Transactional Distance in Online Graduate Courses at Doctoral Institutions

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Abstract

IDEA Student Ratings of Instruction (SRI) were compared in graduate/professional online (*n* =1,210) and face-to-face (*n* = 432) classes offered at 22 doctorate-granting institutions. Grouped by Biglan's classification of disciplines, instructors in soft fields were over five times more likely to employ active learning approaches if the course was taught online than face-to-face. In contract, about 7 out of 10 instructors in hard disciplines relied upon lecture regardless of course format. Online courses were offered less frequently in hard and pure disciplines. A course was more likely to have been taught online if the instructor believed physical facilities and equipment had a negative impact on learning. In addition, students in online classes perceived their instructor expected them to take a greater share of responsibility for learning than did those in face-to-face classes. Taken together, these findings suggest that several dimensions of transactional distance affect the odds of a course being offered online in graduate courses at doctorate-granting institutions.

Keywords: online doctoral education, active learning, transactional distance

Approximately one-third of college students are currently taking at least one online course (defined as at least 80% of the course content being Web-based). The demand for online courses continues to grow as close to 70% of institutions believe online education is "critical to their long-term strategy" (Allen & Seaman, 2013, p. 4). Nonetheless, skepticism about e-learning remains as more than two-thirds of faculty believe students learn less online than in the traditional classroom (Allen, Seaman, Lederman, & Jaschik, 2012). In contrast, three-fourths of higher-education leaders view online courses comparable or superior to those offered face-to-face (Allen & Seaman, 2014). However, most chief academic officers acknowledge faculty do not accept the value and legitimacy of online education (Allen & Seaman, 2013, p. 6), and more than two-thirds believe there will continue to be concerns about quality (Allen & Seaman, 2013).

With this growing trend in online courses accompanied by persistent widespread doubts, we believe it worthwhile to compare student ratings of instruction in online and face-to-face graduate courses at doctorate-granting institutions where the primary course delivery format remains face-to-face accompanied by supplemental online components (Oh & Park, 2009). Specifically, we investigated whether under different course formats students perceive their learning experiences similarly and instructors employ the same approaches to instruction.

Student Ratings in Online and Face-to-Face Courses

Studies of student ratings collected in online and face-to-face classes point toward more similarities than differences (Beattie, Spooner,

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Jordan, Algozzine, & Spooner, 2002; Benton, Webster, Gross, & Pallett, 2010a; McGhee & Lowell, 2003; Wang & Newlin, 2000). Reviewing 76 studies, Tallent-Runnels et al. (2006) found student achievement of learning outcomes was comparable across the two environments. Means et al. (Means, Toyama, Murphy, Bakia, & Jones, 2010) conducted a meta-analysis of 28 studies and found an average effect size (Cohen's *d*) of 0.14 that only slightly favored learning outcomes in online courses. Despite the evidence of substantial comparability, a few authors (Carey, 2001; Means et al., 2010; Phipps & Merisotis, 1999) have pointed out several limitations in the research: questionable reliability and validity of outcome measures, inadequate sample sizes, authors' dual roles as experimenters and instructors, lack of control for extraneous variables, and absence of theoretical frameworks.

The current study addresses these limitations by accessing a large archival database of IDEA student ratings backed by considerable reliability and validity evidence (Benton, Webster, Gross, & Pallett, 2010b; 2010a; Hoyt & Lee, 2002). The sample sizes are large and spread across a wide variety of institutions. No current authors were conflicted with dual roles, as none taught courses contained in the database at the time the study was conducted. Several extraneous variables outside the instructor's control were included in the study: physical facilities and equipment, class size, student desire to take the course, and student typical work habits. Finally, as described in the following sections, three conceptual frameworks guided our work: approaches to instruction, transactional distance, and disciplinary differences.

Approaches to Instruction

Several factors influence the decision about which instructional approach to employ in a given course: goals and objectives, the teacher's personality and philosophy of teaching, and the instructor's abilities (e.g., as a speaker, facilitator) (Svinicki & McKeachie, 2011). Another consideration may be whether the course is taught primarily online or face-to-face. At the doctoral level, for example, are instructors more or less inclined to apply student-centered, active learning approaches in either course format? Do they tend to rely to a greater or lesser extent on lecture if the course is offered face-to-face? We examined these kinds of questions by testing whether the frequency of lecture and active learning approaches differed in online and face-to-face courses.

Lecture, the oldest form of teaching, is still most widely used by college instructors (Neumann, 2001; Svinicki & McKeachie, 2011). Lecture was initially developed as a means for instructors to deliver content prior to the time many textbooks were available (I. M. Jones, 2011). It continues to provide several advantages: to present up-to-date information, to synthesize material from multiple resources, to adapt material to student background knowledge and interests, to elaborate on readings, and to direct student attention to key concepts (Svinicki & McKeachie, 2011).

With the wide availability of printed material easily accessible on the Internet, the need to lecture has been reduced (Jones, 2011). Effective instructors can now employ student-centered, active learning approaches such as discussion, putting aside the more teacher-centered lecture method. They can require students to do, write, think critically, read, and speak (Berge, 2002).

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Active learning approaches (e.g., discussion, skill/activity, lab) can enhance students' learning, motivation (Svinicki & McKeachie, 2011), and engagement (Umbach & Wawrzynski, 2005). When students discuss rather than simply listen, they retain more information, transfer knowledge more effectively, perform better at problem solving, and improve their attitudes and motivation for future learning (Svinicki & McKeachie, 2011). Discussion requires deep thinking on the part of students. They ask and respond to questions, elaborate on key concepts, summarize, and explain. In active learning, students "do" rather than listen. They apply what they have learned, thereby increasing understanding. Examples include writing, computing, conducting experiments, and participating in simulations.

Using a sample that included both undergraduate and graduate students, Benton and colleagues (Benton, Li, Gross, Pallett, & Webster, 2013) found that instructors were less likely to lecture and more likely to facilitate discussion if the course was offered online. Given Benton et al.'s (2013) previous findings, we predicted instructors teaching online graduate/professional courses would be more likely to employ active learning than those teaching face-to-face. They should be more likely to take advantage of interactive technology offered in the online environment and to benefit from andragogy, or student-led discussions, common among adult learners (Knowles, Holton, & Swanson, 2005). We also examined whether active learning would be more common online among certain disciplines, given the varied nature of academic content.

Theory of Transactional Distance

Transactional distance (TD) is the "psychological and communication space to be crossed, a space for potential misunderstanding between the inputs of instructor and those of the learner" (Moore, 1993, p. 22). Since TD can impede learner understanding and outcomes, effective instructors must try to minimize it. Misunderstanding in communication can exist in any instructional context, even in face-to-face settings (Rumble, 1986), but may be more likely in online courses because the instructor and students rarely physically meet one another. Given the inherent separation of space and time, we expect TD to be more prevalent in online courses if teachers and students fail to apply more student-centered teaching and learning strategies.

Moore (1993) identified three clusters of variables that theoretically influence TD: dialogue, structure, and learner autonomy. The first two concern pedagogy and course circumstances, and the third describes behaviors the learner can practice to minimize misunderstanding. The following paragraphs explain factors that influence each element of TD. Although we did not measure TD directly in this study, we examined some of the determining factors so we could understand whether online instructors make extra efforts to reduce TD.

Dialogue. Moore (1993) defined dialogue as positive interactions among instructors and learners that improve students' understanding. Such interactions can reduce TD and lead to students' greater achievement and satisfaction (Marks, Sibley, & Arbaugh, 2005). But interpersonal exchanges are not limited to communications with the instructor; interactions with peer learners are just as critical for reducing TD.

Teaching online requires computer-mediated dialogue in which the lack of contextual cues can generate notable TD unless special measures are

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taken to build relationships with and between students (Dennen, Aubteen Darabi, & Smith, 2007; Dykman & Davis, 2008). Depending on the structure of the course and the extent to which the instructor and students participate in online communication, the online classroom environment could either enhance or reduce course dialogue (S. B. Smith, Smith, & Boone, 2000), which will consequently influence TD experienced by the instructor and learners.

Establishing rapport, one of the teaching style scales in the IDEA Student Ratings of Instruction system (see Table 1), describes student perceptions of interaction, or dialogue, between the instructor and students. Encouraging student-faculty interaction beyond the class (e.g., e-mails, office visits), explaining the reasons for criticisms of students' work, and displaying personal interest in students are behaviors directed toward building rapport. Another IDEA teaching style called fostering student collaboration measures the extent to which instructors encourage dialogue among students. It includes asking students to share ideas and experiences with peers and to help each other, and forming teams or discussion groups (see Table 1). These two active and collaborative teaching styles are intended to enhance student engagement (Umbach & Wawrzynski, 2005), which should theoretically decrease TD.

Other determinants of dialogue measured in the IDEA instrument include class size (i.e., course enrollment), the physical teaching environment (i.e., instructors' perceived influence of physical facilities and equipment on student learning), the teacher's motivation level (i.e., desire to teach the course), and the learner's motivation level (i.e., desire to take the course). When the instructor is enthusiastic about teaching an online course, for example, students tend to be more motivated and engaged (Concannon, Flynn, & Campbell, 2005). Theoretically, TD should diminish when classes are smaller, teaching environments have sufficient facilities, and the instructor's desire to teach and the students' desire to take the course are high (Moore, 1993).

Type of subject-matter discipline (Moore, 1993) can also affect dialogue by influencing the approach an instructor takes to teaching (Braxton, Olsen, & Simmons, 1998; Cashin & Downey, 1995; Hoyt & Lee, 2002; Umbach, 2007). Biglan (1973) proposed a means of distinguishing among academic fields by categorizing them along three dimensions: structure, application, and life orientation. The first two are especially relevant to the current study. Based on discriminant analysis, structure is the most prominent because it distinguishes between "hard" (e.g., engineering, chemistry) and "soft" (e.g., political science, education) disciplines. Hard disciplines typically have better organized and more established theories within their fields. Content tends to be hierarchical and highly structured. Therefore, instruction is typically teacher-centered (Lueddeke, 2003), involving substantial lecture and limited dialogue that lead to greater TD (Benton et al., 2013).

In contrast, instructors in soft fields tend to put more emphasis on active learning strategies (Braxton et al., 1998; Lattuca & Stark, 1995). They are more likely to interact with students, communicate high expectations, and ask questions (Braxton et al., 1998; Umbach, 2007). They take a student-centered approach (Lueddeke, 2003), which should theoretically increase dialogue and reduce TD.

Biglan (1973) labeled the second dimension as application, which distinguishes "pure" (e.g.,

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chemistry, political science) from "applied" (e.g., education, engineering) fields. Applied subject matter deals with practical problems, whereas pure domains are more concerned with accumulating basic knowledge. As with hard disciplines, content in pure fields tends to be highly structured and made up of closely related concepts and principles. In contrast, applied fields' subject matter is typically more loosely organized (Donald, 1983; Neumann, 2001). The more structured content of pure disciplines may incline instructors to more frequently choose lecture than active learning, which should increase TD.

Structure. Moore's (1993) second element of TD, structure, addresses how a course is designed and how well it meets individual learner needs. Structure refers to the flexibility or rigidity of instruction. Highly structured courses with little dialogue theoretically lead to greater TD. Moore (1993) described many structural processes inherent in distance learning programs: presentation, motivation, analytic and critical development, application and evaluation, and learner support. Two IDEA teaching style scales measure how frequently the instructor applies methods that influence some of these processes. Stimulating student interest assesses how frequently the instructor applies teaching methods that influence student motivation, and structuring classroom experience considers aspects of presentation, application, and evaluation (see Table 1). In addition, on the IDEA Faculty Information Form (FIF) instructors report any impact technical/instructional support had on learning, which speaks to learner support. High student ratings on stimulating student interest (i.e., motivation) and structuring the classroom experience along with positive technical/instructional support learner support should be associated with less TD (Benton et al., 2013).

Learner autonomy. Learner autonomy concerns how well the learner operates independently of the instructor (Moore, 1993). Greater transactional distance requires more learner autonomy to bridge gaps in communication. Three items in the IDEA instrument relate to learner autonomy: student perceptions of their typical work habits, perceived effort in the course, and how much the instructor expects students to share in responsibility for learning. To reduce TD, we expected learner autonomy to be greater in online classes.

Purpose and Predictions

The purpose of the current study was to investigate whether elements of transactional distance reflected in student and faculty perceptions distinguish online from face-to-face graduate/professional courses. Drawing upon the TD constructs of dialogue and structure, we examined whether discipline classification (hard, soft; pure, applied) interacted with course format (online, face-to-face) and the instructor's primary approach to teaching (lecture, active learning). We hypothesized that for the purpose of reducing TD, instructors teaching online courses would be less likely to lecture, especially in soft and applied disciplines, and more likely to apply active learning approaches than those teaching face-to-face. Our rationale for these predictions was that instructors teaching less structured content might be more likely to take advantage of the interactive benefits of technology and adult learners' tendencies toward andragogy.

We next investigated whether determinants of TD are related to whether a course is taught online. First, within the dialogue cluster of TD variables, we investigated whether the odds of a

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course being taught online is a function of class size, physical teaching environment, the teacher's motivational level, the learner's motivational level, the subject matter of the course, and student ratings of how well the instructor fostered student collaboration and established rapport. Second, with respect to the TD construct of structure, we tested whether the odds of a course being taught online would change depending on student perceptions of how well the instructor stimulated student interest and structured the classroom experience, and how the instructor rated the effect of technical/instructional support on learning. Finally, with respect to learner autonomy, we examined whether the odds of a course being taught online would vary in response to the amount of student effort in the course, students' typical work habits, and instructor expectations that students share in responsibility for learning.

Method

Data Source

Data came from a subset of IDEA Student Ratings of Instruction (SRI) collected online from 105 institutions during the years 2002 to 2008. A technical report (Benton, Webster, Gross, & Pallett, 2010a) and article (Benton, Li, Gross, Pallett, & Webster, 2013) have been published previously based on analyses of this longitudinal database. The current study addresses new questions and follows guidelines pertaining to reanalysis of published data (American Psychological Association, 2010). For this study, our analyses focused on graduate/professional classes offered online (n = 1,210) and face-to-face (n = 432) in 22 doctorate-granting institutions.

To select courses, IDEA staff asked its users of IDEA Online (the system that powers ratings administered over the Web) to identify which courses were taught on campus (face-to-face), via the Internet (online), or in some combination. Only classes taught exclusively face-to-face or online (i.e., no blended learning) were included in this study. In the current dataset, face-to-face courses had a higher mean response rate (80%) than online courses (63%), although the latter is slightly higher than those reported in other studies (Johnson, 2002; Layne, DeCristoforo, & McGinty, 1999). Average class size was higher for classes taught face-to-face (M = 38.94, SD = 28.07) than online (M = 15.28, SD = 9.79).

Instrumentation

Faculty Information Form. The development of IDEA SRI, one of the oldest and most widely researched student ratings instrument, was in part funded by a grant from the Kellogg Foundation in 1975. IDEA Education is a nonprofit organization that supports the improvement of learning in higher education. In the IDEA system, instructors complete a Faculty Information Form (FIF) for each section taught.[1] They rate each of 12 learning objectives as 3 (essential), 2 (important), or 1 (of minor or no importance). At least one objective must be rated as essential or important. They also indicate which one of eight instructional methods (e.g., lecture, discussion) represents the primary approach taken in the course and whether extraneous course circumstances (e.g., physical facilities, desire to teach the course) had a positive impact (coded as 1), neither a positive nor negative impact (coded as 2), or a negative impact (coded as 3) on learning. Finally, they identify the principal type of student (i.e., lower-level undergraduate, upper-level undergraduate, graduate/professional) enrolled in the course.

[1] A sample questionnaire can be found at http://www.theideacenter.org/sites/default/files/Student-Ratings_Faculty_Information_Form.pdf.

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Student Rating Form. The IDEA Student Ratings of Instruction Diagnostic Form is a 47-item instrument.[2] Students indicate how frequently their instructor used each of 20 teaching methods by responding 1 (hardly ever), 2 (occasionally), 3 (sometimes), 4 (frequently), or 5 (almost always). The 20 teaching methods are conceptually tied to Chickering's and Gamson's (1987) principles of good practice and are comprised of five underlying teaching styles based on factor analysis (Hoyt & Lee, 2002). Students also rate their progress on the same 12 learning objectives the instructor rated for importance. Students respond with 1 (no apparent progress), 2 (slight progress), 3 (moderate progress), 4 (substantial progress), or 5 (exceptional progress). Additional questions concern course characteristics (e.g., amount of reading, amount of non-reading assignments, difficulty of subject matter), student characteristics (e.g., work habits, motivation, effort), overall excellence of the course and instructor, and other teaching methods and instructor standards. The scale for these items ranges from 1 (definitely false) to 5 (definitely true). For information on validity and reliability research conducted on the instrument, see Hoyt and Lee (2002).

Statistical Analyses

We employed log-linear analysis to test possible relationships between types of academic disciplines (i.e., Biglan categorization), course formats (online, face-to-face) and the instructor's primary approach to teaching (lecture, active learning). We performed separate analyses for Biglan structure (hard, soft) and application (pure, applied). We followed up any significant effects by computing 2 × 2 contingency tables, chi-square statistics, Phi coefficients, and odds ratios. We next employed three logistic regression models to examine whether predictors of each element of TD were related to whether a course was taught online. Given the large sample sizes, Type I error rate was set at $\alpha = .01$ in order to not call attention to trivial effects.

Results

Biglan Categorization by Course Format and Primary Approach to Instruction

Two primary approaches to instruction—lecture and active learning—were analyzed to examine whether their use varied first by discipline structure (hard = 0, soft = 1) and course format (face-to-face = 0, online = 1). The approach to instruction was considered active learning if the instructor primarily employed discussion, seminar, skill/activity, laboratory, field experience, studio, or practicum/clinic. A total of 318 classes were excluded from this analysis because 27% of faculty either chose not to indicate their primary approach or selected the response "other." The three-way log-linear analysis produced a model that retained all effects, likelihood ratio X^2 (0) = 0, $p = 1$. The three-way interaction was significant, X^2 (1) = 13.70, $p < .001$. (See Tables 2 and 3 for frequencies of classes within each categorical level.) As a follow-up, we separately computed chi-square tests and odds ratios on frequencies of course format by instructional approach for hard and soft disciplines.

Within soft disciplines there was a significant relationship between course format and instructional approach, X^2 (1) = 46.27, $p < .001$. If a course was offered online, the instructor was five times (odds ratio = 5.08) more likely to use active learning approaches. In contrast, no association

[2] A sample questionnaire can be found at http://www.theideacenter.org/sites/default/files/Student_Ratings_Diagnostic_Form.pdf.

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was found between course format and instructional approach within hard disciplines. About 7 out of 10 of instructors in hard disciplines relied upon lecture regardless of whether the course was taught online or face-to-face.

Next, we examined whether the primary approach to instruction varied by discipline application (pure =0, applied =1) and course format. The three-way log-linear analysis produced a model that retained all effects, likelihood ratio X^2 (0) = 0, p = 1, but the three-way interaction was not significant, X^2 (1) = 3.59, p > .05. Therefore, instructor decisions about whether to employ lecture versus active learning in online and face-to-face classes did not depend on whether the content was pure or applied. However, the Instructional Approach by Course Format interaction was significant, X^2 (1) = 136.85, p < .001. Instructors were more likely to lecture in face-to-face classes regardless of whether the discipline was pure or applied.

Results of Logistic Regressions

We tested three logistic regression models to detect explanatory variables that either decreased or increased the likelihood of a course being taught online. The explanatory variables were the previously described TD determinants of dialogue, structure, and learner autonomy. (Table 4 presents means and standard deviations for all continuous variables in the models.)

Model 1 (Dialogue). The fit statistics indicated the model with predictors was a better fit than the intercept-only model, Likelihood ratio = X^2 (8) = 767.27, p < .0001. (Table 5 presents Wald chi-square statistics and regression coefficients for all variables entered into the model.) Several explanatory variables were significant (p < .01): class size (b = -.06), hard-soft distinction (b = -2.75), pure-applied distinction (b = -.75), and physical facilities and equipment (b = .23). As class size increased, the course was somewhat less likely to have been taught online (odds ratio = .94). In hard disciplines, classes were over 15 times less likely to have been taught online (odds ratio = .064). In pure disciplines, they were over two times less likely to be taught that way (odds ratio = .47). A course was 1.26 times more likely to have been taught online if the instructor believed physical facilities and equipment had a negative impact on learning. Wald statistics were not significant for fostering collaboration, establishing rapport, the instructor's desire to teach the course, and the students' desire to take the course.

Model 2 (Structure). The model was a good fit, Likelihood ratio = X^2 (3) = 13.24, p < .005. However, Wald chi-square statistics did not reach the α = .01 level of significance for any of the explanatory variables (see Table 5).

Model 3 (Learner Autonomy). The model was statistically significant, Likelihood ratio = X^2 (3) = 191.96, p < .0001. The class was over 10 times more likely (odds ratio = 10.54) to have been taught online if the instructor expected students to take their share of responsibility for learning (b = 2.36). Students in online classes (M = 4.63, SD = .31) rated their instructor higher on this expectation than did students taking the class face to face (M = 4.37, SD = .33). Students' typical work habits and effort did not affect the odds of a course being taught online (see Table 5). Although online instructors expected students to share more in the responsibility for learning, their students did not report more effort than did students in face-to-face classes.

Discussion

The results of the current study suggest several dimensions of transactional distance affect the odds of a course being offered online in

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graduate courses at doctorate-granting institutions. The log-linear analysis revealed a three-way interaction of discipline structure, course format, and primary teaching approach. If a course falls within soft discipline and is taught online, instructors are more likely to employ active learning than if taught face-to-face. This finding replicates what Benton et al. (2013) found in a larger sample of online classes that included all student levels and diverse types of institutions. When teaching a course online, instructors in soft disciplines are less likely to rely on a teacher-centered approach (i.e., lecture) and more likely to adopt student-centered methods that involve active learning (e.g., discussion and skill/activity). TD should be lower in such situations because teaching approaches encouraging active learning are theoretically more likely to enhance dialogue over that achieved by lecturing.

Dialogue and learner autonomy, two of the three clusters of TD variables entered into logistic regression modeling, contributed to understanding the difference between online and face-to-face courses. The most important indicator of dialogue was disciplinary distinction. Courses offered in hard and pure disciplines, which share in common highly organized content, were less likely to have been offered online, which confirms what was found previously (Benton et al., 2013). We suspect a greater percentage of instructors in those disciplines find the online environment less suitable for highly structured subject matter. In addition, instructors who believed physical facilities/equipment had a negative impact on student learning were more likely to have taught an online course, confirming previous findings (Benton et al., 2013). Because online courses require substantial technological support, online instructors might be more likely to be affected by poor facilities and equipment. Future research should investigate which aspects of facilities and equipment online instructors perceive as insufficient.

Some aspects of dialogue did not affect the odds of a course being taught online. Student ratings of how frequently the instructor fostered student collaboration and established rapport did not differ between online and face-to-face courses. In addition, class size had only a small impact. Moreover, neither the instructor's desire to teach the course nor the students' desire to take the course distinguished online courses.

With respect to the TD concept of learner autonomy, students in online courses were much more likely to say the instructor expected them to take their share of responsibility for learning, confirming what Benton et al. (2013) found. We consider it to be evidence of the instructor's awareness of the greater needs for students' autonomy in online courses. The self-directed, autonomous nature of the online learning environment (LeNoue, Hall, & Eighmy, 2011) means students were held more accountable for their portion of the learning process. However, student self-perceptions of how hard they typically work and their effort in the current course were unrelated to whether or not they were enrolled in an online course.

Structure, the third element of TD, did not increase the odds of a course being offered online. Student perceptions of how well the instructor stimulated student interest and structured the classroom experience had no meaningful effect. Similarly, the instructor's perception of how technical/instructional support affected learning did not distinguish course formats.

The current findings differ in some ways from previous research (Benton et al., 2013), which

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may speak to the unique nature of online graduate education. First, Benton et al. (2013) found students in a larger sample, which included all student levels and diverse types of institutions, perceived online instructors somewhat less successful in establishing rapport. IDEA teaching methods associated with rapport include encouraging student-faculty interaction outside of class, finding ways to help students answer their own questions, explaining reasons for criticisms of students' academic performance, and displaying personal interest in students. In doctorate-granting institutions, however, graduate students observed the same amount of rapport building across course formats. Notably, the average class size was only somewhat less in the online classes in the current study (15 students) compared to Benton et al. (20 students). Therefore, it is unlikely differences in class size contributed greatly to the differences in outcomes. Apparently, graduate-level instructors exhibit comparable rapport-building techniques regardless of whether they teach online or face-to-face.

Another finding different from previous research is that students in the current study believed instructors in online and face-to-face courses did not differ in how frequently they tried to stimulate interest. In contrast, Benton et al. (2013) found students perceived online instructors did relatively less to inspire them and stimulate them to intellectual effort, and they less frequently introduced stimulating ideas and demonstrated the importance of the subject matter. No such differences were observed between course formats in graduate/professional courses.

The current findings differed in a third way. In the Benton et al. (2013) study, students perceived that online instructors did a better job of structuring the classroom experience by clarifying how each topic fit into the course and explaining course materials clearly and concisely, which influence clarity of presentation. They also perceived greater instructor attention to keeping students up-to-date in their work and to providing more frequent and timely feedback, which relate to evaluation. We found no differences in these teaching styles in the current study.

In summary, findings from this study suggest active learning in online graduate classes offered at doctorate-granting institutions is more likely to be found in soft and applied disciplines than in hard and pure fields. More to the point, online classes in this study were less likely to be found at all in hard and pure disciplines. Unfortunately—and what deserves further study—is that faulty physical facilities and equipment are more likely to negatively affect learning in online than face-to-face classes. Finally, students in online courses are more likely to say the instructor expected them to take their share of responsibility for learning, although they report making no more effort in the course.

On the one hand, we found it encouraging that instructors teaching online exhibited awareness of the limitations and opportunities offered by web-based learning. They tended to adopt active-learning strategies to maximize the interactive characteristics of online technology, acknowledge the limitations of inadequate physical facilities and equipment on student learning, and expect students to be autonomous learners in online courses. According to the theory of transactional distance, all these can contribute to the reduction of TD. On the other hand, instructors in online graduate courses were no more likely than those in traditional classes to behave in ways that might reduce TD, such as stimulating student interest,

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establishing rapport, fostering student collaboration, and structuring the classroom experience.

We must acknowledge several limitations of the current study. First, our data were restricted to classes that used the IDEA SRI. We did not include other indicants of teaching effectiveness (e.g., instructor self-ratings, ratings by peers, alumni) or other measures of TD clusters. Our investigation of teaching approaches was also limited to those found in the IDEA Faculty Information Form. Researchers should investigate other teaching methods not included in the IDEA instrument. Second, many of the classes in the IDEA database were excluded because we could not categorize them as exclusively online or face-to-face. Third, we compared different classes and instructors across course formats. We did not pair classes taught by the same instructor, which would have reduced within-subject variance and increased statistical power. Finally, future researchers may want to undertake qualitative approaches to uncover the unique approaches instructors take when applying teaching styles online.

The current findings indicate several dimensions of transactional distance are related to whether or not a graduate course is taught online at doctorate-granting institutions. Online instructors are adapting to the many challenges they face in trying to reduce transactional distance by fostering active learning and greater learner autonomy. Might they do even more by practicing some of the teaching methods theoretically connected with reduced TD, such as stimulating student interest, providing greater course structure, and fostering collaboration? Perhaps it's worth a try.

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Table 1

Teaching Method Subscales on the IDEA Student Ratings Diagnostic Form

I. Stimulating Student Interest
4. Demonstrated the importance and significance of the subject matter
8. Stimulated students to intellectual effort beyond that required by most courses
13. Introduced stimulating ideas about the subject
15. Inspired students to set and achieve goals which really challenged them
II. Fostering Student Collaboration
5. Formed "teams" or "discussion groups" to facilitate learning
16. Asked students to share ideas and experiences with others whose backgrounds and viewpoints differ from their own
18. Asked students to help each other understand ideas or concepts
III. Establishing Rapport
1. Displayed a personal interest in students and their learning
2. Found ways to help students answer their own questions
7. Explained the reasons for criticisms of students' academic performance
20. Encourage student-faculty interactions outside of class (office visits, phone calls, e-mail, etc.)
IV. Encouraging Student Involvement
9. Encouraged students to use multiple resources (e.g., data banks, library holdings, outside experts) to improve understanding
11. Related course material to real life situations
14. Involved students in "hands-on" projects such as research, case studies, or "real-life" activities
19. Gave projects, tests, or assignments that required original or creative thinking
V. Structuring Classroom Experience
3. Scheduled course work (class activities, test, and projects) in ways which encouraged students' to stay up-to-date in their work
6. Made it clear how each topic fit into the course
10. Explained course material clearly and concisely
12. Gave tests, projects, etc. that covered the most important points of the course
17. Provided timely and frequent feedback on tests, reports, projects, etc. to help students improve

Table 2

Frequency of Instructional Approach by Biglan Structure and Course Format

	Face-to-Face (*n* = 271)		Online (*n* = 898)	
Biglan Structure	Lecture	Active	Lecture	Active
Soft discipline	36	36	110	559
Hard discipline	153	46	159	70

Table 3

Frequency of Instructional Approach by Biglan Application and Course Format

	Face-to-Face (*n* = 271)		Online (*n* = 898)	
Biglan Structure	Lecture	Active	Lecture	Active
Applied discipline	168	66	240	570
Pure discipline	21	16	29	59

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Table 4

Means and Standard Deviations for Continuous Variables in the Logistic Regression Models

	Course Format			
	Face to Face		Online	
Variable	*M*	*SD*	*M*	*SD*
Foster collaboration	3.97	.64	4.13	.74
Establish rapport	4.17	.51	4.19	.60
Student motivation	3.71	.55	3.69	.57
Stimulate interest	4.17	.49	4.25	.55
Structure classroom experience	4.17	.51	4.27	.56
Student effort	3.70	.58	3.84	.54
Student work habits	3.85	.30	3.95	.38
Student responsibility for learning	4.37	.33	4.63	.32

Table 5

Results of Logistic Regression Models

Variables		*b*	X^2
Model 1			
	Fostering collaboration	0.14	0.99
	Establishing rapport	-0.08	0.15
	Course enrollment	-0.06	128.48*
	Biglan structure	-2.75	216.64*
	Biglan application	-0.75	8.64*
	Physical facilities	0.23	7.76*
	Desire to teach course	0.02	0.02
	Student motivation	0.03	0.05
Model 2			
	Stimulating interest	-0.16	0.46
	Structuring classroom	0.48	4.05
	Technical support	-0.07	1.49
Model 3			
	Student effort	-0.11	0.81
	Student work habits	0.23	1.50
	Instructor expectations	2.36	137.58*

*$p < .01$

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