the effects of LGO, perceived barriers and enablers, and delivery mode on course outcomes would be partially mediated by motivation to learn. The same process for establishing mediation, described for Hypothesis 5, was used here. To examine Step 1, course satisfaction, metacognition, and course grades were regressed on the control variables, followed by delivery mode, LGO, and perceived barriers and enablers. The results of these analyses are presented in Table 5.
**TABLE 4**  
*Regression Results for the Effects of Motivation to Learn, Delivery Mode, Learning Goal Orientation, and Perceived Barriers and Enablers on Course Outcomes*

<table>
<thead>
<tr>
<th>Model</th>
<th>β</th>
<th>F</th>
<th>ΔR²</th>
<th>F</th>
<th>R²</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course satisfaction</strong></td>
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</tr>
<tr>
<td>Step 1: Control variables</td>
<td>.38</td>
<td>11.26*</td>
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<tr>
<td>Step 2</td>
<td>.13</td>
<td>39.75**</td>
<td>.51</td>
<td>17.05**</td>
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<tr>
<td>Motivation to learn</td>
<td>.40</td>
<td>39.75**</td>
<td>.58</td>
<td>16.29**</td>
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</tr>
<tr>
<td>Step 3</td>
<td>.07</td>
<td>7.36**</td>
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<td>Delivery mode</td>
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<td>1.38</td>
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<tr>
<td>Learning goal orientation</td>
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<td>1.49</td>
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<tr>
<td>Perceived barriers/enablers</td>
<td>.27</td>
<td>17.70**</td>
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<td><strong>Metacognition</strong></td>
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<tr>
<td>Step 2</td>
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<td>26.97**</td>
<td>.23</td>
<td>4.98**</td>
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<tr>
<td>Motivation to learn</td>
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<td>26.97**</td>
<td>.26</td>
<td>4.18**</td>
<td></td>
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</tr>
<tr>
<td>Step 3</td>
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<td>1.59</td>
<td>.26</td>
<td>4.18**</td>
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<td>Delivery mode</td>
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<td>Learning goal orientation</td>
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<tr>
<td>Perceived barriers/enablers</td>
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<td><strong>Course grades</strong></td>
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<td>Step 1: Control variables</td>
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<td>18.43**</td>
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<tr>
<td>Step 2</td>
<td>.15</td>
<td>7.31**</td>
<td>.41</td>
<td>17.64**</td>
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<tr>
<td>Motivation to learn</td>
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<td>Step 3</td>
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<td>2.62*</td>
<td>.43</td>
<td>14.17**</td>
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<td>Perceived barriers/enablers</td>
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<td>1.69</td>
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</tbody>
</table>

*Note. n = 157 (53 in the blended learning condition, 104 in the classroom condition) for course satisfaction and metacognition, 239 (84 in the blended learning condition, 155 in the classroom condition) for course grades. Standardized regression weights are presented. *p < .05, **p < .01.*

entered in a second hierarchical step following the control variables, delivery mode, LGO, and perceived barriers and enablers as a set accounted for an incremental and statistically significant 10% of the variance in course satisfaction. The only significant beta weight, however, was for perceived barriers and enablers (β = .33, p < .05).

With metacognition as the dependent variable, a statistically significant 7% of the incremental variance was explained by the three independent variables. For metacognition, the only statistically significant beta weight was for delivery mode (β = .29, p < .05). Finally, as a set, delivery mode, LGO, and perceived barriers and enablers accounted for an incremental statistically significant 2% of the variance in course grades. For course
TABLE 5
Regression Results for the Effects of Delivery Mode, Learning Goal Orientation, and Perceived Barriers and Enablers on Course Outcomes

<table>
<thead>
<tr>
<th>Model</th>
<th>β</th>
<th>F</th>
<th>ΔR²</th>
<th>F</th>
<th>R²</th>
<th>F</th>
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<tr>
<td><strong>Course satisfaction</strong></td>
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<td>14.58**</td>
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<tr>
<td>Step 2</td>
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<td>12.24**</td>
<td>.48</td>
<td>15.84**</td>
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<td>0.02</td>
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</tr>
<tr>
<td>Learning goal orientation</td>
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<td>0.02</td>
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<td></td>
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<td>Perceived barriers/enablers</td>
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<td>29.45**</td>
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</tr>
<tr>
<td>Step 1: Control variables</td>
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<td>2.34*</td>
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<tr>
<td>Step 2</td>
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<td>4.95**</td>
<td>.16</td>
<td>3.16**</td>
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<td>.35</td>
<td>16.74**</td>
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<td>5.96*</td>
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<tr>
<td>Learning goal orientation</td>
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<td>4.51*</td>
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</tr>
<tr>
<td>Perceived barriers/enablers</td>
<td>−.01</td>
<td>0.02</td>
<td></td>
<td></td>
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</tbody>
</table>

Note. n = 197 (67 in the blended learning condition, 130 in the classroom condition) for course satisfaction and metacognition, 355 (121 in the blended learning condition, 234 in the classroom condition) for course grades. Standardized regression weights are presented. *p < .05, **p < .01.
mediating role of motivation to learn for the above-described four relationships. The final issue is whether the relationship between the independent and dependent variables was reduced or disappeared entirely.

First, for the relationship between perceived barriers and enablers and course satisfaction, partial mediation is indicated as both the change in $R^2$ (from .10 to .07) and the beta weight for perceived barriers and enablers (from .33 to .27) remained significant but were reduced in magnitude when controlling for motivation to learn. With metacognition as the dependent variable, partial mediation is again indicated. The incremental variance explained by the three independent variables dropped from a significant 7% to a nonsignificant 3% when controlling for motivation to learn, but the beta weight for delivery mode remained significant, though it was reduced in magnitude (from .29 to .22). Finally, with course grades as the dependent variable, there was no change in the significance or amount of variance explained by the three independent variables when controlling for motivation to learn. In addition, there was no change in significance or drop in the magnitude for the beta weight for delivery mode. The beta weight for LGO did, however, become nonsignificant and drop in magnitude (from .10 to .05). It can thus be concluded that Hypothesis 7 was partially supported as motivation to learn fully mediated the LGO–course grade relationship, partially mediated the perceived barriers/enablers–course satisfaction relationship and the delivery mode–metacognition relationship, but did not mediate the relationship between delivery mode and course grades.

Interactions

To explore potential interactions among LGO, delivery mode, and perceived barriers and enablers, a series of moderated regression analyses were conducted. Because of the exploratory nature of these analyses, the results should be interpreted with caution. A total of 12 regression analyses were conducted to examine the possible interactions among delivery mode, perceived barriers/enablers, and LGO on course grades, metacognition, course satisfaction, and motivation to learn. In each case, the dependent variables were first regressed on the set of control variables, followed by all of the main-effect variables in a second hierarchical step, with the specific interaction term entered alone in a third hierarchical step. The interaction term accounted for a statistically significant amount of incremental variance in 3 of the 12 analyses.

The first of these was a delivery mode by perceived barrier/enabler interaction in predicting motivation to learn. Delivery mode and perceived barriers and enablers explained a statistically significant 12% of the variance in motivation to learn ($\Delta R^2 = .12$; $F = 12.25$, $p < .01$. $n = 245$ [86 blended, 159 classroom]) in addition to the 12% explained by the
control variables. The third hierarchical step, containing the interaction term, explained an additional 2% of the variance in motivation to learn ($\Delta R^2 = .02; F = 5.33, p < .05; \text{Total } R^2 = .26; F = 6.84, p < .01$). This interaction, illustrated in Figure 2, was plotted using the resulting regression equation and inputting the dummy-coded values for the delivery mode conditions and high and low values (defined as the mean plus and minus one standard deviation) for perceived barriers and enablers. The form of this interaction shows that perceiving environmental features as enablers rather than barriers is positively related to motivation to learn for both conditions but that this relationship is stronger for learners in the classroom condition than for learners in the blended learning condition. In addition, this figure indicates that regardless of perceptions of barriers/enablers, learners in the blended learning condition had higher motivation to learn than those in the classroom condition.

Course satisfaction was the dependent variable for the other two significant interactions (delivery mode by perceived barriers/enablers and LGO by perceived barriers/enablers). For both of these interactions, delivery mode, LGO, perceived barriers and enablers, and motivation to learn explained a statistically significant 20% of the variance in course satisfaction ($\Delta R^2 = .20; F = 16.74, p < .01$. $n = 157$ [53 blended, 104 classroom]) beyond the 37% explained by the control variables. For the delivery mode by perceived barriers and enablers interaction, the third hierarchical step, containing the interaction term, explained an additional 2%
Figure 3: Interaction Between Delivery Mode and Barriers/Enablers on Course Satisfaction.

of the variance in course satisfaction ($\Delta R^2 = .02; F = 6.33, p < .05; \text{Total } R^2 = .59; F = 16.08, p < .01$). This interaction, illustrated in Figure 3, shows that perceiving environmental features as enablers rather than barriers is positively related to course satisfaction for both conditions but that this relationship is stronger for learners in the blended learning condition than for learners in the classroom condition. When testing the interaction between LGO and perceived barriers and enablers on course satisfaction, the third hierarchical step explained an additional 3% of the variance in course satisfaction ($\Delta R^2 = .03; F = 8.96, p < .01; \text{Total } R^2 = .60; F = 16.55, p < .01$). This interaction, illustrated in Figure 4, again shows that perceiving environmental features as enablers rather than barriers is positively related to course satisfaction for both conditions but indicates that this relationship is stronger for low LGO learners than for learners high in LGO.

Discussion

The results from this naturally occurring quasi-experiment were largely supportive of the hypotheses. Learners in the blended learning condition, learners high in domain-specific LGO, and learners who perceived external features as enablers rather than barriers had higher motivation to learn. In addition, perceptions of barriers/enablers partially mediated
the effects of LGO on motivation to learn. Motivation to learn was, in turn, significantly related to course satisfaction, metacognition, and course grades. Finally, it was shown that motivation to learn partially mediated the relationships between delivery mode and metacognition and between perceived barriers/enablers and course satisfaction. Motivation to learn also fully mediated the relationship between LGO and course grades.

Strengths and Limitations

The strengths of the study include the use of a longitudinal design with data collected from learners at three different points in time. Such temporal separation allows for stronger causal inference and reduces the potential impact of common method response bias. In addition, we obtained course grades from instructor records so as to not rely solely on self-report data. The use of a naturally occurring quasi-experiment has both strengths and weaknesses. A strength is that the study involved a real learning environment in which motivation to learn and the other examined variables operated naturally. A weakness is that the two delivery mode conditions examined in this study were not as pure as they would have been in a laboratory setting. For three of the courses, the exact same course (in terms of content and assessments) was simultaneously taught by the same instructor in both conditions. However, there was no parallel course taught at the same time for the other three courses included in the blended learning condition. In addition, the study included six different
courses taught by six different instructors. There would have been fewer threats to internal validity had we been able to hold course and instructor constant and had a more balanced design. Additional concerns include a low response rate, attrition over time, and differences in both the sample size and participation rate across conditions. Had we only used parallel courses, the sample size and response rate differences would have been even greater, and the overall sample size and resulting statistical power diminished. We did account for the differences in course and instructor statistically, and the analytical approach used does not assume equal cell sizes. This does not, however, completely address the concerns regarding the unbalanced design and response rates.

A key concern with any quasi-experimental design is the initial comparability of the groups. Because random assignment of learners to conditions was not possible, there may have been important preexisting differences. The admission requirements into the academic program were identical across conditions and there were no significant differences observed between the two groups in terms of initial motivation to learn, LGO, number of prior courses, or prior GPA. There were, however, significant differences in age and work experience. We statistically controlled for age and work experience, but the possibility exists that there were other unmeasured and uncontrolled differences between the two groups. Future researchers using similar quasi-experimental designs should gather as much background data as possible to eliminate or control for pre-existing differences. These design limitations could also be addressed by identifying learning situations that would allow for true field experiments with random assignment to conditions. Conducting laboratory experiments is another option, but such studies would require high ecological validity to adequately capture the learning experience and to realistically represent barriers/enablers, motivation to learn, and learning outcomes.

Limitations concerning the measurement of declarative knowledge and perceived barriers/enables in this study also need to be acknowledged. First, course grades are a contaminated operationalization of declarative knowledge. Course grades might best be viewed as reflecting course performance (a result of learning), rather than learning itself. In addition, a number of different factors, some less directly reflective of learning, go into the determination of course grades. Examination scores, which are perhaps the best assessment of learner mastery of course material, were available from some, but not all, instructors. Even if we could have used examination scores, those scores would still have been problematic because of the variability among the courses included in the study in terms of form, content, and the emphasis given to examinations in determining course grades. The course content variability also precluded the development and
administration of a common direct assessment of declarative knowledge across delivery conditions. These factors likely introduced error variance into the course grade measure, although we did statistically control for instructor and course differences.

To avoid similar limitations in future research, we make the following recommendations. First, to the extent possible, studies should include courses or training programs that have similar content across conditions so that treatment differences are solely due to delivery mode. This would reduce the contamination of declarative knowledge measures due to differences in instructor, course content, and differential emphasis placed on declarative knowledge. It would also be beneficial for future studies to use more specific, fine-grained measures of declarative knowledge. Such measures might include recognition and recall, power, or speed tests that measure amount of knowledge, recall of knowledge, accuracy of recall, or speed in recalling knowledge (Kraiger et al., 1993). In addition, future research should measure other forms of cognitive learning (e.g., knowledge organization) as well as other important outcomes related to learning and transfer of training (e.g., affective, skill-based and behavioral outcomes, retention, maintenance, generalization, adaptability).

Two limitations of the perceived barriers/enablers measure are also worth noting. The first concern is the response scale used, which asked learners to rate the extent to which each of several general factors was a barrier, enabler, or both/neither. For each item, there could be any number of different specific issues relating to that factor that could be perceived as either barriers or enablers. For example, a learner could view different aspects of “access to the Internet” differently. The location of the school’s computer lab could have been perceived a barrier, but the availability of computers in that lab and the connection and processing speeds of those computers could be viewed as enablers. Similarly, having a computer at home could be simultaneously perceived as both an enabler (because of its location) and as a barrier (slower connection and the need to compete with others to use it). We recommend that future research on perceived barriers/enablers ask respondents to assess the extent to which each factor is perceived to be barrier separately from the extent to which that same factor is perceived to be an enabler. A met expectations approach might also prove useful. Respondents could be asked about the support they need in different areas in order to be successful and then about the support they receive in each area, with polynomial regression used to analyze the impact of the difference.

The barriers/enablers examined in this study are also an issue. The items were adapted from prior research, but the particular set of potential barriers/enablers had not been previously examined. In addition, past research has been inconsistent as to whether multiple dimensions are examined, representing different broad categories of barriers/enablers.
(e.g., Tsay et al., 2000), or a single composite is created (e.g., Mathieu et al., 1992), representing each learner’s overall assessment of the extent to which they perceive situational factors as likely to help or hinder their achievement. Because of the high inter-item agreement and because we were not able to a priori establish a multi dimensional factor structure using a separate sample, we chose to use the composite approach. In doing so, we may have obscured the effects of particular barriers. In addition, it may be useful for future researchers to present more specific, finely grained items to learners, rather than the general factors used here, to more precisely identify key perceived barriers/enablers. In addition, the possibility exists that the set of barriers/enablers examined in this study may have been more salient to students in the blended condition than those in the traditional classroom condition.

Finally, this study may be criticized for a lack of ecological validity because we used an educational rather than an organizational training context. However, we believe our results can be generalized to nonacademic settings for several reasons. First, the nature and dynamics of the variables of interest (e.g., perceived barriers and enablers, motivation to learn, and learning) are largely the same in both contexts. Second, study participants were not that different from learners enrolled in blended learning courses in organizations. For example, the students in the blended learning condition reported working an average of 28 hours per week, suggesting that they experienced many of the same pressures as full-time employees trying to fit work-related instruction into their schedules. In addition, the average level of motivation to learn reported by study participants did not differ significantly from levels reported in prior studies conducted in field settings. Third, the courses examined in this study are highly similar to company-supported or even company-delivered educational offerings. Many working adults are taking courses and pursuing undergraduate and graduate degrees to further their careers using a wide range of delivery approaches, including classroom instruction, blended learning, and Web-based distance learning. For example, Capella University (www.capellauniversity.com) offers more than 650 Web-based distance learning courses and has more than 12,000 students, many of them full-time employees. Nonetheless, future research on blended learning in organizational settings is needed to ensure that our results are generalizable to workplace training and development contexts. Despite the above limitations, this study has several important implications for future research and practice which are discussed below.

Implications and Directions for Future Research

Delivery mode. Learners in the blended learning condition were more motivated to learn, engaged in more metacognition, and achieved higher
course grades than learners in the classroom condition. The primary differences were that the technology used in the blended learning condition gave learners more control over when and where they learned and provided them with a larger variety of tools to facilitate learning. Blended learners had to take a more active role in learning, which resulted in greater metacognitive activity. This suggests that the use of both asynchronous and synchronous technology in learning facilitates metacognition, which is important in learner controlled environments where less external structure or feedback is given to guide the learner on how to best progress through training (Schmidt & Ford, 2003). It would be helpful for future research to verify that the observed differences in motivation to learn and metacognition are due to greater learner control and accountability. Research investigating the impact of specific instructional elements on learner control would also be of value. For example, DeRouin, Fritzsch, and Salas (2005) suggest that providing guidance to learners in the form of how to effectively use the control they are given (advisement) or on the content and skills to study and practice during instruction may improve learning and transfer.

Learning goal orientation. Consistent with the extant literature, domain-specific LGO was significantly correlated with motivation to learn and both affective and cognitive course outcomes. In addition, LGO was associated with perceiving features as enablers rather than as barriers, which was predicted given that high LGO individuals tend to view obstacles as opportunities to further develop their skills (Dweck, 1986). A unique finding to this study, however, was that the relationship between LGO and motivation to learn was partially mediated by perceived barriers/enablers. Future research is needed to determine whether motivation to learn is best maximized by enhancing LGO, and hence increasing the likelihood that features will be viewed as enablers, or by directly enhancing perceptions of features as enablers rather than barriers. We also found that perceptions of barriers/enablers had greater impact on course satisfaction (positively for enablers and negatively for barriers) for low LGO learners than high LGO learners. This interaction analysis was exploratory, however, and needs to be replicated. Future research should also examine whether this interaction was due to differences in the regulation of on-task attention. That is, individuals with high LGO may be less concerned with extenuating environmental factors and be better at focusing on learning (e.g., VandeWall et al., 2001).

Barriers and enablers. Perceptions of external features as either a barrier or enabler impacted motivation to learn, course outcomes, and partially mediated the effects of LGO on motivation to learn. All three significant interactions also involved perceived barriers and enablers. In addition to the interaction with LGO discussed above, the relationship between
perceptions of barriers/enablers and affective reactions was stronger for learners in the blended learning condition than for learners in the classroom condition. The form of the interaction was crossed, with learners in the blended condition more satisfied than those in the classroom condition when factors were viewed as enablers and less satisfied than those in the classroom condition when factors were viewed as barriers. This may have been due to the fact that the blended learning condition relied more heavily on technology and required a greater overall time commitment than the classroom condition.

The nature of the perceived barrier/enabler by delivery mode interaction on motivation to learn was somewhat unexpected. The relationship between the perception of environmental factors as enablers rather than barriers was actually more strongly related to motivation to learn for learners in the classroom delivery condition than for learners in the blended learning condition. The form of this interaction was uncrossed, however, with learners in the blended learning condition having higher motivation to learn across the range of perceived barriers and enablers. These interactions need to be interpreted with caution given their exploratory nature. The significant relationships between perceived barriers and enablers and motivation to learn and learning outcomes suggest that it would be useful for future research to focus on identifying additional individual characteristics and situational characteristics that influence perceptions of barriers and enablers in blended learning and Web-based distance learning contexts. For example, future research should identify how different types of interruptions (Jett & George, 2003) impact knowledge and skill acquisition during Web-based distance learning. Learner characteristics (e.g., five-factor model personality traits) may also play a role, such that different learners may react differently to the same types of interruptions.

Motivation to learn. The results suggest that the conceptual model used in this study, an integration of Brown and Ford’s (2002) IPO model of learning and training motivation theory (Colquitt et al., 2000), may be useful for future research on distance learning. Our results confirm the central role of motivation to learn in understanding the effects of learner characteristics, instructional characteristics, and perceived environmental barriers/enablers on learning outcomes. Surprisingly, motivation to learn has been included in few prior distance learning studies. One exception to this was Brown, Reitz, and Sugrue (2005) who examined motivation to learn in their comparison of videoconferencing to classroom instruction. Counter to our findings, the relationship between delivery mode and motivation to learn was not significant in Brown et al. (2005) who instead found a significant interaction between motivation to learn and delivery mode on learning outcomes. Additional research is needed to determine whether differences between blended learning and videoconferencing account for
these discrepant findings. In general, future research should include motivation to learn as either a mediating variable, a potential moderating variable, or as a more proximal dependent variable when attempting to understand for whom and under what conditions alternative instructional strategies are more effective.

Metacognition. Future research also needs to clarify the role of metacognition. In this study, motivation to learn was found to partially mediate the effects of delivery mode on metacognition. Other studies have considered metacognition as a mediator between learner characteristics and knowledge and skill acquisition. For example, Schmidt and Ford (2003) found that learners who engaged in more metacognition gained more declarative knowledge, performed better on a skill-based measure, and had higher levels of self-efficacy. In this study, metacognition was not significantly related to course grades and therefore did not mediate the effects of LGO on knowledge acquisition. Metacognition was significantly related to course satisfaction but did not mediate the relationship between motivation to learn and course satisfaction. Future conceptual and empirical work is needed to clarify whether metacognition is best viewed as an antecedent, parallel process, or consequence of motivation to learn. Research that isolates the use of specific online instructional elements requiring learners to engage in metacognitive activity (e.g., self-assessment to determine what skills most needed practice, evaluation of learning tactics) would also be of value. Finally, additional research is needed that simultaneously examines all aspects of self-regulated learning (cognitive strategy use, motivation, and metacognition). Most research to date, this study included, has focused on metacognition and motivation. The cognitive strategy component involves activities that support the learner’s active manipulation of content. Future research needs to investigate how all three components relate to course outcomes in blended (and Web-based distance) learning programs, and identify which components have the greatest impact on training outcomes (e.g., Kauffman, 2004).

Practical Implications

The study results have several implications for the design of blended learning and creating conditions to ensure that learners in blended learning environments are motivated to learn. The relationship between delivery method and metacognition was partially mediated through motivation to learn and higher levels of motivation to learn were found for learners in the blended learning condition. The primary differences between the blended learning and the classroom condition were the amount of time spent in face-to-face instruction and that the technology used in the blended learning condition gave learners more control over when and where they learned and provided additional tools to facilitate learning. Learners had to take a
more active role in learning, which was directly related to motivation to learn and subsequent metacognitive activity. This suggests that to increase motivation to learn, designers of blended learning courses should consider the use of both synchronous and asynchronous technology to complement face-to-face instruction. Hypermedia learning environments have been criticized as not being conducive to learning because learners may fail to engage in metacognition (e.g., Azevedo, Guthrie, & Siebert, 2004). Our study suggests that blended learning may be a superior to either totally technology driven (hypermedia) or instructor driven (classroom) instruction by facilitating both motivation to learn and metacognition.

The results of this study also point to the important role of perceived barriers and enablers in training effectiveness. Learners using a blended-learning approach were more likely to view external features as barriers than as enablers. In addition, course grades, metacognition, course satisfaction, and motivation to learn were influenced by perceived barriers and enablers. Perceived barriers and enablers also moderated several relationships between learner and instructional characteristics and motivation learn and course satisfaction. These results suggest that for blended learning to be effective, managers should provide employees with dedicated time during their workday for receiving instruction rather than just informing employees of the availability of instruction and placing the burden on them to schedule instruction around other work activities (e.g., Rossett & Schafer, 2003; Zielinski, 2000). Course assistance, including the availability of technology support staff, contact with course facilitators and instructors, and opportunity to interact with peer learners, is also critical for insuring that blended learning is perceived by learners as easy to use and not as a barrier (e.g., Martins & Kellermanns, 2004).

Our results also suggest that LGO influences motivation to learn through its relationship with learners’ perceptions of barriers and enablers. Maximizing LGO is appears to be beneficial for all instructional delivery methods but appears to be particularly important in Web-based distance and blended-learning environments where learners have greater control over when and how learning occurs. Although it is impractical for instructors to hand pick learners who have high trait or domain-specific LGO, instructors should consider assessing LGO during needs assessment. If needed, steps could then be taken to induce a LGO state within the instructional context (e.g., Noe & Colquitt, 2002; Schmitt & Ford, 2003; VandeWalle et al., 2001).

**Conclusion**

This study makes several important contributions to the literature by highlighting the central role of both motivation to learn and learner perceptions of features as barriers or enablers. Few studies have examined
the influence of perceived barriers and enablers on training effectiveness in Web-based learning environments and the results reported here suggest that enhancing trainee perceptions of enablers and addressing concerns about potential barriers are important strategies for enhancing motivation to learn which, in turn, facilitates positive course outcomes. Our results also substantiate the assertion that a better understanding of how the use of technology in the delivery of instruction impacts training effectiveness requires the examination of mechanisms that can account for differences in learning, such as motivation to learn, as well as direct effects of technology on learning. This study provided a direct comparison between blended learning and classroom instruction and supported the notion that blended delivery facilitates motivation to learn more than classroom instruction.

REFERENCES


