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THE EFFECT OF TRANSACTIONAL DISTANCE ON STUDENTS' PERCEPTIONS OF COURSE QUALITY AND INSTRUCTOR EFFECTIVENESS IN ONLINE LEARNING

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ABSTRACT

THE EFFECT OF TRANSACTIONAL DISTANCE ON STUDENTS' PERCEPTIONS OF COURSE QUALITY AND INSTRUCTOR EFFECTIVENESS IN ONLINE LEARNING

Andrew G. Mungai

This study explored students' perceived course quality and instructor effectiveness as a function of course structure, dialogue/interaction, and learner autonomy in an online learning environment. Using Moore's (1993) theory of Transactional Distance (TD) as a conceptual framework, the researcher collected data from postsecondary learners (N = 1049) across the USA who took online courses between Fall 2014 and Fall 2018. The highest percentage of participants, 48.2%, were aged between 25 to 34; 26.0% were 35 to 44; 11.4% were 18 to 24, while the rest were 45 and above. Of the total respondents, 54.5% were male, 45% were female, and .5% were of other gender. The sample by race consisted of 62.2% White; 22.8% Black or African American; 7.3% Asian or Pacific Islander; while the rest broke into Hispanic or Latino 5.5%; American Indian or Alaskan Native .9%; Other Race .9%; while .4% preferred not to answer. The study adopted a quantitative, non-experimental, survey approach in the identification of TD factors that influenced or best predicted course quality and instructor effectiveness from the students' view. All participants completed a Course Quality and Instructor Effectiveness (CQIE) survey as a measure of transactional distance (18 items), course quality (2 items), and instructor effectiveness (2 items). Path analysis was employed to assess the conceptual model, while Pearson's correlation and multiple linear regression were applied as key data analysis techniques. The momentous study categorically established that TD exhibited significant, positive, and strong correlations

with course quality ($r = .610$, $N = 1038$, $p < .001$) and instructor effectiveness ($r = .656$, $N = 1019$, $p < .001$ with 99% confidence. Most importantly, the study demonstrated that TD dimensions (course structure, dialogue/interaction, and learner autonomy) were predictive of course quality (F (3, 1036) = 205.95, $p < .001$, R^2 of .374) and instructor effectiveness (F (3,1024) = 276.21, $p < .001$, R^2 of .448). Transactional distance explained 37% of course quality variance and 45% of instructor effectiveness variance. Based on the findings, educationists should always consider the role of transactional distance in online programs development and delivery.

"Only in God may we trust; all others must have data" (Reynolds, 1983, p. 257).

DEDICATION

This work is dedicated to Natasha Mungai and Rachel Mungai for the endless sacrifices forced upon the little angels when daddy went to school.

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CHAPTER 1: INTRODUCTION

Traditionally, distance education involved correspondence courses where the student interacted with the school via post. Today, distance education is synonymous with online teaching or online learning. There has been incredible growth in online courses and programs. As far back as 2003, researchers had noted that in the effort to meet the needs of the student body, online learning was introduced in many institutions globally to increase revenue, to attract more students, to reduce pressure for more faculty, and to sort out the diminishing space challenge (Watts, 2003). Online courses have also grown in importance, and many universities across the USA now consider them necessary strategically. Ginder, Kelly-Reid, and Mann (2019) analyzed data from the U.S. Department of Education, National Center for Education Statistics, and found that: by 2017, there was a total of 20,135,159 students enrolled at American degree-granting postsecondary institutions, with 6,657,460 (33.1%) taking distance education courses. The number of students pursuing at least one, but not all, of student's courses via distance education was 3,552.581 (17.6%), while those exclusively taking distance education courses were 3,104,879 (15.4%). Much recently, the novel coronavirus (COVID-19) forced migration of teaching and learning from face-to-face to online learning across all levels - and all institutions - of education, accentuate the critical importance of distance education. Unfortunately, while the growth has been tremendous and impressive, studies still show that crucial stakeholders (faculty, academic leaders, the public, and employers) have continued to perceive online degrees as less quality and valuable than traditional degrees. They opine that students without strong educational backgrounds are less likely to complete fully online courses or perform poorly. High-quality classes are expensive to

produce and maintain, and the lack of enough student-faculty interaction is a significant impediment (Protopsaltis & Baum, 2019).

Purpose of the Study

This study was purposed towards establishing the effect of transactional distance on students' perceptions of course quality and instructor effectiveness in online learning. The study was conducted in the USA on college students who had an online learning experience. The period under consideration was Fall 2014 to Fall 2018.

Many strategies have been applied in efforts to evaluate course quality and instructor effectiveness in online education settings. Literature abounds with factors forwarded as possible considerations towards teaching effectiveness, including learning outcomes or objectives, student assessment and measurement, learning resources and materials, learner interactions, institutional technology and support, learner skill levels, and instructors' philosophical perspectives. This research effort posits that the psychological and communications gap (transactional distance), which is inherent in separated teaching and learning activities, may hinder imparting knowledge and skills. In the effort to improve online learning, it is incumbent upon educationists to research and comprehend the effects of transactional distance, and one strategy may involve the gathering and analysis of students' opinions. Online learners' viewpoints may provide in-depth and worthwhile information on student preferences that affect online learning (Kuo, Walker, Belland, & Schroder, 2013). A greater understanding of learners' perceptions of the online learning environment leads educational designers to develop quality online courses that decrease the sense of transactional distance experienced by learners (Barbour & Plough, 2012).

Theoretical Framework

The study applied Moore's (1993a) Transactional Distance Theory (TDT) to evaluate teaching effectiveness in online learning. Moore's theory provides the conceptual anchoring for measuring course quality and instructor effectiveness through its dimensions of dialogue, structure, dialogue, and learner autonomy, as perceived by online learning students. It may be assumed that, predictively, the smaller the transactional distance, the better is the course quality and instructor effectiveness.

Significance of the Study

The continued interest and rapid uptake of online education herald its potential as a channel of learning. Therefore, quality evaluation systems build in the opportunity for sustained improvement of online education in all its dimensions. This study provides a basis to gauge whether quality standards are met, and where inconsistencies are identified, corrective measures are recommended. Online educators have an inherent responsibility to provide quality services to their online students who invest heavily in time, money, and effort. The determination of the level of quality of online courses, programs, and related services is essential to meeting the desired student and institutional outcomes.

The advent of the novel coronavirus pandemic (COVID-19) at the end of December 2019 is a stark reminder of the importance and the challenges of online learning. In the effort to break transmission channels for COVID-19, public health experts advised government officials to take drastic measures across national populations, including social distancing, self-isolation, or quarantine; and working at home. Postsecondary institutions were not exempt when educational institutions' closure, to

reduce the spread of infectious disease in the community, was implemented. To the credit of many institutions, and under challenging circumstances, rapid expansion and transition of various courses and programs from face-to-face to online delivery (Gewin, 2020; Lau, Yang, & Dasgupta, 2020) was witnessed. Unfortunately, hundreds of lawsuits against universities have arisen, many of which allege that "online instruction is not commensurate with the same classes being taught in person." Others argue that "common sense would dictate that the level and quality of instruction an educator can provide through an online format is lower than the level and quality of instruction provided in person." Other proceedings allege that “Education delivered online is of a lower "level and quality" than what can be provided in person. The "true college experience" requires face-to-face interaction between students, mentors, professors and peers, access to labs and libraries, and "hands-on learning and experimentation" (*Ritter v. UC Berkley*, 2020). The findings of the current study may contribute to future implementations of online learning in addressing some of the quality concerns identified by such litigations.

Way before COVID-19, it is also crucial to note that Protopsaltis and Baum (2019) found that key stakeholders, including faculty, academic leaders, employers, and the public, were still doubtful of its quality value of online education. Most seem to view online learning as inferior to traditional brick and motor approaches. This study would serve well to allay or confirm such fears.

Just as other industries realized earlier, the critical determinants of success or failure in online offerings are not merely website presence and functionality but also includes the service quality (Zeithaml, 2002). It may be understood as an overall student assessment and judgment of online learning delivery in the virtual knowledge space.

There is a paucity of and a lack of currency in studies that utilize transactional distance dimensions to analyze students' evaluation of teaching effectiveness in online learning in higher education scenarios. It is a gap that this study endeavored to bridge. Consistent with the avenues for further research identified in the journal articles reviewed, the dissertation considered diversified subject areas and utilizing larger samples. Further, the application of the three dimensions of TDT augmented the plethora of existing research efforts that seem to study dialogic interactions predominantly.

Research Questions

Four research questions guided this study. The four tie the pillars of TDT to the possible outcome variables of teaching effectiveness. The measures of course structure, dialogue/interaction, and learner autonomy may be viewed as the independent variables and predictors. Course quality and instructor effectiveness measures may be assumed to be the dependent variables and outcomes.

1. Research Question 1: Does a statistically significant relationship exist between transactional distance and students' perceptions of course quality in online learning? The null hypothesis being, ($H1_0$: $\rho = 0$), there is no association between transactional distance and students' perceptions of course quality in online learning, and the population correlation coefficient is therefore 0. The alternative hypothesis ($H1_1$: $\rho \neq 0$) is that the population correlation coefficient is not 0. The implication is that there is an association between transactional distance and students' perceptions of course quality in online learning.
2. Research Question 2: Does a statistically significant relationship exist between transactional distance and students' perceptions of instructor effectiveness in online

learning? The null hypothesis being, ($H2_0$: $\rho = 0$), there is no association between transactional distance and students' perceptions of instructor effectiveness in online learning, and the population correlation coefficient is therefore 0. The alternative hypothesis ($H2_1$: $\rho \neq 0$) is that the population correlation coefficient is not 0. The implication is that there is an association between transactional distance and students' perceptions of instructor effectiveness in online learning.

3. Research Question 3: To what extent is transactional distance predictive of students' perceived course quality in online learning? The related null hypothesis ($H3_0$: $\beta_1 = \beta_2 = \beta_3 = 0$) is that the population correlation coefficients are all 0, implying transactional distance is not predictive of students' perceived course quality in online learning. The alternative hypothesis ($H3_1$: $\beta_i \neq 0$) is that at least one population correlation coefficient is not 0, indicating that either one, a combination, or all transaction distance variables predict a student's perception of course quality.
4. Research Question 4: To what extent is transactional distance predictive of students' perceived instructor effectiveness in online learning? Consequently, the null hypothesis ($H4_0$: $\beta_1 = \beta_2 = \beta_3 = 0$) is that the population correlation coefficients are all 0, implying transactional distance is not predictive of students' perceived instructor effectiveness in online learning. The alternative hypothesis ($H4_1$: $\beta_i \neq 0$) is that at least one population correlation coefficient is not 0, indicating that either one, a combination, or all transaction distance variables predict a student's perception of instructor effectiveness.

Design and Methods

This study's approach is quantitative in design, non-experiment in type, and applies correlational and regression data analysis techniques. Student Evaluation of Teaching (SET) survey questionnaires will be administered to students who have completed various online courses. Statistical analysis and tabulation will be conducted to determine students' perceptions of course quality and instructor effectiveness.

Definition of Terms

- **Online Learning:** Broadly, online education refers to the pedagogical acquisition of knowledge through Internet-based instruction. Online learning is the utilization of the Internet to access learning materials; interact with the content, instructor, and other learners; and obtain support in the acquisition of knowledge, construct meaning, and grow from a learning experience, Ally (2004).
- **Transactional Distance:** Moore (1991, p.3) defines it as "a psychological and communication space to be crossed, a space of potential misunderstanding between the inputs of instructor and those of the learner." Transactional distance involves the psychological, not the geographical, gap between students and the teacher, which may be traversed through the appropriate balance of dialogue, structure, and learner autonomy (Moore & Kearsley, 2005). Therefore, it refers to a distance of understandings and perceptions that may lead to a communication gap or a psychological distance between participants in the teaching-learning situation.
- **Learner Autonomy:** The extent to which in the teaching/learning relationship, it is the learner rather than the teacher who determines the goals, the learning experiences, and the evaluation decisions of the learning program (Moore, 1993).

- **Course Quality:** Specific to quality, there exists a plethora of definitions and understandings of what it entails in education circles. Quality may be assumed to exist in a course if it effects positive change in student learning (affective, cognitive, and psychomotor domains) and personal and professional potential (Bobby, 2014).
- **Instructor Effectiveness**: How well an instructor can best direct, facilitate, and support students toward certain academic ends, such as achievement and satisfaction. (Gorsky & Blau, 2009)
- **Student Evaluation of Teaching (SET):** An assessment used to measure student opinions of the course and instructor effectiveness.
- **SET Dimensions:** The dimensions of effective teaching that the SET instrument included within its items. Some aspects were measured by one item, while others were measured by more than one.
- **Constructivist learning:** Constructivism is an approach to teaching and learning based on the premise that cognition (knowledge) results from "mental construction."

Conclusion

The sections of chapter one provided the background that makes this study necessary, a statement of the problem in a succinct purpose, a brief theoretical framework, and the study's significance. Additionally, the chapter laid out the research questions, previewed the design methodology, and terminated with the operational definitions of key terms used in the study. Chapter two endeavored to anchor the study into theory and examined empirical evidence supporting emergent fundamental themes.

CHAPTER 2: REVIEW OF RELATED RESEARCH

Introduction

Chapter one provided the background that made the study necessary, a statement of the problem in a concise purpose, the theoretical guide, the study's significance, and the operational definitions of some terms used in the study. Chapter two discussed the themes arising in the efforts to provide a more detailed theoretical and empirical anchoring to the study. It revisited the theory guiding the study, the critical thematic tenets that emerged, and evidence of application in previous related studies. It finally built a conceptual context for the current study.

Transactional Distance Theory

Within the last three decades, distance education has been formalized into a discipline. As a testament to this, there now exists a number of seminal theories on distance education. The most discussed seem to be Peter's (1993) industrial model; Holmberg's (1989) theory of distance education; Keegan's (1993) theory of reintegration of teaching acts; Garrison's (1989) theory of communication and learner control; Verduin and Clark's (1991) three-dimensional theory; and Moore's (1993) transactional distance theory. With the passage of time, the transactional distance theory has gained considerable traction over the other five. Moore (1993a) is a discourse on "transactional distance," or the teacher-learner detachment that develops when teacher and student are disconnected by space and time. Transactional distance is a psychological and communication expanse that exists between an instructor and the learner. He contends that the divide severely affects both teaching and learning because the psychological and communication "space" to be crossed may give rise to misunderstandings. He notes that transactional distance is a relative and not an absolute term because it may also exist in

the traditional classroom. This space between a learner and a teacher can be bridged through constructive interactions, thoughtful course design, and enabling student independence. This study applies Moore's (1993) transactional distance theory (TDT) to evaluate teaching effectiveness in online learning as perceived by learners. Moore's approach provides the conceptual anchoring for the measurement of course quality and instructor effectiveness through its dimensions of dialog, structure, and learner autonomy.

- ***Dialog/Dialogue*** is the extent to which the learner, the program, and the educator are able to respond to each other (Moore, 1983). It is multifaceted and captures the student's interactions with the teacher, the content, and other students. It is the exchange of words and other symbols to aid in improved understanding and knowledge construction.
- ***Structure*** is a measure of an educational program's responsiveness to a learners' individual needs (Moore, 1983). It analyses the curricula and course design to measure responsiveness to a learner's individual needs and preferences. The aspects of concern are flexibility and rigidity and are evidenced in the constructs of sequence, contents, themes, objectives, teaching, and assessment.
- ***Learner autonomy*** describes the student's role, the degree of freedom, and self-management to determine learning goals, process, and evaluation. A researcher may find it worthwhile to learn how much and what kind of autonomy does a program gives to the learner.

Moore's transactional distance theory provides a basis for measuring course quality and instructor effectiveness in its facets of dialog, structure, and autonomy as perceived

by online learning students in the current study. TDT is a useful and appropriate framework for analyzing and describing online learning and teaching environment.

Figure 1

A 3D Model of Transactional Distance

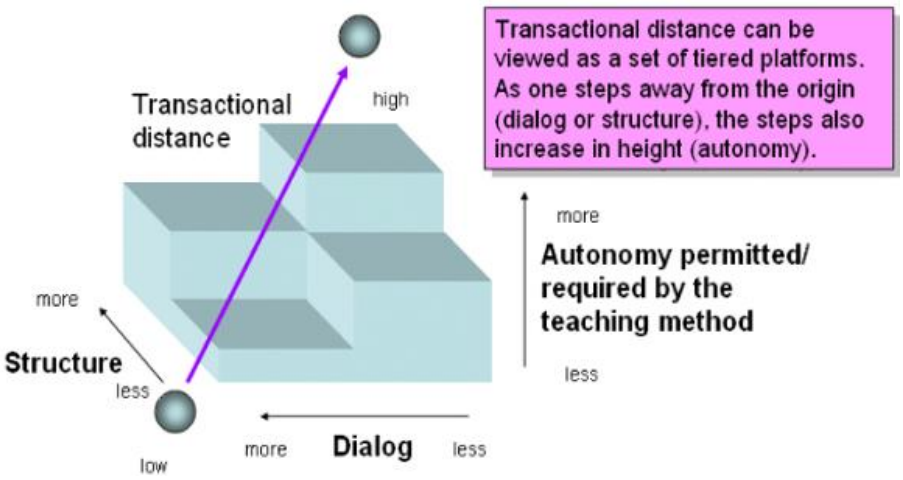


Figure 1 (produced by Michael Moore) suggests that as structure increases and dialogue decreases, learner autonomy and transaction distance increase. It may be assumed that the smaller the transactional distance theory, the better is the course quality and instructor effectiveness. Moore (1991) suggested that dialogue (D) and structure (S) are inversely related. High levels of structure (+S) combined with limited or low dialogue levels (−D) contribute to high transactional distance. Increasing dialogue (D) then becomes a significant implication for design, though this is influenced by the third variable, learner autonomy (A).

Benson and Samarawickrema (2009) claim that TDT provides one way of analyzing the learning and teaching milieu by considering it in terms of the separation between learners and between teacher and learners. They add that TDT provides a means

of examining how design elements can be addressed based on the teacher's knowledge of the learning and teaching context. Kawka, Larkin, and Danaher (2012) suggested that structure, dialogue, and learner autonomy are elements from the domain of distance education, which can be utilized to understand emergent learning environments. Best and Conceição (2017) sought to test the theory via learners' discernment and intent to return for other e-learning experiences –consistent with the theory's focus – and claimed to have achieved experimental validity of the TDT theory. The significant prominence of TDT is recognized in other works too. Garrison (2000) contends that TDT is inestimable in guiding the rational process of teaching and learning at a distance. Jung (2001) proclaims that TDT provides a valuable theoretical framework for defining and understanding distance education; and is a source of research hypotheses.

It may thus be surmised that TDT is useful in the study of online education contexts. TDT is an adequate and reliable framework to analyze course quality and instructor effectiveness. High levels of dialogue/interaction are desirable for learning. Dialogue has an inverse relationship to the course structure. A desirable quality in courses and effective instruction aims at reducing the transaction distance.

Dialogue/Interaction

Teachers and learners develop dialog in the course of the interactions that occur when one gives instruction and the others respond. The term 'dialog' is used to describe an interaction, or series of interactions, with positive qualities that some interactions might not have. Interaction may be understood to encompass the exchange of information and thoughts between two transacting objects or events that influence each other (Beldarrain, 2008; Moore, 1989). Dewey (cited in Anderson, 2003) defined interaction as

a vital component of the education through which a student converts information into knowledge. A dialogue is consequently purposeful, constructive, and valued by each party. Each participant in a dialogue is a respectful and active listener; each contributes and builds on other parties' inputs. Though there may be harmful or neutral interactions; the term 'dialog' is mostly reserved for positive interactions, with the value placed on the synergistic nature of the parties' relationship. The direction of the dialogue in an educational relationship is towards the improved understanding of the student.

Ekwunife-Orakwue and Teng (2014) conducted a study that measured how student interactions in online and blended learning environments affected student learning outcomes when measured by student satisfaction and grades. The study hypothesized that: increased dialogue would produce improved student learning, the form of dialogue that occurred would influence the degree of improvement in student learning outcomes that are observed, individual differences would moderate the relationship between dialogue and outcomes, and differences in the modality of content delivery and media richness would moderate the relationship between dialogue and outcomes. The study was underpinned by Moore's (1993) transactional distance theory (TDT). Moore termed the perceived distance that arises as a result of attitudinal changes to an object of interaction as transactional distance and defined it as a psychological and communications space (in which there exists "potential misunderstanding between the inputs of instructor and those of the learner") created by the separation of learners and instructors. Data were obtained from 342 online, and blended students between 2010 and 2013 enrolled in three programs: Technological Systems Management (TSM), Global Operations Management, and Electrical Engineering (E.E.). The sample was 57.9% male

and 41.8% female; 7.6% African Americans, 24.3% Asian American, 46.5% White, 9.1% Hispanic, 4.4% Chinese, and 2.6% Asian-Indian; 72.5% (248) were undergraduates, and 26.3% (90) graduates. The average age was 26.5 years. Technology and Society participants comprised 43.3%, SPD 15.8%, EE 3.5%, Nursing .6%, Professional Education 3.2%, College of Business .9%, Math .3%, and others 32.5%. The dialogue was measured as student interactions with other students, the instructors' technologies, and the course contents.

Student satisfaction was measured using the Strachota (2003) instrument, labeled as General Satisfaction (GSAT), and computer self-efficacy used the tool developed by Cassidy and Eachus (2002). GSAT ($\alpha = .90$) is a six-item survey measuring student satisfaction in both online learning environments. The grade was measured as the final assessment score received in the course. Confirmatory Factor Analysis was used to structure the measurement model for dialogue: Cronbach's alpha reliability coefficient was above .89, and factor loadings were above .54 on the related interaction construct/factor. Standard multiple regressions were performed with GSAT and student final course grades as the dependent variables. The findings in this study show that: students may interact with course contents more frequently than they interact with their instructors and other learners, and student-content interaction had a more significant impact on student academic achievement than other forms of dialogue. Results supported the suspected contribution of dialogue to increased student satisfaction, but not to final course grades. Learner-Content and Learner-Technology were found to be more critical in predicting GSAT than Learner-Instructor and Learner-Learner. Learner-Content

interaction (38%) to GSAT was almost twice the contributions of other forms of dialogue.

Best and Conceição (2017) explored the impact of transactional distance dialogic interactions on student satisfaction in an international blended learning master's degree program. Moore's (1993) transactional distance theory (TDT) provided this study's theoretical framing. Seventeen participants were surveyed. The cohort was mostly female (84.6%); 69.2% were aged 36-45, the rest were 26-35. Their employment status was predominantly full-time (84.6%). The study adopted a survey approach, and the research instrument was based on Strachota's (2003) survey. Out of the 17 program graduates surveyed, only 13 (76.5%) responded. The researchers arrived at the following specific results: 92.2% of the learners found Moodle ineffective in enabling interaction between them. The homepage language that is known to none; the platform never provided the opportunity for critical thinking (77%), and 92.4% of the respondents indicated that Moodle was a waste of time. In general, the students saw the program as enabling the sharing of viewpoints (91.7%), enabling clarification from colleagues (92.3%), and encouraging discussion of ideas and concepts (92.4%). 46.2% of respondents disagreed that the program's online component created a sense of community amongst them. Majority of the participants: 69.2% disagreed that teachers were active members of the online discussion group; 69.8% disagreed that they received timely feedback; 61.6% felt they got individualized attention from a teacher, and 61.6% and knew which teacher to ask for questions. Most of the students: 84.7 %, felt that the program lecture notes facilitated their learning; 95.5% agreed that assignments facilitated their learning; 67.3% agreed that learning activities required the application of problem-solving skills, and

92.3% decided that learning activities needed critical thinking. 46.2% disagreed, and 30.8% were neutral when asked to express satisfaction with the program's online portion, which contrasted the 84.6% in agreement for the in-person block seminars. The students were delighted with the program. None disagreed with the statement of overall program satisfaction, and 69% were in agreement. In general, the findings indicated that students: experienced transactional distance for learner-learner and learner-teacher dialogic interaction elements; they were dissatisfied with the online components; the students reported a sense of community and satisfaction for the in-person sections, and transactional distance in learner-content interaction was highest in multi-institutional features, but students were generally satisfied with the program.

Ekwunife-Orakwue and Teng (2014) measured dialogue as student-student interaction, student–technology interaction, student-teacher interaction, and student–content interaction. Their results indicated that student–content interaction had a more substantial effect on student learning outcomes than other forms of dialogue. Best and Conceição (2017) explored the impact of transactional distance dialogic interactions on student satisfaction in an international blended learning master's degree program. They found that students experienced transactional distance for learner-learner and learner-teacher dialogic interaction elements and dissatisfaction in the program's online components. The transactional distance was highest for aspects of the program that were impacted by multi-institutional implementation. Jung et al. (2002) examined the effects of academic, collaborative, and social interaction on learning, satisfaction, participation, and online learning attitude. They concluded that social interaction with instructors and

collaborative interaction with peer students is essential in enhancing education and active participation in the online discussion.

Consistent with the claims above, Strachota (2003), Lewis (2011), and Fullwood (2015) also concluded that dialogic interaction dimensions of transactional distance could impact student satisfaction. Therefore, empirical evidence supports the view that active interaction in online learning is key to a student's positive perception of course quality.

Course Structure

The course structure includes the development and design of the course curriculum, instructional strategies and methods, resources, scheduling, and planning before, during, and after a course is taught (Garrison, Anderson, & Archer, 2000). In the current study, the course structure is seen as the flexibility of a program in satisfying the students' needs (Moore & Kearsley, 2012) and the level of flexibility in access to course components, including content, learning outcomes, and learning activities. Course structure expresses the rigidity or flexibility of the program's educational objectives, teaching strategies, and evaluation methods. Rigidity is extreme structuredness, while flexibility denotes least structuredness, they are two sides of a coin. It describes how an education program can accommodate or be responsive to each learner's individual needs. The aspects of interest in course structuring are clarity of course goals and grading procedures, organization of learning activities, clarity and accessibility of course presentations and materials, efforts to accommodate personal pace, and fair grading of tests, papers, and assignments. Course structure refers to course design or how the teaching program is structured to be delivered through the various communications media. Programs are structured differently to accommodate the need to produce, copy,

distribute, and control mediated messages. The extent of structure in a program is mainly determined by the nature of the communications media being employed and the philosophy and emotional characteristics of teachers, the personalities and other characteristics of learners, and the constraints imposed by educational institutions.

Larkin and Jamieson-Proctor, (2015) examined the impact of a series of design changes to an online mathematics education course in terms of the transactional distance between learner and teachers, pre-service education students' attitudes towards mathematics, and their development of mathematical pedagogical knowledge. Their findings indicated that technologies, when used thoughtfully by teachers, can afford high levels of structure and dialogue. Transactional distance theory (TDT) was utilized to investigate and describe the interactions among course structure, course dialogue, and student autonomy in an online course over two years. The pre-service teachers' feedback indicated an improved attitude towards mathematics and an increase in their mathematical pedagogical content knowledge.

Quong, Snider, and Early (2018) evaluated the effectiveness of a social media platform in facilitating interactions among faculty and student participating in online and hybrid courses at a public university. Survey methods were used to measure students' perceptions of the platform. Variables included demographic information as well as opinions of a social media platform. Descriptive, regression, and factor analyses were used to analyze relationships and group differences amongst the variables. Qualitative scales explored participants' perceptions of the social media platform and how the organization, participant autonomy, and dialogue influenced interactions and dialogue. The results provided evidence that social networks may reduce the transactional distance

in online and blended learning environments and enhance students' engagement, cooperation, and social presence.

In their investigation on the determinants of students' perceived learning outcomes and satisfaction in online university education, Eom, Ashill, and Wen (2006) concluded that course structure significantly impacts student satisfaction. Gray and DiLoreto (2016) studied the effects of student engagement, student satisfaction, and perceived learning in online learning environments. They found significant correlation at 99% confidence level between course structure and learner interaction, r (187) = .51, p < .001; student satisfaction, r (187) = .66, p < .001; and perceived learning, r (187) = .62, p < .001.

The research efforts above tell us that thoughtful design with high flexibility and dialogue levels may improve attitude and pedagogical content knowledge. They tell us course structuring can significantly impact student satisfaction and learner interaction.

Learner Autonomy

Piaget's constructivist theory (Piaget, 1980) avers that learning occurs as students are actively involved in the process of meaning and knowledge construction (Ally, 2004) instead of passively receiving information from a presently available instructor. This description ties well to the environment and context under which online students are expected to operate in. Although it cannot be disputed that behaviorist and cognitive schools of thought have implications for online learning, constructivism is vital. Online education is anchored on constructivist learning theories, especially in the collapse of time and space with individualistic asynchronous models that most online courses adopt. In online learning, the greater onus is placed on the learner in the construction and

making of meaning, understandings, and knowledge from their interaction and reflection experiences with course content provided online and with other students. Online learning is mostly premised on an individual's ability to organize their resources, time and have the discipline to persistently follow an online course to successful completion. The concept of online learning also borrows from the theory of self-efficacy, which refers to one's belief in their capacity to execute behaviors necessary to produce specific performance attainments (Bandura, 1977, 1986, 1997). The role of the instructor is predominantly facilitation (Duffy & Cunningham, 1996).

An analysis of data used to generate the concepts of distance, dialogue, and structure by Moore in 1993 revealed that there were recognizable patterns of personality characteristics. There were significant differences between students who preferred or succeeded in teaching more highly dialogic and less structured teaching programs than those who preferred or succeeded in less dialogic and more structured programs. It became apparent to Moore that many students used teaching materials and teaching programs to achieve their goals, in their way, under their control. Autonomous learners were born. “Learner autonomy is the extent to which in the teaching/learning relationship, it is the learner rather than the teacher who determines the goals, the learning experiences, and the evaluation decisions of the learning program” (Moore, 1993, p.31). Autonomous learners are motivated by their independence, and they rely on their skills, set targets, deal with challenges, and steadily acquire knowledge (Peters, 2000; Zimmerman, 2000). Highly autonomous students take responsibility for the learning process, participation, and overcoming the barriers associated with geographical distance, Moore (2007). The ideal distance learner is emotionally independent of an

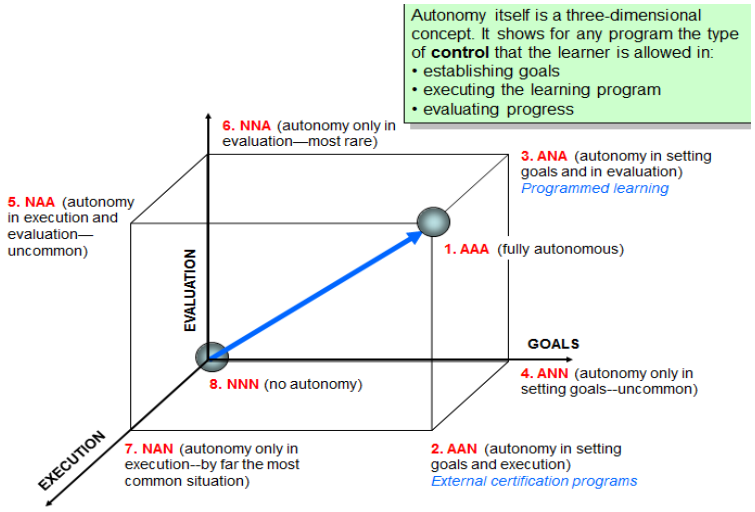
instructor. He or she is a person who can approach subject matter directly without a guardian in a set of intervening roles between the student and the subject matter (Boyd 1966). The personal requirements for success in distance learning include motivation, Internet self-efficacy, time and study environment management, and learning assistance management (Lynch and Dembo, 2004).

According to Malcolm Knowles (1970), autonomous behavior should be natural for the adult, who has a self-concept of being self-directed. The statement does not suggest that all adults are ready for self-directed learning. On the contrary, because learners are trained to be dependent in the school system, 'adults are typically not prepared for self-directed learning, they need to go through a process of reorientation to learning as adults' (Knowles 1970). While only a minority of adults practice as fully autonomous learners, they must help students acquire these skills. As transactional distance increases, a higher level of student autonomy is needed to succeed in the distance educational environment (Moore, 1973). There is a broad agreement that autonomous learners: understand the purpose of their learning program; share in the setting of learning goals; explicitly accept responsibility for their learning; regularly review their knowledge and evaluate its effectiveness, and take initiatives in planning and executing learning activities, (Holec 1981, Little 1991).

Learner autonomy implies that courses are classifiable on a scale from, AAA where the learner has total freedom to decide what to learn (Goals) how to learn (Execution) and how much to learn (Evaluation), to NNN where the learner has no liberty to make any decisions about the learning, as shown on Figure 2 (produced by Michael Moore).

Figure 2

Determinants of Autonomy



Online Course Quality

Numerous online learning quality assurance frameworks that measure the practical value of online education are in existence. They are moored in extensive theory, which identifies the dimensions of quality in online learning. They include rubrics by Quality Matters (Lowenthal & Hodges, 2015); Online Learning Consortium Scorecards (OLC, 2014); POET (Mungai & Hampel, 2005); quality standards in e-learning (Frydenberg, 2002); and IHEP's Benchmarks for Success in Internet-Based Distance Education (Bower, 2001).

Shelton (2011) reviewed existing paradigms for evaluating the quality of online education programs. This resultant meta-analytic article compared 13 approaches for identifying and assessing the quality of online education programs in higher education. The 13 exemplars for assessing quality were carefully examined and compared for similarities and differences and included:

- IHEP's 24 Benchmarks for Success in Internet-Based Distance Education (2000);
- Bate's ACTIONS Model of Quality (2000);
- WCET's Best Practices for Electronically Offered Degree and Certificate Programs (2001);
- Khan's Eight Dimensions of e-Learning Framework (2001);
- Frydenberg's Quality Standards in e-Learning (2002);
- Sloan Consortium's Five Pillars of Quality (2002);
- Lee and Dziuban's Quality Assurance Strategy (2002);
- Lockhart and Lacy's Assessment Model (2002);
- CHEA's Accreditation and Quality Assurance Study (2002);
- Osika's Concentric Model (2004);
- Moore and Kearsley's Assessment Recommendations (2005);
- Haroff and Valentine's Six–Factor Solution (2006); and
- Chaney, Eddy, Droman, Glessner, Green, and Lara-Alecio's Quality Indicators (2009).

The author does not claim to have exhausted the domain but best represented different accessible efforts that define and evaluate online education programs' quality. In this meta-analysis, specific data identified and collected are themes related to assessing online education quality. Each of the articles reviewed was scrutinized for its list of dimensions and themes envisaged as indicative of online education programs' quality. Each paradigm was broken into the primary facets or themes in a Microsoft Excel spreadsheet and coding method. The major themes identified were: institutional

commitment, support, and leadership; teaching and learning; faculty support, student support, and course development; technology and evaluation and assessment; cost-effectiveness and management and planning; and faculty satisfaction, student satisfaction, and student retention, and institutional factors. The results of the meta-analysis indicated that: institutional commitment, support, and leadership themes were the most cited in the discourse on standards for online education programs. Teaching and learning was the second most mentioned theme for indicating quality. Faculty and student support, and the course development themes were the third most cited in the analyzed studies. Technology and evaluation and assessment were noted in 6 of the 13 studies reviewed. Cost-effectiveness and management and planning were only identified three times in the studies, while faculty satisfaction; and student retention and satisfaction were only listed twice out of the 13 examined. In conclusion, the study decried different indicators and suggested a strong need for a common framework to assess online education programs' quality.

A multiplicity of literature draws a parallel between course quality and course satisfaction. Mbwesa (2014) investigated transactional distance as a predictor of perceived learner satisfaction in distance learning courses. The study examined three critical distances experienced by students enrolled in distance learning courses as predictors of perceived learner satisfaction. The analysis was primarily informed by Moore's (1972) theorem, which identified the environment's structure and the degree of meaningful communication (dialogue). The theorem also identified the degree to which the learner can mediate choices and decisions regarding personal learning goals and trajectories (learner autonomy). The subjects constituted a random sample of 168 students

enrolled for the Bachelor of Education degree in 2013 at a university in Nairobi, Kenya. Of these, 56% were female; their ages ranged between 25 and 54 years, with 88.1% in the 25 – 44 years bracket, while 11.9% fell between 45 – 55 years. 78.6% of the students were married, and 75.6% had 1-4 children. 21.4% were single. The main design adopted in this study was survey analysis using a questionnaire that measured the transactional distance predictive constructs, Learner-Learner (LLTD), Learner-Teacher (LTTD), and Learner-Content (LCTD). Reliability testing for internal consistency was performed via Cronbach's Alpha coefficients. Descriptive and correlational statistics were the main techniques for statistical analysis. The study results indicated that LLTD, LTTD, and LCTD were crucial predictors of students' perceived satisfaction. LLTD registered a low mean score. The lower the LLTD, the better because it implies a higher likelihood of effectiveness of learning. LTTD had a high ranking. 98.2% of the students indicated they experienced high to very high transactional distance. Higher transactional distance between learners and teachers guaranteed less effectiveness in learning. LCTD registered a high mean score >2.5, revealing that most of the students were satisfied with most aspects, except course modules' availability. Statistical significances ($rs = .996$, $p = 0.05$); ($rs = .874$, $p = 0.05$); and ($rs = .328$, $p = 0.01$) for LLTD, LTTD and LCTD against SPS respectively, were encountered.

Hart, Friedmann, and Hill (2018) contrasted student outcomes between online and face-to-face course-taking. The study utilized fixed effects analysis to estimate student performance differences between online and face-to-face course delivery formats in California's Community College system. The study applies a series of fixed effects models (college-course fixed effects, student fixed effects, and instructor fixed effects) to

compare course performance differences between online and face-to-face courses. The research was domiciled on California's community colleges, which consists of 113 institutions and hosts over 2.3 million students per year. The sample consisted of first-time entrants to the community college system in the 2008-09 academic year, and consideration was given to all course enrollments, course outcomes, student characteristics, and instructor characteristics for the cohort, which totaled over 3,011,232 enrollments in 57,270 courses from 2008-09 through 2011-12. Restrictions applied in the study narrowed the sample from 440,405 unique students to 217,194. The data was made available by the California Community College Chancellor's Office. Based on various course enrollments, course outcomes, student characteristics, and instructor characteristics, the study uses descriptive analysis, fixed-effects analyses (college-course, student, and instructor), and simple regression modeling to draw out relations, patterns, and predictors. These results were robust across different estimation techniques, groups of students, and types of classes. The key findings of the study indicated that:

- Students in face-to-face courses outperform their peers in online courses across several outcomes. Average-wise, students had poorer outcomes in online classes, in course completion likelihood, and course completion with a passing grade.
- The study tested whether students perform worse in instructors' online courses than in courses the same instructors teach face-to-face. The findings were affirmative.
- Differences in instructors' observed characteristics related to online course enrollment formed a negligible portion in the performance decrement associated with online course-taking.

- Online course-taking was associated with a higher likelihood of repeating the same class but were less likely to register in new courses in the same subject than courses taken face-to-face.
- There was a strong negative relationship between online course-taking and contemporaneous performance across different subjects and different types of students.

Instructor Effectiveness

Competent online instructors are knowledgeable in their field and have skills and expertise in technology, online course management, and creating visual course materials. Kara and Can (2019) aimed to explore non-thesis master's students' perceptions and expectations of excellent tutors and advisors in distance education programs. Course participants agreed that exceptional tutors and advisors know their field, keep up with new research, and apply these to their courses and supervision. They found that tutors are expected proficient in technology, troubleshooting, online course management, and creating appealing teaching materials. Edwards, Perry, and Janzen's (2011) study revealed the qualities of exemplary online educators: they challenge and affirm learners (had high expectations of students); they establish clear classroom presence and are persons of influence (expertise in subject area). Schroeder et al., 2016, and Cain et al., 2007 found that students desired quality interaction with their tutors and advisors and perceived them as primary academic support sources. In summary, effective online instructors must be well-versed in the content of the academic domains they teach and must have excellent skills with technology.

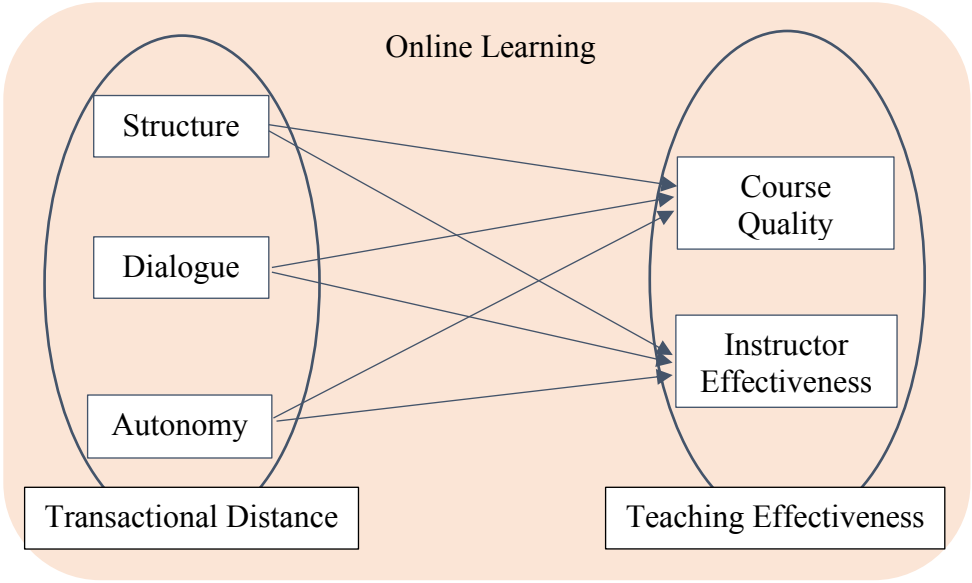
Conclusion

Literature review leads us to deduce that the transactional distance theory is a valid, useful, adequate, and reliable framework in the analysis of teaching effectiveness in online education. The literature also points out that purposeful dialog and interaction in online learning may promote a positive perception of course quality and instructor effectiveness. One also arrives at the realization that meticulous course design may improve attitude towards, and pedagogical content knowledge of, an online program, and online education place more autonomy and responsibility on the learner. A conceptual framework emerges in which TDT is may be accepted as an adequate and reliable framework to analyze course quality and instructor effectiveness. Figure 3, below, illustrates that each of the TDT dimensions (dialogue, structure, and autonomy) is presumed to impact teaching effectiveness. High levels of dialogue/interaction are desirable for online learning. Dialogue has an inverse relationship to the course structure. A desirable quality in courses and effective instruction aims at reducing the transaction distance. The review revealed that though many online learning quality assurance frameworks exist, grounded in extensive theory, the critical dimensions of online learning quality are primarily agreed upon. Lastly, the review indicated that the instructors who are effective in the realm of online education knowledgeable in their academic domain and have excellent skills and expertise in technology, online course management, and creating visual course materials. Concerning the guiding questions set up at the start, the study postulated that a significant relationship exists between transactional distance and students' perceptions of course quality and instructor effectiveness in online learning. It

was also a supposition of this research effort that transactional distance significantly predicts students' perceived course quality and instructor effectiveness in online learning.

Figure 3

Conceptual Framework of Transactional Distance Dimensions' Effect on Course Quality and Instructor Effectiveness



CHAPTER 3: METHOD

Introduction

Chapter two reflected on literature that exists on transactional distance. The section investigated the theoretical foundations of transactional distance, considered the profusion of empirical evidence, and finalized with the conceptual framework that will guide this study. Chapter three of the study describes the research methodology to be employed. It will present the research design, sample characteristics, the instruments for data collection, and the analysis techniques. This chapter is organized into the following sub-sections: the purpose of the study, specific research questions; research design and data analysis; reliability and validity of the research design; sample or participants; instrument, procedures for collecting data, research ethics; and will terminate with a conclusion.

Specific Research Questions and Hypotheses

This study aimed to identify and understand the impact that transactional distance has on students' perceptions of the quality of courses and instructor effectiveness in online learning at degree-granting postsecondary institutions. The study was conducted across the entirety of the USA. The four questions that guided the study were:

1. Research Question 1: Does a statistically significant relationship exist between transactional distance and students' perceptions of course quality in online learning?

The null hypothesis ($H1_0$: $\rho = 0$) for the first research question was no association between transactional distance and students' perceptions of course quality in online

learning. The alternative hypothesis ($H1_1$: $\rho \neq 0$) was an association between transactional distance and students' perceptions of course quality in online learning.

2. Research Question 2: Does a statistically significant relationship exist between transactional distance and students' perceptions of instructor effectiveness in online learning?

The null hypothesis being, ($H2_0$: $\rho = 0$), for the second research question, indicated there is no association between transactional distance and students' perceptions of instructor effectiveness, while the alternative hypothesis ($H2_1$: $\rho \neq 0$) had the implication is that there was an association between transactional distance and students' perceptions of instructor effectiveness in online learning.

3. Research Question 3: To what extent is transactional distance predictive of students' perceived course quality in online learning?

The related null hypothesis ($H3_0$: $\beta_1 = \beta_2 = \beta_3 = 0$) for the third research question implied transaction distance was not predictive of students' perceived course quality in online learning. In contrast, the alternative hypothesis (H31: $\beta i \neq 0$) stated that at least one transactional distance variable predicted student's perception of course quality.

4. Research Question 4: To what extent is transactional distance predictive of students' perceived instructor effectiveness in online learning?

Consequently, in the fourth research question, the null hypothesis ($H4_0$: $\beta_1 = \beta_2 = \beta_3 = 0$) argued that transaction distance was not predictive of students' perceived instructor effectiveness in online learning. The alternative hypothesis ($H4_1$: $\beta_i \neq 0$) implied that at

least one transactional distance variable predicted students' perception of instructor effectiveness.

The four research questions share identifiable independent and dependent variables. The use of a variable in a specific statistical analysis and algorithm must be understood in its native application. The variables of the study may thus be defined as:

Course Structure (CS): An independent variable that measures the degree to which a course is designed to achieve optimal flexibility. CS encompasses clarity of goals, grading procedures, course materials; organization of learning activities; enabling the student to learn at their pace; accessibility of learning materials; and fair grading of tests, papers, and assignments.

Dialogue/Interaction (DI): An independent variable that measures the degree to which a course is designed to achieve optimal delivery. DI requires that an instructor conveys interest and enthusiasm in the subject matter. An instructor responds satisfactorily and in a reasonable time to students; that various channels are made available for inter-learner communication; that students engage in valuable interaction with others to construct and share knowledge.

Learner Autonomy (LA): An independent variable that measures the degree to which a course is designed to achieve optimal learner self-determination. LA demands that the student understands the purpose of the course; participates in setting goals; takes responsibility for their learning experiences, and evaluation decisions; takes the initiative in planning and executing learning activities; and regularly reviews their learning and evaluates the effectiveness.

Course Quality (CQ): A dependent variable that measures the degree to which a student perceives that the course increased their understanding of the subject matter and their ability to think critically.

Instructor Effectiveness (IE): A dependent variable that measures the degree to which a student perceives that a professor's teaching deserves a high rating and recommendation of the professor to other students.

Research Design and Data Analysis

This study adopted a quantitative approach since the task is to identify transactional distance factors that influenced or best predicted course quality and instructor effectiveness from the students' view. According to Leedy and Ormrod (2001), the intention of quantitative research is establishing, confirming, or validating relationships and developing generalizations that contribute to theory. Quantitative researchers seek explanations and predictions that may generalize to other situations. Creswell (2002) is of the idea that quantitative research is collecting, analyzing, interpreting, and writing the results of a study. The absence of interventions, treatments, and control groups made the specific type of design, non-experimental. This study was considered non-experimental because it involved neither (a) random assignment of participants to a group, nor (b) the active introduction or manipulation of an intervention by a researcher, which are central tenets of experimental research (Cook, Cook, Landrum, & Tankersley, 2008).

With regard to data analysis, this study applied both Pearson's correlation and multiple linear regression. Creswell (2002) defined correlation as a statistical test to establish patterns for two variables. Bold (2001) noted that a correlational study confirms

whether two or more variables are related. The statistical analysis test for correlation produces a result “r,” reported with a decimal numeral known as the Pearson Correlation Coefficient (Cooper and Schindler, 2001). In a correlational analysis, high positive coefficients (tending towards +1) confirm the positive correlation.

In contrast, high negative values (tending towards -1) prove inverse correlations, while any results approaching zero prove very weak or non-existence of any association. Sykes (1993) describes regression analysis as follows: it investigates relationships between variables in statistics; the investigator seeks to ascertain the predictive effect of one variable upon another; regression estimates the quantitative effect of the causal variables upon the variable that they influence, and the investigator typically assesses the "statistical significance" of the estimated relationships. In regression analysis, the coefficients indicate the independent variable's multiplicative strength over the dependent variable, while other factors are held constant.

Research Question 1 sought to determine whether there was a statistically significant relationship between transactional distance and students’ perceptions of course quality in online learning. Correlational analysis between dialogue, structure, and autonomy against course quality was expected to show (non) existence of the relationship, the direction, and the strength. Research Question 2 sought to determine whether there was a statistically significant relationship between transactional distance and students’ perceptions of instructor effectiveness in online learning. Correlational analysis between dialogue, structure, and autonomy against instructor effectiveness was expected to show (non) existence of a relationship, the direction, and the strength. Research Question 3 sought to establish the extent to which transactional distance was

predictive of students' perceived course quality in online learning. Regression analysis, with course quality as the dependent variable, and dialogue, structure, and autonomy as the independent variables, was expected to compute the coefficients to show the predictive relationship. Research Question 4 sought to establish the extent to which transactional distance was predictive of students' perceived instructor effectiveness in online learning. Regression analysis with instructor effectiveness as the dependent variable, and dialogue, structure, and autonomy as the independent variables, was expected to compute the coefficients to show the predictive relationship.

Research Population and Sample

The study was conducted on the population of all college students in degree-granting postsecondary institutions across the USA who had experience with online learning between Fall 2014 and Fall 2018. By Fall 2018, of the 20,008,434 students enrolled at American degree-granting postsecondary institutions, 6,937,429 (34.7%) took distance education courses. The number of students pursuing at least one, but not all, of student's courses via distance education was 3,677,689 (18.4%), while those exclusively taking distance education courses were 3,259,560 (16.3%), Ginder, Kelly-Reid, and Mann, (2019). Potentially, over 6,937,429 students could have responded to the online questionnaire. The details are presented in Table 1 below.

Table 1

Number of Students Enrolled at Post-Secondary Institutions, by Student Level, Level of Institution, and Distance Education Status of Student, in the United States, Fall 2014 - Fall 2018

	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Total students	20,664,180	20,400,164	20,230,012	20,138,477	20,008,434
Enrolled exclusively in distance education courses	2,823,512	2,877,188	2,980,184	3,104,913	3,259,560
Enrolled in some distance education courses	2,901,022	3,095,280	3,330,529	3,552,651	3,677,689
Distance education students	5,724,534	5,972,468	6,310,713	6,657,564	6,937,249
Undergraduate	17,748,829	17,458,363	17,257,536	17,133,000	16,972,521
4-year	10,579,567	10,547,299	10,782,295	10,818,442	10,865,098
Enrolled exclusively in distance education courses	1,384,665	1,373,328	1,420,956	1,461,660	1,519,949
Enrolled in some distance education courses	1,524,147	1,695,818	1,913,910	2,114,610	2,232,239
Distance education students	2,908,812	3,069,146	3,334,866	3,576,270	3,752,188
2-year	6,844,576	6,619,766	6,207,833	6,057,268	5,849,184
Enrolled exclusively in distance education courses	712,565	731,207	738,249	773,772	805,872
Enrolled in some distance education courses	1,150,312	1,152,548	1,138,163	1,161,388	1,169,159
Distance education students	1,862,877	1,883,755	1,876,412	1,935,160	1,975,031
Less-than-2-year	324,686	291,298	267,408	257,290	258,239
Enrolled exclusively in distance education courses	1,111	750	1,150	773	894
Enrolled in some distance education courses	2,873	2,630	2,078	2,442	1,771
Distance education students	3,984	3,380	3,228	3,215	2,665
Graduate	2,915,351	2,941,801	2,972,476	3,005,477	3,035,913
Enrolled exclusively in distance education courses	725,171	771,903	819,829	868,708	932,845
Enrolled in some distance education courses	223,690	244,284	276,378	274,211	274,520
Distance education students	948,861	1,016,187	1,096,207	1,142,919	1,207,365

Within the available number of potential respondents, the study survey was responded to by 1049 participants. Table 2 summarizes their characteristics.

Table 2

Description of Participants

Category	Number	Percentage
Age		
18 to 24	120	11.4%
25 to 34	506	48.2%
35 to 44	273	26.0%
45 and above	150	14.4%
Gender		
Female	472	45%
Male	572	54.5%
Other	5	0.5%
Race/ Ethnicity		
American Indian or Alaskan Native, Other, and Prefer not to answer	22	2.2%
Asian or Pacific Islander	77	7.3%
Black or African American	239	22.8%
Hispanic or Latino	58	5.5%
White / Caucasian	653	62.2%
Year of Most Recent Online Course		
2020	264	25.2%
2019	277	26.4%
2018	192	18.3%
2017	149	14.2%
2016	167	15.9%
Semester of Most Recent Online Course		
Fall	251	23.9%
Spring	436	41.6%
Winter Intersession	152	14.5%
Summer Intersession	210	20.0%
Level of Most Recent Online Course		
Undergraduate	592	56.4%
Graduate	457	43.6%

Instrument

The four-sub-scales instrument was developed around Students' Evaluations of Teaching (SETs), which most postsecondary institutions administer at the end of each semester. The subscales covered Course Structure, Dialogue/interaction, Learner Autonomy, and Teaching Effectiveness (Course Quality and Instructor Effectiveness). Students' Evaluations of Teaching are surveys that ask students to use their judgment and report their individual experiences concerning the effectiveness of the instructor or the quality of a course (Ali & Ajmi, 2013; Brown, 2008; Driscoll & Cadden, 2010; Hobson & Talbot, 2001; Lindahl & Unger, 2010; Oliver & Pookie, 2005; Smith, 2007; Tsai & Lin, 2012). Literature has an abundance of dimensions of reliable SETs. Feldman (2007) found that a SET's overall rating was influenced by six aspects: clarity and understandability of the course, teacher stimulation of interest, teacher preparation and organization, the perceived outcome of the instructor's impact, and meeting the objectives and student motivation. Arthur Chickering and Zelda Gamson (1989) suggested seven principles for effective teaching for undergraduate education: communicating high expectations; encouraging contact between students and professors; developing reciprocity and cooperation among students; encouraging active learning; giving prompt feedback; emphasizing time on task, and respecting diverse talents and ways of learning.

Marsh (2001), Gage and Berliner (1992), Huitt (1995), and Kim, Damewood, and Hodge (2000) argue that teaching effectiveness is multidimensional. The strongly related indicators include communication skills, attitude toward the students, knowledge of the subject, organizational skills, enthusiasm, fairness, flexibility, and students' encouragement. Gursoy and Umbreit (2005) identified four factors: learning, instruction,

organization, and workload as effective teaching measures. Marks (2000) identified five dimensions: organization, workload, expected grades, teacher's concern, and learning. Marsh and Roche (2007) proposed that SETs should cover nine dimensions: learning/value, instructor enthusiasm, organization/clarity, group interaction, and personal rapport, breadth of coverage, examinations and grading, assignments and readings, and workload and difficulty.

The SET items adapted for this study may not be comprehensive. Still, it is reasonable to cover most of the essential elements found in similar instruments documented in the literature that measure multiple effective teaching dimensions and whose psychometric properties have been studied extensively. The instruments considered include Frey's Endeavor (Frey, 1973, 1978; Frey, Leonard, & Beatty, 1975; also see Marsh, 1984) and Marsh's Students' Evaluations of Educational Quality (SEEQ; Marsh, 1982a, 1982b, 1983, 1984; Marsh & Hocevar, 1984). The instrument's learner autonomy component adapts Moore's (1993) definition of the same, which identifies the determination of goals, learning experiences, and evaluation decisions as main pillars. The section also represents Holec's (1981) and Little's (1991) agreement on the critical facets of learner autonomy as the purpose of a learning program, acceptance of responsibility for learning, sharing in the setting of learning goals, taking the initiative in planning and executing learning activities, and regular review of learning. The instrument applied had eighteen TDT dimension items and four teaching quality outcome variables that were generally tested on a 5-point agreement Likert-scale survey. Table 3 below summarizes the test items and variables for each TDT component.

Table 3

Mapping TDT CQIE Survey Items to the Research Study Independent and Dependent Variables

Individual Questions		Research Variable
Q1	The course goals and grading procedures were clear.	IV – Course Structure
Q2	The learning activities were well organized.	IV – Course Structure
Q3	The course presentations and materials were clear and understandable.	IV – Course Structure
Q4	The course was structured to enable me to work at my own pace to meet the course goals and objectives.	IV – Course Structure
Q5	The instructor, course presentations, and materials were easily accessible to students.	IV – Course Structure
Q6	Tests, papers, and other assignments were graded fairly.	IV – Course Structure
Q7	The instructor conveyed interest and enthusiasm in the subject matter.	IV – Dialogue/Interaction
Q8	The instructor responded to students' work in a reasonable amount of time.	IV – Dialogue/Interaction
Q9	The instructor satisfactorily answered students' questions.	IV – Dialogue/Interaction
Q10	I communicated with other students through various channels (e.g., emails, phone, discussion board, and online chat).	IV – Dialogue/Interaction
Q11	I actively engaged in dialogues with other students to construct and share knowledge	IV – Dialogue/Interaction
Q12	I valued my communication with other students on course-related issues.	IV – Dialogue/Interaction
Q13	I understood the purpose of the course.	IV – Learner Autonomy
Q14	I shared in the setting of learning goals for the course.	IV – Learner Autonomy
Q15	I took responsibility for my learning experiences.	IV – Learner Autonomy
Q16	I took the initiative in planning and executing learning activities.	IV – Learner Autonomy
Q17	I took responsibility for evaluation decisions in this course.	IV – Learner Autonomy
Q18	I regularly reviewed my learning and evaluated how effective it was.	IV – Learner Autonomy
Q19	*This course increased my understanding of the subject matter.*	*DV – Course Quality*
Q20	*This course increased my ability to think critically.*	*DV – Course Quality*
Q21	*I would recommend the instructor to other students.*	*DV – Instructor Effectiveness*
Q22	*I highly rate the professor's teaching.*	*DV – Instructor Effectiveness*

Procedures for Data Collection

Data collection was conducted through an online questionnaire hosted on an Internet-0based survey tool, Survey Monkey. In surveys, researchers typically measure the perceptions, attitudes, behaviors, or characteristics of a group (Creswell, 2005). Further, many studies now recognize that the Internet allows researchers to access large, affordable data samples in quantitative research (Goodman, Cryder, & Cheema, 2012; Kees, Berry, Burton, & Sheehan, 2017; Schmidt, & Jettinghoff, 2016). The study employed a survey as a strategy of inquiry; it utilized data collected on a predetermined instrument. The survey instrument covering the Transactional Distance dimensions (course design, structure, and learner autonomy) was administered via the Internet, nationally, to college students with an online learning experience. Regional diversity and large sample size significantly improved reliability and validity.

The online survey platform for this study was Survey Monkey, a popular inexpensive online crowdsourcing research platform. Survey Monkey is a self-serve survey platform on which researchers can create, deploy, and analyze surveys through an online interface. It provides customization for a demographically diverse and balanced research population in the USA by use of screening items. Survey Monkey provided extensive confidentiality, privacy, and security measures. It had a consent form option; it did not collect personal identifiable information; it disabled I.P. address tracking; it had extensive privacy and security policies and met various government compliance requirements. Survey Monkey had achieved ISO 27001 certification. Data and all related information to the study were always secure. Computing devices and specific softcopy research documents had strong passwords. The hardware and any print documents were

stored in the safety of locked cabinets and rooms. Access to the research materials was limited to the principal researcher only. Other studies had shown that Survey Monkey compares favorably to other surveys or separately obtained ground truth (Bentley, Daskalova, and White, 2017.) A cursory search on Google Scholar revealed over 18,900 studies about - or utilizing - the Survey Monkey platform.

The deployment of surveys in the evening reduced the possibility of bias towards students who work during the day. Settings and screening items limited respondents to only those accessing the United States survey, were current or recently completed students, and had taken college online courses. A $1.00 token payment per participant, which includes platform fees, guaranteed a reasonable number of completed surveys. Participants were requested to volunteer to complete the survey; there was no penalty for not participating. Respondents were required to make selections about their agreement with a statement. There was an opportunity to provide text for short answers for some survey items. Participants were allowed to skip items. On completion of the survey, one selected "Submit Survey" to finish the activity. Anyone who abandoned the survey without submitting results did not make it to the sample count. Each successful submission of the survey questionnaire created a complete data record in the Survey Monkey database. At the end of the data collection period, the data set was transferred to SPSS for statistical analysis. Participants did not have access to the Survey Monkey data records and data set or the research results.

Reliability and Validity of Research Design

Literature seems to support that Students' Evaluations of Teaching (SETs) are valid, reliable, and worthwhile means of evaluating instructional effectiveness (Braskamp and Ory, 1994, Cashin, 1995, Centra, 1993, D'Apollonia and Abrami, 1997, Feldman, 1997, Marsh and Dunkin, 1997, Marsh and Roche, 2000, McKeachie, 1997, Theall and Franklin, 2001). SETs have been validated by student grades demonstrated by Cohen (1981) and Feldman (1989). They conducted meta-analyses of multi-section courses and found moderate correlations between SET and student learning as measured by examination scores. SETs have been validated in many correlational studies using many other indicators, constructs, and instructor competence variables, including peer (colleague) ratings, expert judges' ratings, self-ratings, graduating seniors' and alumni ratings, and student learning. Different studies report that student ratings are a reliable measure of teaching effectiveness in general terms (Marsh 2007; Zhao & Gallant 2012; Lu & Wu 2018; Vanacore & Pellegrino 2019). It has also been demonstrated that the ratings of these instruments are reliable, stable, and relatively valid through their application in different educational scenarios (Abrami, D'Apollonia & Cohen, 1990; Marsh & Dunkin, 1997; Marsh, 2001).

Research Ethics

The study was conducted with IRB approval. Participation in the completion of the survey by the students was voluntary. It was envisioned that the study results would help professors to significantly improve the quality of the courses in both content and delivery. The students were expected to benefit, too, since the study would lead them to

ask more insightful questions in class, understand course material more deeply, and take greater responsibility for their learning.

Limitation

The research design was considered as a limitation of the study. While a correlational design offered the capacity to determine the existence (or none thereof) of a relationship between transactional distance and teaching effectiveness variables, it could not establish causation (Rumrill, 2004), mainly because the study is non-experimental.

Conclusion

Chapter three delved into the details of the research methodology. Building on the purpose and research questions, it comprehensively laid out the research design and analysis, reliability, and validity, describes the sample, provides information on the research instrument, and commits to an ethical guide. Chapter four involved the statistical analysis of data and the presentation of research results.

CHAPTER 4: PRESENTATION OF RESULTS

Introduction

Chapter four encompasses the results of the research effort. First, the chapter assesses the theoretical model for reliability, validity, and structural equations. Secondly, it shows descriptive details of the sample and course characteristics and how they impact the transaction distance theory (TDT). Thirdly, it addresses the research questions by presenting the statistical findings on TDT's effect on students' perception of course quality and instructor effectiveness. In a fourth segment, it looks at some auxiliary results. The chapter of results is a follow-through of chapter three's methodology, data collection execution, and data analysis. The deductions of chapter four consequently feed into the discussions and recommendations in chapter five.

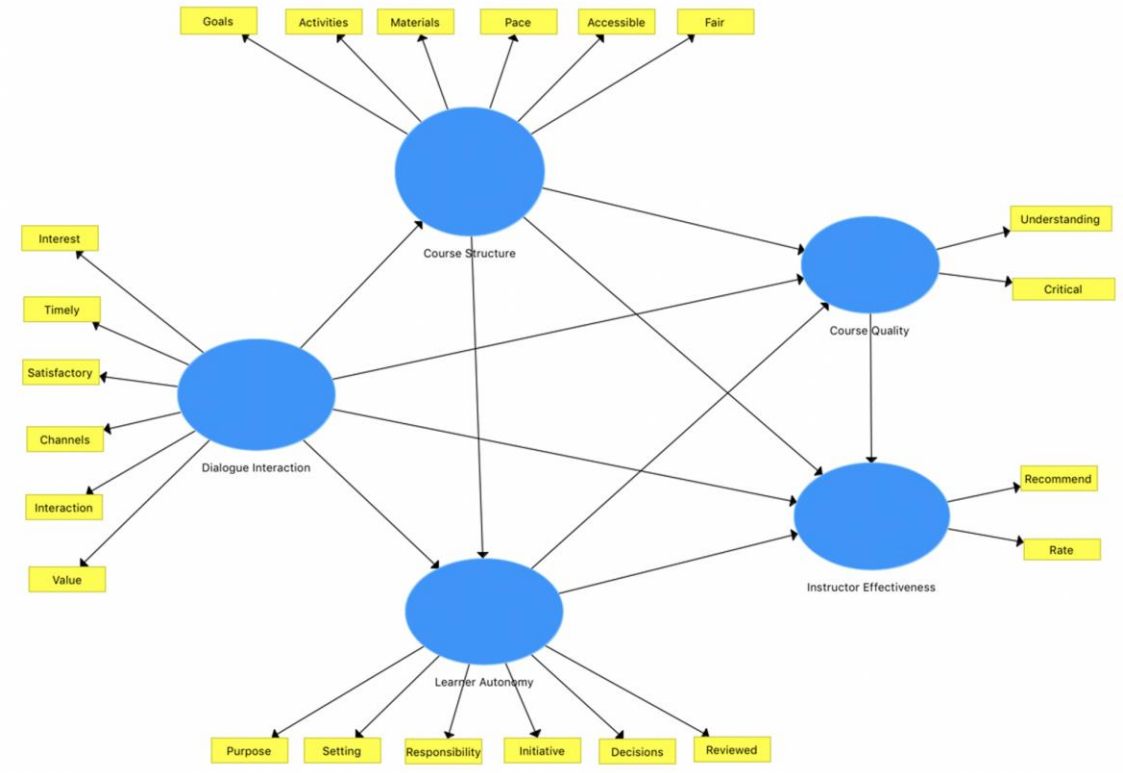
Assessment of Conceptual Model

In this study, the researchers devised a 22-question online Course Quality and Instructor Effectiveness (CQIE) survey to gauge how college students perceive course quality and instructor effectiveness in online courses. Each question was a 5-point Likert item from "strongly disagree" to "strongly agree." The CQIE survey was administered to a national sample of college students with online course experience. One thousand forty-nine records were cleared for inclusion in this analysis. The SmartPLS software program was utilized to analyze the data for reliability and validity and structural equation modeling. SmartPLS implements partial least squares structural equation modeling (PLS-SEM) algorithms. PLS-SEM is recommended for high predictive accuracy (Hwang et al., 2010; Wong, 2010). The default settings of a path weighting scheme, 300 iterations, and seven for stop criterion, were used. Path weighting scheme was selected since it

maximizes the R^2 value of the endogenous variables and is recommended in Hair et al. (2014). Convergence was reached in six iterations.

Figure 4

Hypothesized pathways between the transactional distance variables (dialogue/interaction, course structure, and learner autonomy) and teaching effectiveness variables (course quality and instructor effectiveness)



In the illustration above (Figure 4), the blue ellipses represent the latent variables or factors. Dialogue/interaction is exogenous since it is not an effect of any latent variable, while course structure, learner autonomy, course quality, and instructor effectiveness are endogenous. The items in yellow rectangular boxes are the indicators, and the arrows pointing to them indicate a reflective model.

The data were first analyzed to consider information on the reliability and validity. Reliability is a measure of consistency, while validity is defined as the degree to which a concept measures what it is supposed to measure (Vogt, 1993). The study utilized SmartPLS V 3.3.2 software to test for reliability and validity.

Vogt (1993 p.195) defines reliability as "the consistency or stability of a measure or test from one use to the next." The SmartPLS program measures include three reliabilities (Cronbach's Alpha, composite, and AVE).

Table 4

Reliability Results for 1049 Respondents and the Five Key Factors of the CQIE Survey

	Composite Reliability	Cronbach's Alpha	Average Variance Extracted (AVE)	rho_A
Course Quality	0.831	0.594	0.711	0.599
Course Structure	0.853	0.792	0.494	0.8
Dialogue/Interaction	0.839	0.772	0.465	0.776
Instructor Effectiveness	0.909	0.805	0.834	0.867
Learner Autonomy	0.821	0.74	0.434	0.738

Composite reliability was developed by Wert, Linn, and Joreskog (1974) as another measure of internal consistency. Composite reliability is also considered as factor reliability. It can be used as a check to see how well a construct is measured by its indicators (Gotz, Lierhr-Gobbers & Krafft, 2010). The range of composite reliabilities goes from 0 to 1. The resulting composite reliabilities were as follows: course structure *Pc* =.853, dialogue/interaction *Pc* = .839, learner autonomy *Pc* = .821, course quality *Pc* = .831, and instructor effectiveness *Pc* = .909. Table 4 illustrates a consistent pattern of

high reliability as all were well above the .60 threshold. Reliability was thus fully established for all the factors.

Cronbach's alpha (α) is the most common scale of internal consistency ("reliability"). It is used when you have multiple Likert questions in a survey that form a scale, and determination of its reliability is necessary. Correlations measure reliability and attitude scales produced from surveys and have an acceptable range of greater than .60. The overall Cronbach's alpha for the scale resulted in $r = .898$, indicating a high level of internal consistency and good scale reliability. Further, a bivariate Pearson correlation of the scale proved that all items except one correlate at $r = .70$ or higher, as illustrated in Table 4. No two items were highly correlated to conclude that they were a measure of the same facet of the construct. In virtually all the items except one, deleting any would reduce the scale reliability to $.890 <= r <= .896$. Cronbach's alphas for course structure, dialogue/interaction, learner autonomy, and instructor effectiveness were well above .60. One factor (course quality) was at the Cronbach alpha threshold, $r = .594$.

Outer loadings may be considered as a form of item reliability through coefficients in reflective models. The minimum threshold for the loadings is .3000. Most experts recommend outer loadings of .4000 and above (Chin, 2010; Henseler, Ringle, & Sinkovics, 2009, Churchill, 1979; Gorsuch, 1974). Table 5 shows that all the factors were mostly in the .6000 to .8000 range, well above .4000 (the least being .5760 and the highest .9410). Since the composite reliability was good, it was not necessary to drop any item.

Table 5

Reliability Based on Outer Loadings for 22 Items from the TDT-CQIES Survey

Survey Item	Course Quality	Course Structure	Dialogue Interaction	Instructor Effectiveness	Learner Autonomy
Accessible		0.6650			
Activities		0.7600			
Channels			0.7240		
Critical	0.8620				
Decisions					0.7140
Fair		0.6890			
Goals		0.7470			
Initiative					0.6860
Interaction			0.6140		
Interest			0.6630		
Materials		0.7610			
Pace		0.5760			
Purpose					0.6330
Rate				0.9410	
Recommend				0.8840	
Responsibility					0.6380
Reviewed					0.6450
Satisfactory			0.6810		
Setting					0.6350
Timely			0.6950		
Understanding	0.8240				
Value			0.7090		

Fornell and Larcker (1981) consider Average Variance Extracted (AVE) to be another reliability measure. The range of AVE values is 0 to 1. The acceptable threshold is AVE=.50, where the construct explains 50% of the variance of its indicators. AVE scored the variables: instructor effectiveness (.834), course quality (.711), course structure (.494), and dialogue/interaction (.465), at values greater than or equal to .50. One independent factor (learner autonomy, .434) did not meet recommended AVE value.

Anastasi (1982) defines validity as the degree to which a concept measures what it purports to measure. She considers construct validity to be a comprehensive concept that includes the other types (criterion and content). Messick (1980) argues that the term validity should be reserved for construct validity. Thus, the literature considers construct validity as the most important, and this study sought to establish it by testing for convergent validity and discriminant validity. The SmartPLS program implements the measures of construct validity selected for the study: Fornell-Larcker Criterion (Discriminant Validity), Cross-loadings matrix (Discriminant Validity), and Significance of factor loadings (Convergent Validity). Construct validity was considered for all the latent variables: course structure, dialogue/interaction, learner autonomy, course quality, and instructor effectiveness.

Table 6 summarizes our findings. The AVE formula squares and sums the factor loadings, representing correlations with the underlying factor. In Fornell-Larcher Criterion, AVE's square root should be higher than its correlation with any other latent variable. Comparing all AVE values with the correlations in the rest of the matrix shows which correlations are much more significant than any other off-diagonal correlations. The data in this study supported the Fornell-Larcher Criterion and, by doing so, provided evidence for discriminant validity. Using the Fornell-Larcher criterion, the five constructs possessed higher correlations than those of the other off-diagonal correlations in the latent-variable matrix. The top number (column-wise) representing AVE's square root is greater than the values below it, representing correlations. The distinction is consistent with proven evidence of discriminant validity.

Table 6

Discriminant Validity Based on Fornell-Larcker Criterion for 22 Items from the TDT-CQIES Survey

	Course Quality	Course Structure	Dialogue Interaction	Instructor Effectiveness	Learner Autonomy
Course Quality	0.843				
Course Structure	-0.538	0.703			
Dialogue/Interaction	0.552	-0.612	0.682		
Instructor Effectiveness	0.574	-0.578	0.654	0.913	
Learner Autonomy	0.516	-0.567	0.54	0.474	0.659

Notable higher scores in different variables are strong evidence of discriminant validity in a cross-loading matrix. In Table 7, the noticeable factor loadings for each factor (highlighted) evidently differ from those of the other constructs in the same row. Examination of the Table 7 shows that these factors are substantially different and higher from the other constructs. Evidence for their discriminant validity from the cross-loading matrix shows much higher correlations for the items making up each construct. The intended loadings are .6 and above, while the cross-loadings are mostly under .4. It is clear evidence of discriminant validity.

Table 7

Discriminant Validity Based on Cross-loadings Matrix for 22 Items from the TDT-CQIES Survey

Survey Item	Course Quality	Course Structure	Dialogue Interaction	Instructor Effectiveness	Learner Autonomy
Accessible	-.323	**.665**	-.425	-.389	-.368
Activities	-.406	**.760**	-.494	-.453	-.405
Channels	.465	-.477	**.724**	.572	.368
Critical	**.862**	-.432	.511	.519	.457
Decisions	.310	-.317	.341	.282	**.714**
Fair	-.417	**.689**	-.414	-.399	-.407
Goals	-.376	**.747**	-.394	-.360	-.424
Initiative	.310	-.315	.288	.286	**.686**
Interaction	.363	-.461	**.614**	.423	.339
Interest	.311	-.314	.663	.336	.329
Materials	-.402	**.761**	-.493	-.486	-.434
Pace	-.334	**.576**	-.341	-.332	-.344
Purpose	.428	-.483	.369	.358	.633
Rate	.534	-.541	.621	**.941**	.439
Recommend	.515	-.516	.569	**.884**	.429
Responsibility	.324	-.423	.305	.274	**.638**
Reviewed	.342	-.323	.388	.303	**.645**
Satisfactory	.374	-.302	**.681**	.405	.372
Setting	.292	-.338	.422	.346	**.635**
Timely	.306	-.341	**.695**	.390	.373
Understanding	**.824**	-.478	.415	.445	.411
Value	.402	-.544	**.709**	.491	.418

The HTMT ratio is the geometric mean of correlations of indicators across constructs measuring different phenomena divided by the correlations of indicators within the same construct. In a well-fitting model, heterotrait correlations should be smaller than monotrait correlations. Henseler, Ringle, and Sarstedt (2015) suggest that if an HTMT value is below .90, discriminant validity has been established between a given

pair of reflective constructs. Other authors suggest a cutoff of .85. In the current study, results in Table 8 depict that the HTMT ratios were well below .85, discriminant validity was established.

Table 8

Discriminant Validity Based on HTMT Ratio for 22 Items from the TDT-CQIES Survey

	Course Quality	Course Structure	Dialogue Interaction	Instructor Effectiveness	Learner Autonomy
Course Quality					
Course Structure	0.786				
Dialogue Interaction	0.795	0.757			
Instructor Effectiveness	0.826	0.72	0.805		
Learner Autonomy	0.762	0.726	0.703	0.606	

PLS provides evidence of convergent validity through bootstrapping procedures to calculate the significance of factor loadings for all the constructs. Bootstrapping is considered extremely powerful (Thompson & Melancon, 1990) and treats a sample as if it were the population (Mooney & Duval, 1993), instead of making assumptions about the population parameters. In a two-tailed test, the level of significance is reached when the loading exceeds 2.576 at .01 (Field, 2018, p.729). Two-tailed basic bootstrapping with 5000 samples and a .01 significance level was conducted in this study.

Table 9

Significance of Path Coefficients for 22 Items from the TDT-CQIES Survey

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Course Quality -> Instructor Effectiveness	0.24	0.238	0.039	6.215	0
Course Structure -> Course Quality	-0.233	-0.231	0.04	5.758	0
Course Structure -> Instructor Effectiveness	-0.197	-0.197	0.039	5.061	0
Course Structure -> Learner Autonomy	-0.377	-0.379	0.04	9.427	0
Dialogue Interaction -> Course Quality	0.286	0.286	0.036	7.858	0
Dialogue Interaction -> Course Structure	-0.612	-0.614	0.024	25.141	0
Dialogue Interaction -> Instructor Effectiveness	0.384	0.383	0.035	11.096	0
Dialogue Interaction -> Learner Autonomy	0.309	0.309	0.039	7.951	0
Learner Autonomy -> Course Quality	0.23	0.231	0.041	5.649	0
Learner Autonomy -> Instructor Effectiveness	0.032	0.033	0.036	0.873	0.383

Table 9 illustrates that all the t values, except one, are above 2.576, all are highly significant at $\alpha = .01$ level or 99% confidence level. The model's highest significance is 25.141, indicating that Dialogue/Interaction has the highest Course Structure effects. In

turn, the t =11.096 score signified that Dialogue/Interaction has the next most significant impact on Instructor Effectiveness. All *P* values were .000, meaning all the paths were significant, except Learner Autonomy -> Instructor Effectiveness. Overall, the significance thresholds were greatly exceeded. The significance is profound for the outer (measurement) model. Table 10 is a testament to this, with all t values and p values showing high significance at .01 level.

Table 10

Significance of Outer Loadings for 22 Items from the TDT-CQIES Survey

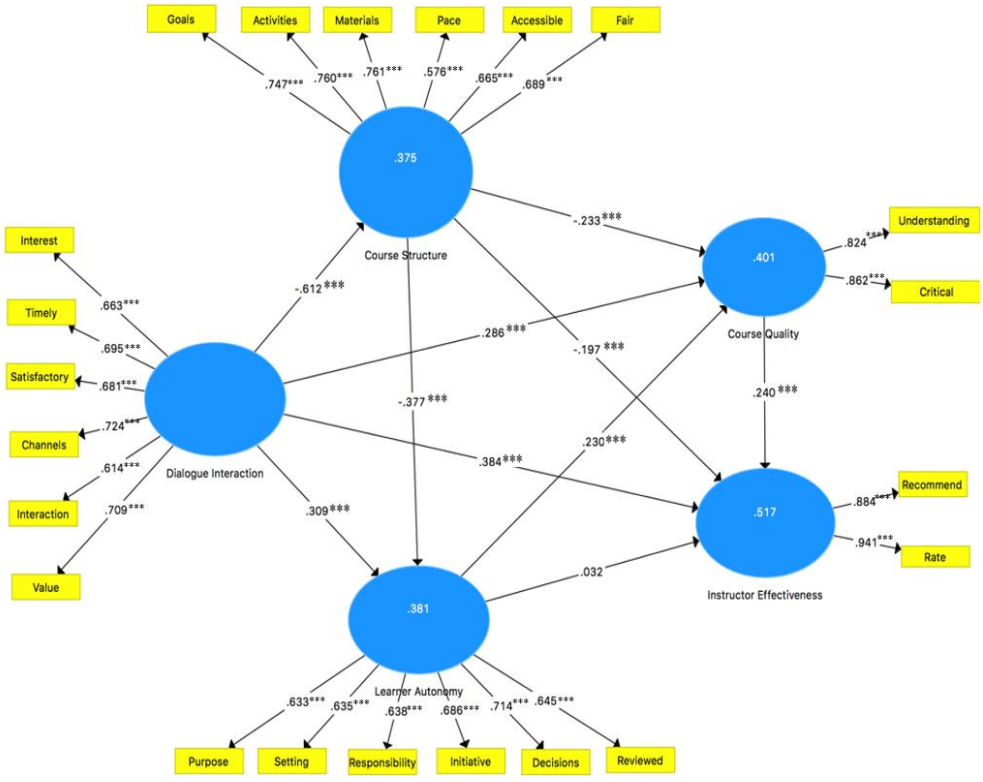
	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Channels <- Dialogue Interaction	0.724	0.724	0.018	40.615	0
Interaction <- Dialogue Interaction	0.613	0.613	0.027	22.701	0
Interest <- Dialogue Interaction	0.663	0.662	0.026	25.773	0
Satisfactory <- Dialogue Interaction	0.681	0.68	0.025	27.438	0
Timely <- Dialogue Interaction	0.695	0.694	0.024	29.368	0
Value <- Dialogue Interaction	0.709	0.709	0.02	35.527	0
Accessible <- Course Structure	0.665	0.665	0.023	28.375	0
Activities <- Course Structure	0.759	0.759	0.016	47.392	0
Fair <- Course Structure	0.689	0.688	0.022	31.853	0
Goals <- Course Structure	0.747	0.746	0.023	32.902	0
Materials <- Course Structure	0.761	0.761	0.016	46.851	0
Pace <- Course Structure	0.576	0.576	0.03	19.021	0
Decisions <- Learner Autonomy	0.714	0.713	0.021	33.362	0
Initiative <- Learner Autonomy	0.685	0.684	0.024	28.284	0
Purpose <- Learner Autonomy	0.633	0.633	0.024	26.937	0
Responsibility <- Learner Autonomy	0.639	0.639	0.026	24.501	0
Reviewed <- Learner Autonomy	0.645	0.645	0.027	24.26	0
Setting <- Learner Autonomy	0.635	0.634	0.028	22.665	0
Understanding <- Course Quality	0.825	0.824	0.015	53.54	0
Critical <- Course Quality	0.861	0.861	0.012	72.274	0
Rate <- Instructor Effectiveness	0.92	0.92	0.006	143.476	0
Recommend <- Instructor Effectiveness	0.909	0.909	0.009	106.855	0

Structural path significance and convergent validity were thus established. Other quality criteria, including standardized indicator loadings on parent variables above .50, composite reliability above .70, and AVE above .50, all demonstrated in this study, are also considered to establish convergent validity.

The SmartPLS program produced the structural model below with the path coefficients in between the latent variables.

Figure 5

SmartPLS Measurement Model with Path Coefficients and R Square Values Based on the 22 TDT-CQIE Survey Items



The PLS path modeling estimation for TDT-CQIE is illustrated in Figure 5 and produced many major observations:

- Each of the latent variables is involved in a significant relationship with at least three others. All the hypothesized path relationships, except one, are statistically significant (> .1).
- The coefficient of determination, R^2, is .401 for the Course Quality endogenous latent variable; this means that the three latent variables (Dialogue/Interaction, Course Structure, and Learner Autonomy) explain 40.1% of the variance in Course Quality.
- The coefficient of determination, R^2, is .517 for the Instructor Effectiveness endogenous latent variable; this means that four latent variables (Dialogue/Interaction, Course Structure, Learner Autonomy, and Course Quality) explain 51.7% of the variance in Instructor Effectiveness.
- Dialogue/Interaction explains 37.5% of the variance in Course Structure, (R^2 =.375).
- Dialogue/Interaction and Course Structure together explain 38.1% of Learner Autonomy variance (R^2 =.381).
- The inner model suggests Dialogue/Interaction has significant effects for Course Structure, Learner Autonomy, Course Quality, and Instructor Effectiveness. Dialogue/Interaction has direct effects on Course Structure and both direct and indirect effects on Learner Autonomy, Course Quality, and Instructor Effectiveness.
- Dialogue/Interaction has the strongest total effects on the other variables: Course Quality (.552), Instructor Effectiveness (.651), Learner Autonomy (.540), and Course Structure (-.612). The negative path coefficient (-.612) between

Dialogue/Interaction and Course Structure indicates an inverse relationship, where increased dialogue and interaction results in less course structure (inflexibility).

- Course Structure significantly effects Learner Autonomy, Course Quality, and Instructor Effectiveness. The negative path coefficients between Course Structure and the other variables (-.377, -.233, -.197) indicate inverse relationships, meaning increased course structure (inflexibility) results in less Learner Autonomy, less Course Quality, and less Instructor Effectiveness, in respective amounts.
- The three hypothesized path relationships towards Course Quality are statistically significant (> .1). Therefore, we can conclude that Dialogue/Interaction, Course Structure, and Learner Autonomy are predictors of Course Quality.
- The hypothesized path relationship between Learner Autonomy and Instructor Effectiveness is not statistically significant (.033). Therefore, we can conclude that Dialogue/Interaction, Course Structure, and Course Quality are predictors of Instructor Effectiveness.

The combination of Dialogue/Interaction, Course Structure, and Learner Autonomy into a new second-order variable, Transaction Distance (TD) as shown in figure 6, produced statistically significant effects for Course Quality (.62) and Instructor Effectiveness (.67). TD is a predictor for both Course Quality and Instructor Effectiveness since path coefficients are greater than .01. TD explained 39% of Course

Quality's variance, while TD and Course Quality together explained 49% of Instructor Effectiveness' variance.

Figure 6

Modelling the Second-Order Variable Transaction Distance (Course Structure, Dialogue/Interaction and Learner Autonomy)

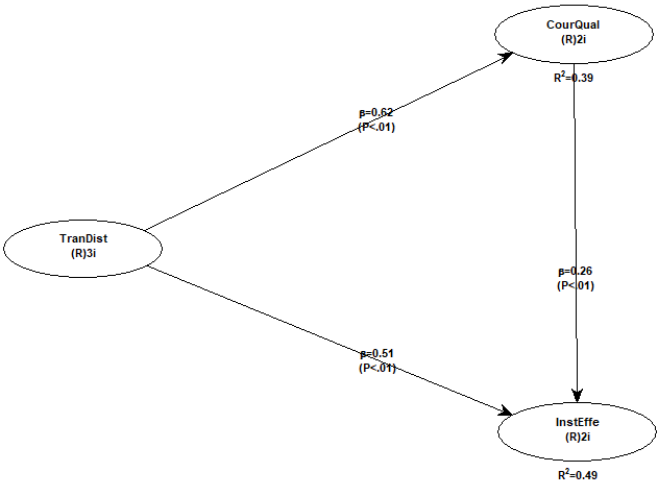
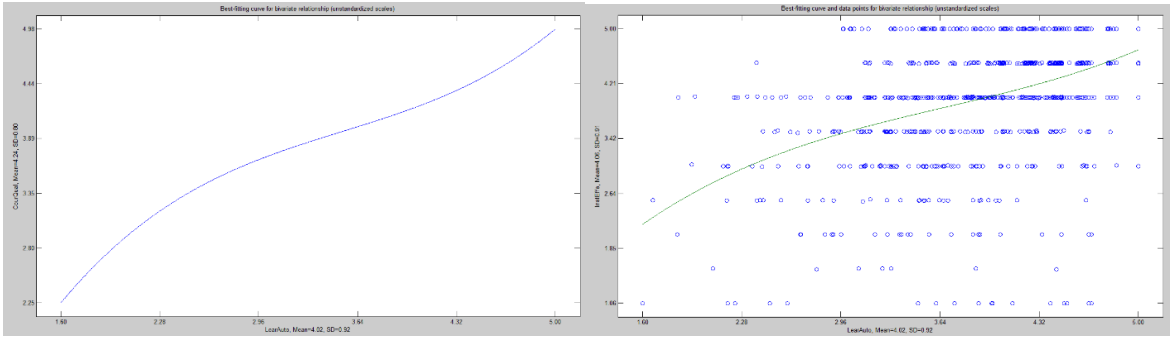


Figure 7

Focused assessment of the bivariate relationships between the latent variables produced warped, non-linear curves. Learning Autonomy against Course Quality and Instructor Effectiveness



The relationships between pairs of all the latent variables produced warped plots on close examination. For example, Learning Autonomy against Course Quality and Instructor Effectiveness produced inverted s-curves (Figure 7). They suggest accelerated rates in perceptions of course quality and instructor effectiveness at low and high learner autonomy and gentler gradient levels in the middle. The observed phenomenon probably groups the students into online learning novices, moderately experienced, and more experienced, with respective differences in course quality and instructor effectiveness perceptions.

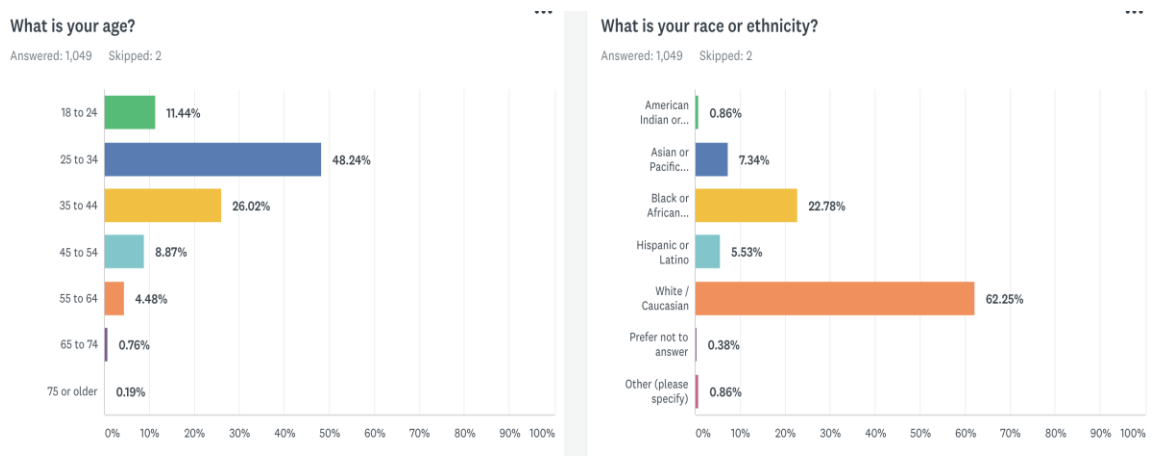
Descriptive Results

The study sample consisted of 1051 students, but two did not qualify to be included in the analysis. Figure 8 depicts the Age and Race statistics. The highest percentage 48.2% (506) were aged between 25 to 34; 26.0% (273) were 35 to 44; 11.4% (120) were 18 to 24, while the rest were 45 and above. Of the 1049 respondents, 572 (54.5%) were male, 472 (45%) were female, and 5 (.5%) were other. The sample by race consisted of 62.2% (653) White; 22.8% (239) Black or African American; 7.3% (77) Asian or Pacific Islander; while the rest broke into Hispanic or Latino 58 (5.5%); American Indian or Alaskan Native 9 (.9%); Other Race 9 (.9%); and 4 (.4%) preferred not to answer. At 26.4% (277) and 25.2% (264) for 2019 and 2020, respectively, almost tied on the year when the students completed their most recent online course. The years 2018 and 2016 came in next with 18.3% (192) and 15.9% (167), respectively. 2017 had the least students by year, 149 representing 14.2% of the sample. 592 (56.4%) were undergraduates, while 457 (43.6%) were graduate students. Seemingly, most students, 436 (41.6%), prefer to take online courses in Spring; 251 (23.9%) in Fall; and almost an

equal number 210 (20.0%) in the Summer Intersession. 152 (14.5%) students reported taking their most recent online course in the Winter Intersession.

Figure 8

Percentage Composition of Research Sample by Age Groups and Race or Ethnicity Groups



For the purpose of statistical analysis, the survey indicators were grouped by the constructs they measured, and the descriptive statistics for each were calculated. Responses ranged from 1 (Strongly Disagree) to 5 (Strongly Agree). Course Structure (M = 1.81, SD = .56) scores are replaced with the reverse logic equivalents. Dialogue/interaction had M = 3.97, SD = .565, Learner Autonomy had M = 4.11, SD = .58, Course Quality had M = 4.12, SD = .73, while Instructor Effectiveness had M = 4.05, SD = .84. The tables for each of the items that measure various constructs are presented below (Tables 11-15).

Table 11

Item Statistics for Course Structure in TD CQIE Survey (N =1049)

Item	Mean	SD
The course goals and grading procedures were clear.	1.71	.684
The learning activities were well organized.	1.84	.807
The course presentations and materials were clear and understandable.	1.83	.792
The course was structured to enable me to work at my own pace to meet the course goals and objectives.	1.93	.917
The instructor, course presentations, and materials were easily accessible to students.	1.74	.838
Tests, papers, and other assignments were graded fairly.	1.82	.794

Table 12

Item Statistics for Learner Autonomy in TD CQIE Survey (N =1049)

Item	Mean	SD
I understood the purpose of the course.	4.38	.724
I shared in the setting of learning goals for the course.	3.82	1.044
I took responsibility for my learning experiences.	4.36	.710
I took the initiative in planning and executing learning activities.	4.12	.859
I took responsibility for evaluation decisions in this course.	4.02	.916
I regularly reviewed my learning and evaluated how effective it was.	4.00	.945

Table 13

Item Statistics for Dialogue/interaction in TD CQIE Survey (N =1049)

Item	Mean	SD
The instructor conveyed interest and enthusiasm in the subject matter.	4.03	.891
The instructor responded to students' work in a reasonable amount of time.	4.12	.859
The instructor satisfactorily answered students' questions.	4.08	.817
I communicated with other students through various channels (e.g., emails, phone, discussion board, and online chat).	3.92	1.031
I actively engaged in dialogues with other students to construct and share knowledge	3.86	1.059
I valued my communication with other students on course-related issues.	3.80	1.016

Table 14

Item Statistics for Course Quality and Instructor Effectiveness in TD CQIE Survey (N =1049)

Item	Mean	SD
This course increased my understanding of the subject matter.	4.24	.805
This course increased my ability to think critically.	4.00	.922
I would recommend the instructor to other students.	4.06	.906
I highly rate the professor's teaching.	4.03	.926

Table 15

Means and Standard Deviations of Online Students' Perceptions by Age

	18 to 24			25 to 34			35 to 44			45 and Over		
Variables	n	M	SD	n	M	SD	n	M	SD	n	M	SD
Course Structure	120	1.97	0.67	506	1.84	0.56	273	1.75	0.52	150	1.70	0.51
Dialogue/ Interaction	120	3.77	0.71	506	3.94	0.65	273	4.04	0.62	150	4.09	0.60
Learner Autonomy	120	3.95	0.62	506	4.10	0.57	273	4.21	0.55	150	4.14	0.56
Course Quality	120	3.92	0.86	506	4.11	0.71	273	4.16	0.73	150	4.26	0.65
Instructor Effectiveness	120	3.80	0.91	506	4.02	0.87	273	4.12	0.77	150	4.20	0.75

Due to the low numbers of students in 45 and above age brackets, it was necessary to re-code and collapse them into one. In Table 15, the resultant four age brackets were well represented, with the 25 to 35 age group being the largest. Except for Learner Autonomy in which the 35 to 44 age group were the highest ($M = 4.21$, $SD = 0.55$); the 45 and Over age group seemed to have the strongest perceptions on all other variables: Dialogue/interaction ($M = 4.09$, $SD = 0.60$); Course Quality ($M = 4.26$, $SD = 0.65$); and Instructor Effectiveness ($M = 4.20$, $SD = 0.75$). Course Structure's $M = 4.30$, $SD = 0.51$, became $M = 1.70$, $SD = 0.51$, on reverse logic.

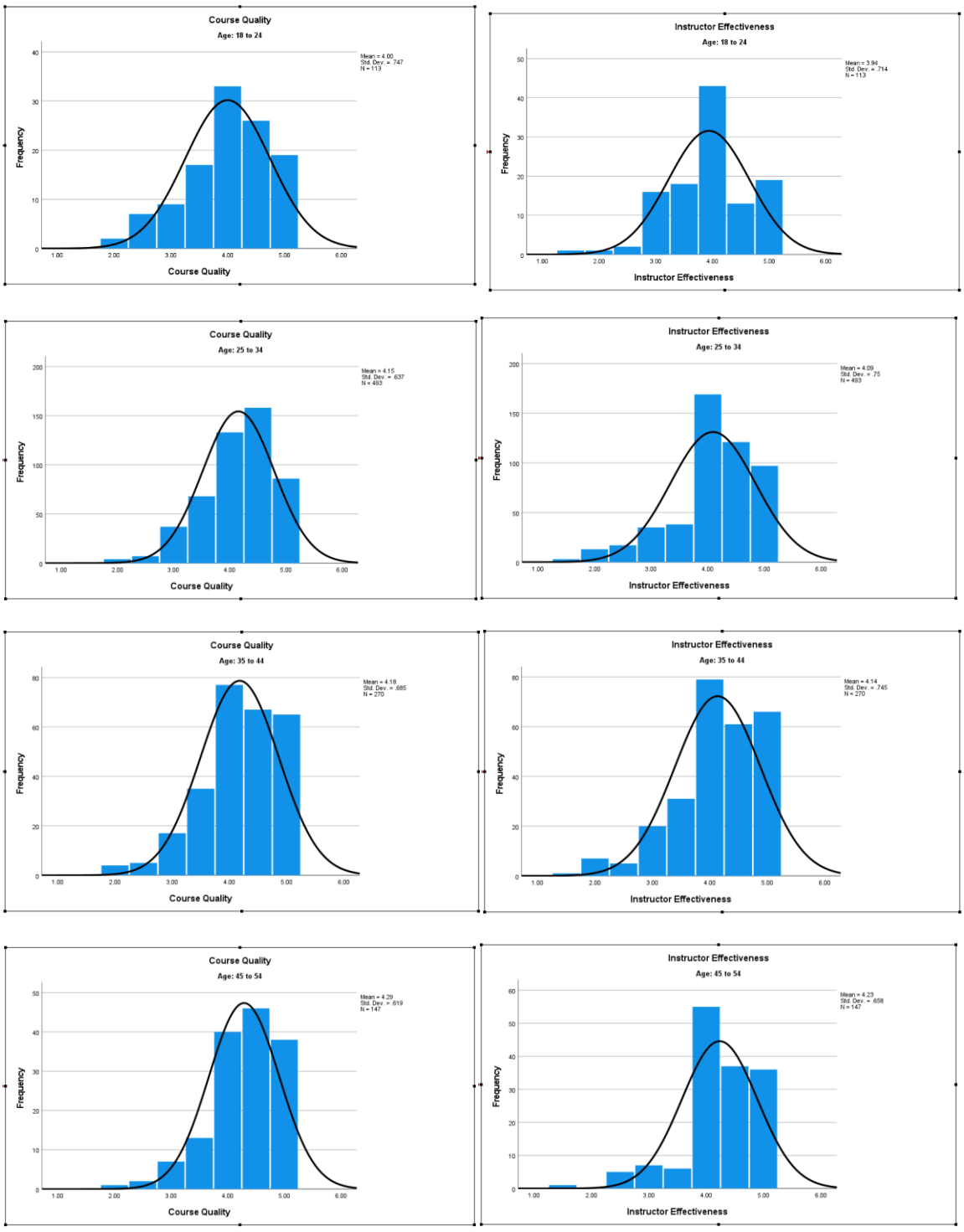
At this juncture, we determined whether there were significant differences between the age groups on students' perceptions of course quality and instructor effectiveness in online learning. The application of one-way multivariate analysis of Variance (one-way MANOVA) was required. Course quality and instructor effectiveness, which had been measured on a continuous scale, acted as our dependent variables, while age was the independent variable, and the four age bands (18-24, 25-34, 35-44, and 45

and over) provided four categorical, independent groups. Each survey questionnaire represented a separate observation, and a particular participant was in only one age group. The sample size of 1049, with the four groups having 120, 506, 273, and 150 members, respectively, is considered adequate and far exceed the 30-participant recommendation.

The variable Course Quality (CQ) revealed nine offending records whose z-scores were below -2.9. None exceeded +1.2. Instructor Effectiveness (IE) had 12 offending records whose z-scores were below -3.0. None exceeded +1.1. Reference was made to an acceptable *Z*-score range of +2.5 (3.0) to -2.5 (3.0) (Hair et al., 2010 as cited in Meyers et al., 2013), and all 21 significantly univariate outliers being a small number, were deleted, as recommended. Mahalanobis distance evaluation revealed five multivariate outliers (values whose probability were below .001), which were also deleted, as recommended. Skewness and kurtosis were used to determine whether the data exhibited univariate and multivariate normality, and it was found that none of the parameters in each of the four groups exceeded the -1 to +1 criterion (George & Mallery, 2003; Morgan, Griego, & Gloekner, 2001 as cited in Meyers et al., 2013). Histograms with the superimposed normal curve (Figure 9) proved the same.

Figure 9

Age Groups Exhibited Univariate Normality in Course Quality and Instructor Effectiveness



A visual inspection of the scatterplot matrix graphs with the fit line at total shows that there was a linear relationship between each pair of dependent variables for each group of the independent variable. The two dependent variables had a moderate Pearson correlation (r = .582) on the +.3 to +.9 reference range. None of the variables had signs of multicollinearity. Box's *M* test of equality of covariance proved homogeneity of variance-covariance, (Box's $M = 16.305$, $F\ (9,1476734) = 1.803$, $p = .062$). Levine's tests on the two variables did not provide any significant output, confirming the homogeneity of variances.

One-way multivariate analysis of Variance (MANOVA) was carried out to determine age category differences in course quality and instructor effectiveness. Outliers were eliminated, and none of the assumption tests were violated. MANOVA results revealed statistically significant differences among age categories on the dependent variables (Wilk's $\Lambda = 0.975$, $F\ (9, 2451) = 2.9$, $p = .002$, partial $\eta 2 = .009$). Analysis of Variance (ANOVA) was conducted on each dependent variable as a follow-up test to MANOVA. Age category differences were significant for Course Quality ($F\ (3, 1019) = 4.177$, $p = .006$, partial $\eta^2 = .012$). The Bonferroni post hoc analysis revealed that the perceptions of course quality and instructor effectiveness in online learning for students of 18-24 years of age differed significantly from all other age brackets. In addition, the 25–34 age group also differs from the 45 and Over age bracket for both constructs.

Table 16

Means and Standard Deviations of Online Students' Perceptions by Gender

	Female			Male			Other		
Variable	n	M	SD	n	M	SD	n	M	SD
Course Structure	457	1.76	0.529	561	1.82	0.555	5	1.70	0.217
Dialogue/Interaction	457	4.02	0.630	561	3.98	0.631	5	3.60	0.585
Learner Autonomy	457	4.15	0.558	561	4.10	0.573	5	4.40	0.384
Course Quality	457	4.21	0.632	561	4.13	0.687	5	3.90	0.418
Instructor Effectiveness	457	4.12	0.748	561	4.09	0.728	5	4.00	0.000

Female students had marginally stronger opinions on online courses than their male counterparts, as the means show in Table 16. A one-way multivariate analysis of Variance (MANOVA) was carried out to determine gender differences in perceptions of course quality and instructor effectiveness in online learning. Outliers were eliminated, and none of the assumption tests were violated. MANOVA results revealed no statistically significant differences amongst gender categories on the dependent variables.

Table 17

Means and Standard Deviations of Online Students' Perceptions by Race

	American Indian or Alaskan Native			Asian or Pacific Islander			Black or African American			Hispanic or Latino			White / Caucasian		
	n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD
Course Structure	22	1.9	0.5	75	1.9	0.7	237	1.8	0.5	56	1.7	0.6	633	1.8	0.5
Dialogue/ Interaction	22	4.0	0.6	75	3.9	0.7	237	4.2	0.5	56	4.0	0.6	633	3.9	0.7
Learner Autonomy	22	3.9	0.6	75	4.0	0.7	237	4.3	0.5	56	4.2	0.7	633	4.1	0.6
Course Quality	22	4.2	0.5	75	4.0	0.7	237	4.3	0.6	56	4.2	0.7	633	4.1	0.9
Instructor Effectiveness	22	4.0	0.8	75	4.1	0.8	237	4.3	0.6	56	4.0	0.7	633	4.1	0.8

American Indian or Alaskan Native (9), those who preferred not to answer (4), and Mixed Races (9) were collapsed into one due to low numbers of students in those categories. Table 17 shows that African American students stand out with the strongest opinions on all variables of online courses: Course Structure (M = 1.67, SD = 0.51); Dialogue/interaction (M = 4.21, SD = 0.51); Learner Autonomy (M = 4.26, SD = 0.49); Course Quality (M = 4.27, SD = 0.59); and Instructor Effectiveness (M = 4.27, SD = 0.60). A one-way MANOVA was carried out to determine race category differences in transactional distance, course quality, and instructor effectiveness. Outliers were eliminated, and none of the assumption tests were violated, except for Box's M and Levine's. MANOVA results revealed statistically significant differences among race categories on the dependent variables (Wilk's Λ = 0.979, F (8, 2036) = 2.664, p = .007, partial η^2 = .010). Analysis of Variance (ANOVA) was conducted on each dependent variable as a follow-up test to MANOVA. Race category differences were significant for Course Quality (F (4, 1018) = 2.647, p = .032, partial η^2 = .010); and for Instructor Effectiveness (F (4, 1018) = 4.074, p = .003, partial η^2 = .016). The Bonferroni post hoc analysis revealed that Black or African Americans' perceptions of Course Quality differ significantly from Asian or Pacific Islanders and White/Caucasian races. In addition, perceptions of instructor effectiveness by Black or African American students differ significantly from those of their White/Caucasian and Hispanic/Latino counterparts.

Table 18

Means and Standard Deviations of Students' Perceptions of Course Quality and Instructor Effectiveness in Online Learning by Major

	Business Studies			Computer Sciences			Education			Engineering			Health Sciences			Liberal Arts and Sciences		
	n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD
Course Structure	237	1.8	0.6	264	1.8	0.5	65	1.7	0.6	25	2.0	0.6	107	1.8	0.6	242	1.9	0.5
Dialogue/ Interaction	237	4.0	0.6	264	4.0	0.6	65	4.0	0.7	25	3.8	0.7	107	3.9	0.7	242	4.0	0.7
Learner Autonomy	237	4.2	0.5	264	4.2	0.6	65	4.0	0.6	25	3.8	0.6	107	4.1	0.6	242	4.1	0.6
Course Quality	237	4.2	0.6	264	4.1	0.7	65	4.0	0.8	25	4.1	0.66	107	4.1	0.6	242	4.2	0.6
Instructor Effectiveness	237	4.2	0.7	264	4.1	0.7	65	4.0	0.8	25	3.7	0.9	107	4.0	0.8	242	4.1	0.8

Table 18 presents the means and standard deviations of the sample when grouped by program major. The largest group of students by major was Computer Science (n = 264), while the smallest group was Engineering (n = 14). Eighty-one had a non-identifiable major. The business group had the strongest opinions on all online course variables except course structure. A one-way multivariate analysis of Variance (MANOVA) was carried out to determine students' major category differences in transactional distance, course quality, and instructor effectiveness. Outliers were eliminated, and none of the assumption tests were violated, except for Box's M and Levine's. MANOVA results revealed statistically significant differences among student's major categories on the dependent variables (Wilk's $\Lambda = 0.980$, F (12,2030) = 1.734, p = .05, partial $\eta^2 = .012$). Analysis of Variance (ANOVA) was conducted on each dependent variable as a follow-up test to MANOVA. Student's major category differences were significant for Transactional Distance (F (6, 1006) = 3.250, p = .004, partial $\eta^2 = .019$).

Table 19

Means and Standard Deviations of Online Students' Perceptions by Year of Most Recently Finished Online Course

	2020			2019			2018			2017			2016		
Variable	n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD
Course Structure as Flexibility	264	4.1	0.6	277	4.2	0.5	192	4.2	0.6	149	4.2	0.5	167	4.2	0.5
Dialogue/ Interaction	264	4.0	0.7	277	4.0	0.6	192	3.9	0.7	149	4.0	0.6	167	3.9	0.6
Learner Autonomy	264	4.1	0.6	277	4.2	0.6	192	4.1	0.6	149	4.0	0.6	167	4.1	0.5
Course Quality	264	4.1	0.8	277	4.2	0.7	192	4.0	0.8	149	4.1	0.7	167	4.2	0.6
Instructor Effectiveness	264	4.0	0.9	277	4.1	0.7	192	3.9	1.0	149	4.1	0.8	167	4.1	0.7

Evident in Table 19, when online Students' Perceptions were considered by Year of Most Recently Finished Online Course, two sets of students held the sway. The 2016 group was the strongest on Course Structure ($M = 4.230$, $SD = 0.518$); while 2019 group was the strongest on Dialogue/Interaction ($M = 4.022$, $SD = 0.609$), Learner Autonomy ($M = 4.189$, $SD = 0.569$), Course Quality ($M = 4.181$, $SD = 0.728$), and Instructor, and Instructor Effectiveness ($M = 4.132$, $SD = 0.742$). A one-way multivariate analysis of Variance (MANOVA) was carried out to determine academic year differences in transactional distance, course quality, and instructor effectiveness. Outliers were eliminated, and none of the assumption tests were violated. MANOVA results revealed no statistically significant differences amongst academic year categories on the dependent variables.

Table 20

Means and Standard Deviations of Online Students' Perceptions by Semester of Most Recently Finished Online Course

	Fall			Spring			Winter			Summer		
Variable	n	M	SD	n	M	SD	n	M	SD	n	M	SD
Course Structure as Flexibility	251	4.212	0.537	436	4.164	0.575	152	4.190	0.569	210	4.213	0.557
Dialogue/Interaction	251	3.961	0.676	436	3.930	0.669	152	4.050	0.573	210	4.001	0.634
Learner Autonomy	251	4.120	0.553	436	4.092	0.595	152	4.145	0.541	210	4.134	0.586
Course Quality	251	4.124	0.724	436	4.095	0.726	152	4.151	0.723	210	4.155	0.747
Instructor Effectiveness	251	4.016	0.864	436	4.018	0.874	152	4.171	0.649	210	4.055	0.850

Far more students took online courses in the Spring semester (n = 436), and the Winter Intersession had the least (n = 152). The Summer Intersession group had the strongest opinions on Course Structure (M = 4.213, SD = 0.557), and Course Quality (M = 4.155, SD = 0.747); while the Winter Intersession group took the lead in Dialogue/interaction (M = 4.050, SD = 0.573), Learner Autonomy (M = 4.145, SD = 0.541) and Instructor Effectiveness (M = 4.171, SD = 0.649). A one-way multivariate analysis of Variance (MANOVA) was carried out to determine semester differences in transactional distance, course quality, and instructor effectiveness. Outliers were eliminated, and none of the assumption tests were violated. MANOVA results revealed no statistically significant differences amongst semester categories on the dependent variables.

Table 21

Means and Standard Deviations of Online Students' Perceptions by Level of Most Recently Finished Online Course

	Undergraduate			Graduate			Total		
Variable	n	M	SD	n	M	SD	n	M	SD
Course Structure as Flexibility	592	4.171	0.590	457	4.212	0.522	1049	4.189	0.562
Dialogue/Interaction	592	3.876	0.689	457	4.090	0.577	1049	3.969	0.651
Learner Autonomy	592	4.076	0.597	457	4.165	0.543	1049	4.115	0.575
Course Quality	592	4.067	0.750	457	4.194	0.696	1049	4.122	0.729
Instructor Effectiveness	592	3.963	0.920	457	4.156	0.704	1049	4.047	0.838

In Table 21, although the Undergraduate students were more (n = 592) than the Graduate students (n = 457), the latter exhibited the strongest opinions on all online course variables. A one-way multivariate analysis of Variance (MANOVA) was carried out to determine level differences in transactional distance, course quality, and instructor effectiveness. Outliers were eliminated, and none of the assumption tests were violated. MANOVA results revealed no differences.

Research Question 1: Transactional Distance and Course Quality

Research Question 1 sought to determine whether a statistically significant relationship existed between transactional distance and students' perceptions of course quality in online learning. The hypothesis that a statistically significant correlation existed between transactional distance and students' perceptions of course quality in online learning was supported. It is imperative to note that causation is not sought, but rather whether the transactional distance and course quality have meaningful relationships. Correlational analysis between course structure, dialogue/interaction, and learner autonomy against course quality will show (non-) existence of the relationship,

the direction, and the strength. The measure of strength and direction of linear relationships between pairs of continuous variables applies Bivariate Pearson Correlation, which calculates a sample correlation coefficient, *r.* The Pearson Correlation is a parametric measure. Pearson Correlation also evaluates the existence of statistical evidence for linear relationships amongst pairs of variables in a population, represented by a population correlation coefficient, ρ ("rho"). In a Two-tailed significance test, our null hypothesis (H_0: $\rho = 0$) is that the population correlation coefficient is 0; there is no association; while our alternative hypothesis (H_1: $\rho \neq 0$) is that the population correlation coefficient is not 0. The implication is that a nonzero correlation could exist.

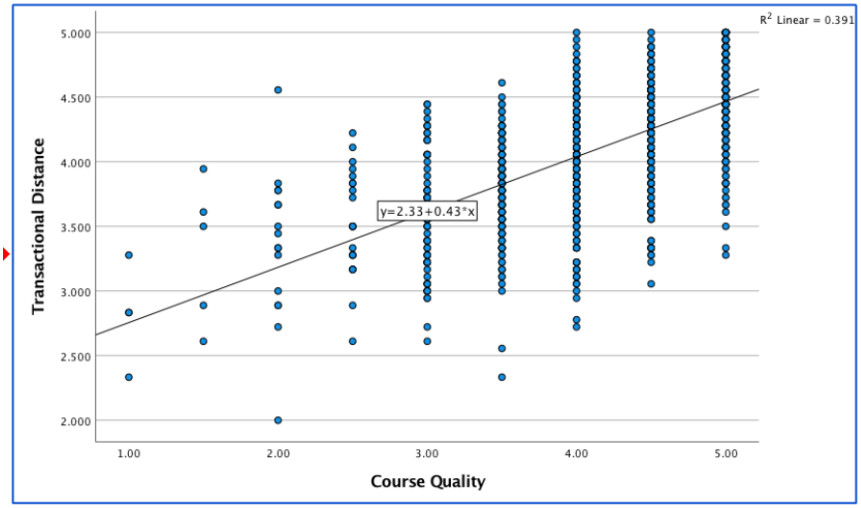
The prelude, therefore, were the seven assumption tests for correlation. The study met the first two assumptions, which required confirmation that the research data was gathered from a random sample of the population; and that in all cases, there were no missing variables. In the next assumption testing, the 18 items of course structure, dialogue/interaction, and learner autonomy are averaged into Transactional Distance (TD). Two items: critical thinking and increased understanding, are averaged into Course Quality. All the initial 20 items had been measured on a five-point Likert scale. We had at least two continuous variables. The fourth assumption, which we also met, demanded independence of observations. Each respondent had completed the survey questionnaire independent of other participants. Thus, the values for all variables across cases were unrelated; for any given case, any variable's value could not influence the value of any variable for other cases; and no case could influence another case on any variable. In the next assumption, it was noted that Pearson's correlation coefficient, r, is sensitive to outliers, meaning that outliers can have an exaggerated influence on the value of r. By *Z*-

score analysis and the +2.5 to -2.5 criterion (Hair et al., 2010 as cited in Meyers et al., 2013), the data presents no significant outliers. The nine respondent records whose z-scores were less than -2.9 were deleted, as recommended. None of the other records had z-scores greater than +1.2. The requirement of linearity was also considered. A visual inspection of the SPSS scatterplot (Figure 10) of Transactional Distance against Course Quality proves unequivocally that a linear relationship exists between the two variables.

Pursuant to the assumption on bivariate normality, the data was normally distributed for both Transactional Distance (M = 4.1, SD = .49, skewness = -.477, kurtosis = .118), and Course Quality (M = 4.15, SD = .68, skewness = -.796, kurtosis = 0.437). The histograms supported this finding too. The reference frame for skewness and kurtosis in normally distributed data ranges from -1 to +1 (George & Mallery, 2003; Morgan, Griego, & Gloekner, 2001 as cited in Meyers et al., 2013). Lastly, the assumption that data has homoscedasticity was also met since the scatter plot above clearly showed that approximately the same number of points lie on either side of the best-fit line. The normality scatter plots for both variables also revealed that almost all points are on the line or very close.

Figure 10

Linear Relationship Between Transactional Distance and Course Quality



This study adopted the bivariate Pearson Correlation in the effort to answer the first research question. Correlations describe linear relationships. A correlation of 1 is a perfect linear relationship, where an increase in one variable has an identical observable increase in another. Correlations are also described by direction +ve or -ve, where a positive increase in one variable heralds a similar positive increase in another, and a negative illustrates an inverse correlation. Correlations are also recognized by their magnitude or strength with the following thresholds: $r = 0.00$ means no linear relationship, r +/- .30 means weak linear relationship, r +/- .50 means moderate linear relationship, and r +/- .70 means strong linear relationship.

We found that transactional distance and students' perceptions of course quality in online learning were correlated, $r\ (1038) = .610$, $p < .001$, and that the correlation was significant at 99% confidence level ($\alpha = .01$). The direction of the relationship is positive (i.e., transactional distance and students' perceptions of course quality are positively correlated), meaning that these variables tend to increase together (i.e., greater

transactional distance is associated with greater students' perceptions of course quality). The strength of the association is moderate ($.5 < | r | < .7$). The alternative hypothesis was thus adopted ($H1_1: \rho \neq 0$), an indication that a statistically significant relationship exists between transactional distance and students' perceptions of course quality in online learning. Course quality also had significant relation to individual components of transactional distance (Table 22): course structure, r (1038) = .527, $p < .001$; dialogue/interaction, r (1038) = .512, $p < .001$; and learner autonomy, r (1038) = .489, $p < .001$.

Table 22

Summary of Correlations among online learning students' perceptions of course quality and transactional distance in the USA

Variable	Transactional Distance	Course Structure	Dialogue/ Interaction	Learner Autonomy	Course Quality
Transactional Distance		.833**	.852**	.816**	.610**
Course Structure as Flexibility	.833**		.569**	.538**	.527**
Dialogue/Interaction	.852**	.569**		.522**	.512**
Learner Autonomy	.816**	.538**	.522**		.489**
Course Quality	.610**	.527**	.512**	.489**	

Note: ** $p < .01$ (Correlation is significant at the 0.01 level, 2-tailed).

Research Question 2: Transactional Distance and Instructor Effectiveness

Research Question 2 sought to determine whether a statistically significant relationship existed between transactional distance and students' perceptions of instructor effectiveness in online learning. The hypothesis that a statistically significant correlation existed between transactional distance and students' perceptions of instructor effectiveness in online learning was supported. It was clear that a causal was not sought, but rather whether the transactional distance and instructor effectiveness have any meaningful relationships. Correlational analysis between course structure, dialogue/interaction, and learner autonomy against instructor effectiveness will show (non-) existence of the relationship, the direction, and the strength. Bivariate Pearson correlation produces a sample coefficient, *r,* which measures the strength and direction of linear relationships between pairs of continuous variables. Pearson's correlation also evaluates the statistical evidence for a linear relationship amongst pairs of variables in the population, represented by a correlation coefficient, ρ ("rho"). The Pearson Correlation is a parametric measure. In a Two-tailed significance test, our null hypothesis (H_0: $\rho = 0$) is that the population correlation coefficient is 0; there is no association; while our alternative hypothesis (H_1: $\rho \neq 0$) is that the population correlation coefficient is not 0. The intimation is that a nonzero correlation could exist. The assumption tests for correlation were first investigated:

- The research data was gathered from a random sample of the population.
- The study confirmed that in all cases, there were no missing variables.
- The 18 items of course structure, dialogue/interaction, and learner autonomy are averaged into Transactional Distance (TD), and two items: recommend

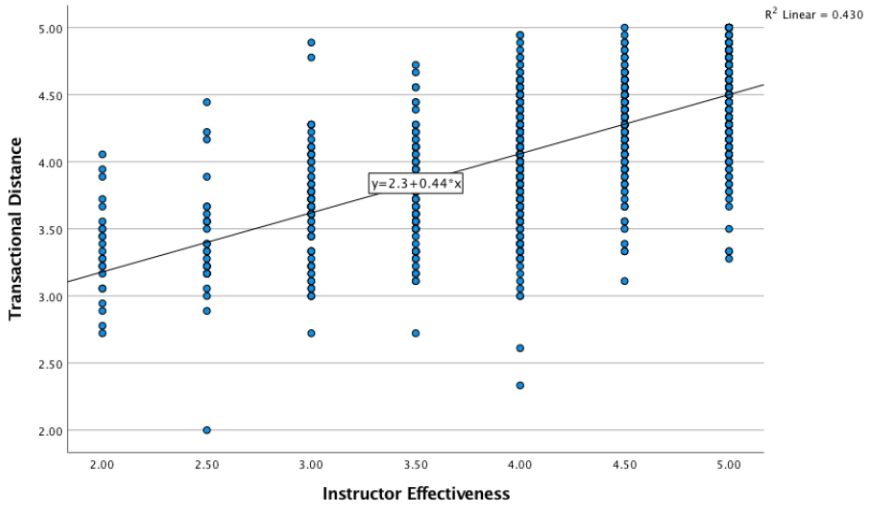
instructor and rate professor are averaged into Instructor Effectiveness. All the initial 20 items had been measured on a five-point Likert scale. We had two continuous variables.

- Each respondent completed the survey questionnaire independent of other participants. Thus, the values for all variables across cases were unrelated; for any given case, any variable's value could not influence the value of any variable for other cases; and no case could influence another case on any variable.
- Pearson's correlation coefficient, r, is sensitive to outliers, meaning that outliers can have an exaggerated influence on the value of r. By *Z*-score analysis and the +2.5 to -2.5 criterion (Hair et al., 2010 as cited in Meyers et al., 2013), the data presents no significant outliers. The 19 respondent records whose z-scores were less than -2.6 were deleted, as recommended. None of the other records had *z*-scores greater than +1.2.
- A visual inspection of the SPSS scatterplot, Figure 11, of Transactional Distance against Instructor Effectiveness proves unequivocally that a linear relationship exists between the two variables.
    - Pursuant to the next assumption, the data is normally distributed for both Transactional Distance (*M* = 4.1, *SD* = .48, skewness = -.424, kurtosis = .108), and Instructor Effectiveness (*M* = 4.12, *SD* = .72, skewness = -.836, kurtosis = 0.520). The histograms supported this finding too. The reference frame for skewness and kurtosis in normally distributed data is

the range -1 to +1, (George & Mallery, 2003; Morgan, Griego, & Gloekner, 2001 as cited in Meyers, et al., 2013).

Figure 11

Linear Relationship Between Transactional Distance and Instructor Effectiveness



- The assumption that data has homoscedasticity is also met since the scatter plot above clearly shows that roughly the same number of points lie on either side of the best-fit line. The normality scatter plots also showed that almost all points are on the line or very close for both variables.

This study also adopted the bivariate Pearson Correlation in the effort to answer the second research question. Correlations describe linear relationships. A correlation of 1 is a perfect linear relationship, where an increase in one variable has an identical observable increase in another. Correlations are also described by direction +ve or -ve, where a positive increase in one variable heralds a similar positive increase in another, and a negative illustrates an inverse correlation. Correlations are also recognized by their magnitude or strength with the following thresholds: $r = 0.00$ means no linear

relationship, *r* +/- .30 means weak linear relationship, *r* +/- .50 means moderate linear relationship, and *r* +/- .70 means strong linear relationship.

We found that transactional distance and students' perceptions of instructor effectiveness in online learning were strongly correlated, $r\,(1019) = .656$, $p < .001$, and that the correlation was significant at 99% confidence level ($\alpha = .01$). The direction of the relationship is positive (i.e., transactional distance and students' perceptions of instructor effectiveness are positively correlated), meaning that these variables tend to increase together (i.e., greater transactional distance is associated with greater students' perceptions of instructor effectiveness). The magnitude of the association is moderate ($.5 < | r | < .7$). The alternative hypothesis was thus adopted ($H2_1: \rho \neq 0$), an indication that a statistically significant relationship exists between transactional distance and students' perceptions of instructor effectiveness in online learning. Instructor effectiveness also had significant relation to individual components of transactional distance (Table 23): course structure, $r\,(1019) = .564$, $p < .001$; dialogue/interaction, $r\,(1019) = .595$, $p < .001$; and learner autonomy, $r\,(1019) = .477$, $p < .001$.

Table 23

Summary of Correlations among online learning students' perceptions of instructor effectiveness and transactional distance in the USA

Variable	Transactional Distance	Course Structure	Dialogue/ Interaction	Learner Autonomy	Instructor Effectiveness
Transactional Distance		.828**	.848**	.825**	.656**
Course Structure as Flexibility	.828**		.554**	.548**	.564**
Dialogue/Interaction	.848**	.554**		.528**	.595**
Learner Autonomy	.825**	.548**	.528**		.477**
Instructor Effectiveness	.656**	.564**	.595**	.477**	

Note: ** p <.01 (Correlation is significant at the 0.01 level, 2-tailed).

Research Question 3: Transactional Distance Predicts Course Quality

Research Question 3 aimed to establish the extent to which transactional distance predicts students' perceived course quality in online learning. The hypothesis that transactional distance as a predictor of students' perceptions of course quality in online learning was supported. The computation of the coefficients that show the predictive relationship required multiple linear regression analysis, with course quality as the dependent variable, and course structure, dialogue/interaction, and learner autonomy as the independent variables. Regression analysis produces *R,* which is considered one measure of the quality of predicting the dependent variable. Regression analysis also produces an R^2 value, also known as the coefficient of determination or explanatory power. R^2 is the proportion of variance in the dependent variable that the independent variables can explain. Technically, R^2 is the proportion of variation accounted for by the

regression model above and beyond the mean model. In multiple linear regression, our null hypothesis ($H3_0$: $\beta_1 = \beta_2 = \beta_3 = 0$) is that the population correlation coefficients are all 0; there is no predictive association. Put merely, course structure, dialogue/interaction, and learner autonomy do not predict course quality. The alternative hypothesis ($H3_1$: $\beta_i \neq 0$) is that at least one population correlation coefficient is not 0; a nonzero correlation could exist, indicating that either one, a combination, or all transaction distance variables (course structure, dialogue/interaction, and learner autonomy) predict student's perception of course quality.

Customarily, the assumption tests for multiple linear regression are necessary. Multiple linear regression analysis makes the following key assumptions:

- The sample size in regression analysis requires at least 20 cases per independent variable in the analysis.
- A linear relationship between the outcome variable and the predictor variables is presumed. Scatterplots may show whether there is a linear or curvilinear relationship.
- MLR assumes that independent variables are not strongly correlated (No Multicollinearity). This assumption is tested using the Variance Inflation Factor (VIF) values.
- MLR assumes that the residuals are normally distributed (Multivariate Normality).
- Multiple regression requires homoscedasticity, an assumption that the variances of error terms are similar across the predictor variables' values. A

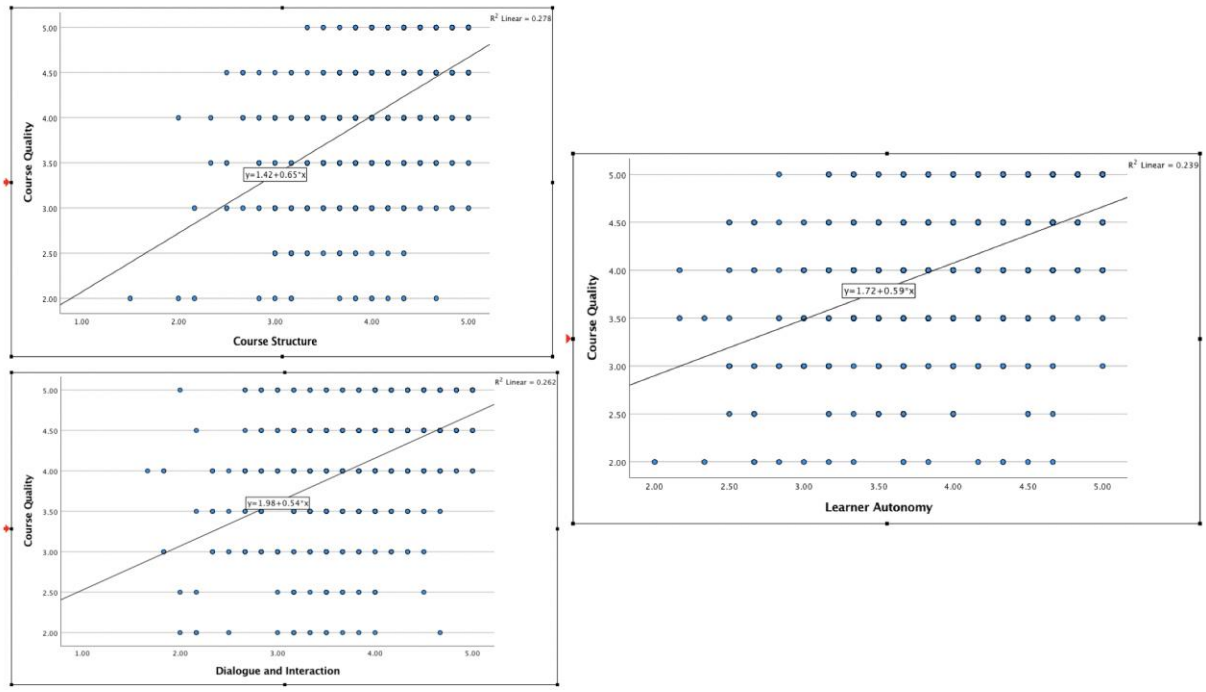
graph of standardized residuals against the predicted values would show whether points are equally distributed across all independent variables' values.

- Finally, multiple linear regression requires at least two independent variables: nominal, ordinal, or interval/ratio level variables.

Data screening procedures produced no value checking and coding errors and no missing data. A test for univariate outliers identified nine records whose z scores were less than -2.9. None of the z scores were greater than +1.2. The nine offending records were deleted. The limits for the univariate outliers, +2.5 (3.0) to -2.5 (3.0), were informed by Hair et al., 2010, as cited in Meyers et al., 2013. Influential data points and significant outliers may create an undue influence on the model, rendering it less representative of your data. SPSS creates the Cook's Distance statistic for each participant, and values over 1 are likely to be significant outliers. In our study, no such instances have occurred, the highest value being .03883. The independent variables are Course Structure, Dialogue/Interaction, and Learner Autonomy in the current study. A sample size of 1049 far exceeds the 60 cases requirement. A visual inspection of the scatterplots in Figure 12 shows a linear relationship between the outcome variable, course quality, and independent variables.

Figure 12

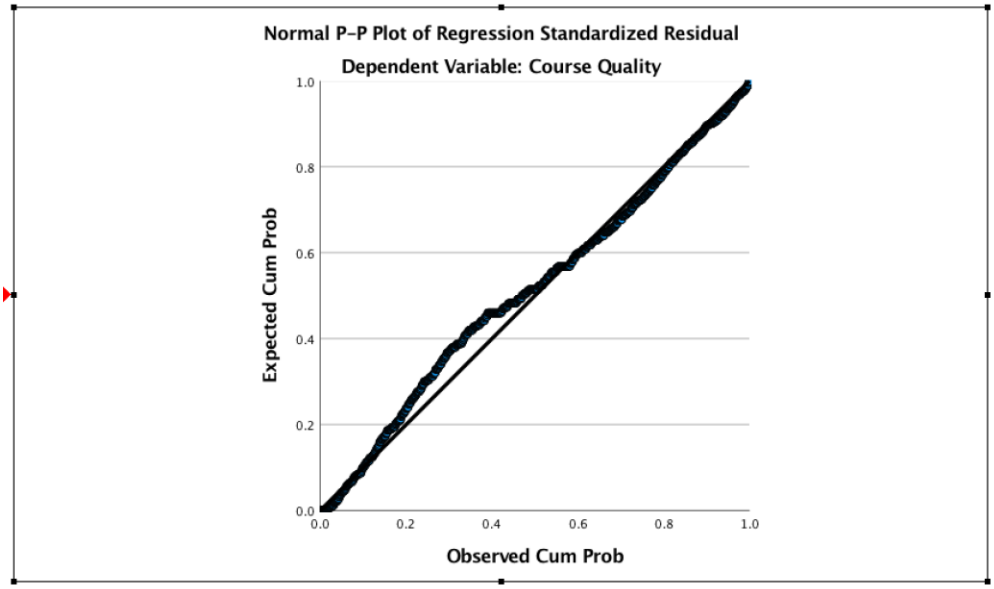
Linear Relationship Between Course Quality and Transactional Distance Variables



Our tests did not produce multicollinearity. Correlations of more than 0.8 may be of concern. The highest correlation is r =.527. We also tested the multicollinearity assumption from the coefficients table to formally check that predictors (or IVs) are not too highly correlated. VIF and Tolerance statistics assessed the assumption. The VIF scores were well below 10, the highest was 1.678, and the tolerance scores were above 0.2, the lowest being .596. We tested for multivariate normality (normal distribution of the residuals) by charting the P-P plot. Looking at Figure 13, which is the P-P plot for the model, we found our dots lay close to the diagonal line, confirming that the residuals were normally distributed.

Figure 13

The Values of the Residuals were Normally Distributed



This assumption of homoscedasticity, which requires that the residuals' variance is constant, was tested with a graph. The graph plotted the standardized values the model would predict against the standardized residuals obtained. As the predicted values increased (along the X-axis), the residuals' variation was roughly similar. We had a random array of dots. The assumption was not violated. Our study has three independent variables (course structure, dialogue/interaction, and learner autonomy), exceeding the requirement of at least two. All the assumptions for multiple linear regression were fully met; none has been violated.

To respond to Research Question 3, the extent to which transactional distance variables (independent, predictor, explanatory, or regressor variables) predict students' perceived course quality (dependent, outcome, target, or criterion variable) in online learning, we utilized multiple linear regression. The aim was to understand whether

course quality can be predicted based on course structure, dialogue/interaction, and learner autonomy. Multiple linear regression allowed us to determine the overall fit (variance explained) of the model and each predictor's contribution to the total variance explained. The target was to know how much of the variation in course quality can be explained by course structure, dialogue/interaction, learner autonomy "as a whole," and the "relative contribution" of each independent variable in explaining the variance.

Table 24

Summary of Multiple Regression Analysis for Variables Predicting Course Quality (n = 1040)

	Course Quality		
Variable	*B*	*SE B*	*β*
Course Structure as Flexibility	0.34	0.04	0.27*
Dialogue/Interaction	0.26	0.03	0.24*
Learner Autonomy	0.26	0.04	0.21*
R^2		.37*	
F		205.95*	

Note: $*p < .05$

MLR analysis was conducted to examine the predictive nature of transactional distance over students' perceived course quality in online learning. Table 24 shows that a significant regression equation was found F (3,1036) = 205.95, $p < .001$, with an R^2 of .374, which accounts for approximately 37% of the course quality variance. The *F*-ratio showed that the independent variables statistically significantly predict the dependent variable. The regression model was a good fit for the study data. The

participants predicted course quality is equal to .642 + .335 * (Course Structure) + .260 * (Dialogue/Interaction) + .258 * (Learner Autonomy). The equation indicates that for every unit increase in all or either course structure, dialogue/interaction, and learner autonomy, there would be an increase in course quality. The average increase in course quality for 1-unit improvement in course structure was .335. The average increase of course quality for 1-unit improvement in dialogue/interaction was .260. The average increase of course quality for 1-unit improvement in learner autonomy was .258. By substitution, the regression equation, Course Quality is equal to $\beta_0 + \beta_1$ * Course Structure + β_2 * Dialogue/interaction + β_3 * Learner Autonomy, becomes:

$$CQ = .642 + .335 * (CS) + .260 * (DI) + .258 * (LA)$$

All the three variables added statistically, significantly to the prediction, $p < .05$. The alternative hypothesis (H_1: $\beta_i \neq 0$) was thus adopted to indicate that transactional distance independent variables (course structure, dialogue/interaction, and learner autonomy) can predict students' perceptions of course quality in online learning.

Research Question 4: Transactional Distance Predicts Instructor Effectiveness

Research Question 4 sought to establish the extent to which transactional distance is predictive of students' perceived instructor effectiveness in online learning. The hypothesis that transactional distance as a predictor of students' perceptions of instructor effectiveness in online learning was supported. Regression analysis with instructor effectiveness as the dependent variable, course structure, dialogue/interaction, and learner autonomy as the independent variables will compute the coefficients to show the predictive relationship. Regression analysis produces *R,* which is considered one measure of the quality of predicting the dependent variable. Regression analysis also produces an

R^2 value, known as the coefficient of determination or explanatory power. R^2 is the proportion of variance in the dependent variable that the independent variables can explain. Technically, R^2 is the proportion of variation accounted for by the regression model above and beyond the mean model). In multiple linear regression, our null hypothesis (H_0: $\beta_1 = \beta_2 = \beta_3 = 0$), is that the population correlation coefficients (β_i) are 0; there is no predictive association. Simply put, course structure, dialogue/interaction, and learner autonomy do not predict instructor effectiveness. The alternative hypothesis (H_1: $\beta_i \neq 0$) is that at least one population correlation coefficient is not 0; a nonzero correlation could exist, indicating that either one, a combination, or all transaction distance variables (course structure, dialogue/interaction, and learner autonomy) predict student's perception of instructor effectiveness.

The assumption tests for multiple linear regression are, therefore, necessary. Multiple linear regression (MLR) analysis makes the following key assumptions: the sample size of regression analysis requires at least 20 cases for each independent variable; there must be a linear relationship between the outcome variable and the predictor variables, and scatterplots show whether there is a linear relationship or not; the independent variables are not highly correlated with each other (No Multicollinearity), and this may be tested using Variance Inflation Factor (VIF) values; the residuals are normally distributed (Multivariate Normality); the variances of error terms are similar across the values of the independent variables (homoscedasticity), and a graph of standardized residuals against predicted values could illustrate whether points are equally distributed across all values of the independent variables; and lastly, MLR requires at

least two independent variables, which can be interval/ratio level variables, nominal, or ordinal.

Data screening procedures produced no value checking and coding errors and no missing data. A test for univariate outliers identified 24 records whose z scores were less than -2.44. None of the z scores were greater than +1.14. The 24 offending records were deleted. The limits for the univariate outliers, +2.5 (3.0) to -2.5 (3.0), were informed by Hair et al., 2010, as cited in Meyers et al., 2013. Influential data points and significant outliers may create an undue influence on the model, rendering it less representative of your data. SPSS creates the Cook's Distance statistic for each participant, and values over 1 are likely to be significant outliers. In our study, no such instances have occurred, the highest value being .07035. The independent variables are Course Structure, dialogue/interaction, and Learner Autonomy in the current study. A sample size of 1025 far exceeds the 60 cases requirement. A visual inspection of the scatterplots in Figure 14 shows a linear relationship between the outcome variable, instructor effectiveness, and independent variables.

Our tests did not produce multicollinearity. Correlations of more than 0.8 may be contentious. The highest correlation is r =.599. We also tested the multicollinearity assumption from the coefficients table to formally check that predictors (or IVs) are not too highly correlated. VIF and Tolerance statistics assessed the assumption. The VIF scores were well below 10, the highest was 1.658, and the tolerance scores were above 0.2, the lowest being .603. We tested for the normal distribution of residuals, multivariate normality by charting the P-P plot. Looking at the P-P plot (Figure 15) for the model, we

found our dots lay close to the diagonal line, confirming the residuals were normally distributed.

Figure 14

Linear Relationship Between Instructor Effectiveness and Transactional Distance Variables

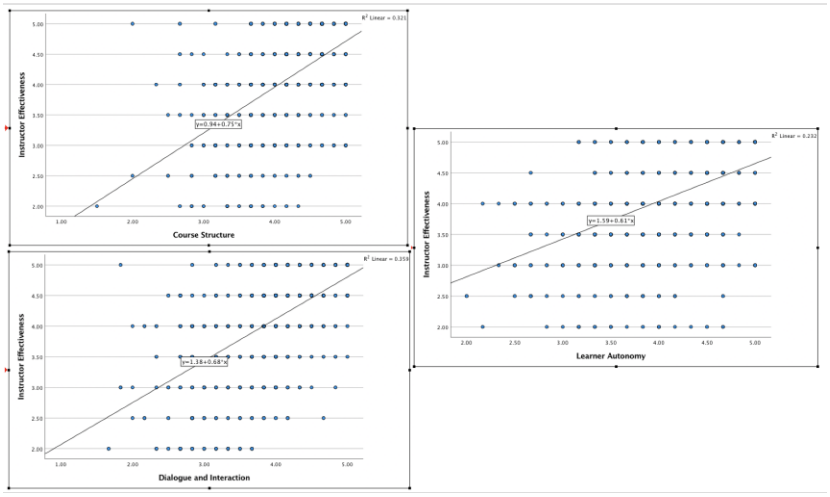
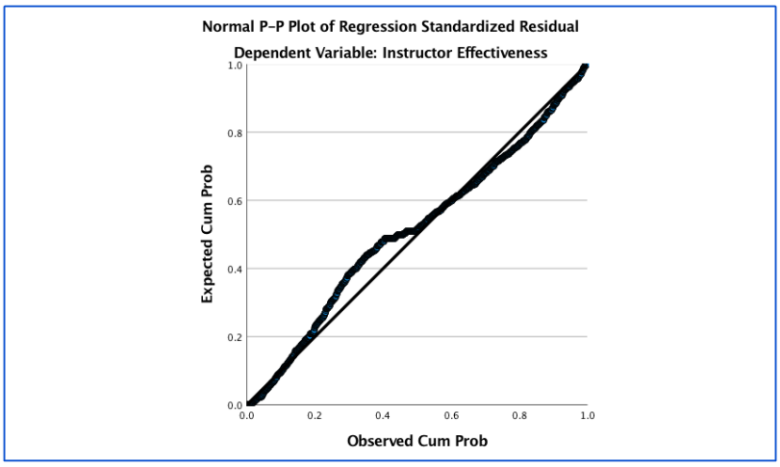


Figure 15

The Values of the Residuals were Normally Distributed



This assumption of homoscedasticity, which requires that the residuals' variance is constant, was tested with a graph. The graph plotted the standardized values the model would predict against the standardized residuals obtained. As the predicted values increased (along the X-axis), the residuals' variation was roughly similar. We had a random array of dots. The assumption was not violated. Our study has three independent variables exceeding the requirement of at least two. All the assumptions for multiple linear regression were fully met; none has been violated.

To respond to Research Question 4, the extent to which transactional distance variables (independent, predictor, explanatory, or regressor variables) predict students' perceived instructor effectiveness (dependent, outcome, target, or criterion variable) in online learning, we utilized multiple linear regression. The aim was to understand whether instructor effectiveness can be predicted based on course structure, dialogue/interaction, and learner autonomy. Multiple linear regression allowed us to determine the overall fit (variance explained) of the model and each predictor's relative contribution to the total explained variance. The target was to know how much of the variation in instructor effectiveness can be explained by course structure, dialogue/interaction, learner autonomy "as a whole," and the "relative contribution" of each independent variable in explaining the Variance.

Table 25

Summary of Multiple Regression Analysis for Variables Predicting Instructor Effectiveness (n = 1025)

	Instructor Effectiveness		
Variable	B	SE B	β
Course Structure as Flexibility	0.389	0.040	0.292*
Dialogue/Interaction	0.423	0.034	0.371*
Learner Autonomy	0.159	0.037	0.1253*
R^2		0.45	
F		276.21*	

Note: *$p < .05$

MLR analysis was conducted to examine the predictive nature of transactional distance over students' perceived instructor effectiveness in online learning. Table 25 shows that a significant regression equation was found F (3,1024) = 276.21, $p < .001$, with an R^2 of .448, which accounts for approximately 45% of the instructor effectiveness variance. The F-ratio showed that the independent variables statistically significantly predict the dependent variable. The regression model is a good fit for the data. The participants predicted instructor effectiveness is equal to .389 * (Course Structure) + .423 * (Dialogue/Interaction) + .159 * (Learner Autonomy). The equation indicates that for every unit increase in all or either course structure, dialogue/interaction, and learner autonomy, there would be an increase in instructor effectiveness. The average increase of instructor effectiveness for 1-unit improvement in course structure was .389. The average increase of instructor effectiveness for 1-unit improvement in dialogue/interaction was .423. The average increase of instructor effectiveness for 1-unit improvement in

learner autonomy was .159. By substitution, the regression equation, Instructor Effectiveness is equal to $\beta_0 + \beta_1$ * Course Structure + β_2 * Dialogue/interaction + β_3 * Learner Autonomy, becomes:

$$IE = .389 * (CS) + .423 * (DI) + .159 * (LA)$$

All the three variables added statistically, significantly to the prediction, $p < .05$. The alternative hypothesis (H_1: $\beta_i \neq 0$) was thus adopted to indicate that transactional distance independent variables (course structure, dialogue/interaction, and learner autonomy) can predict students' perceptions of instructor effectiveness in online learning.

Ancillary Findings of the Study

Table 26

Means and Standard Deviations of Online Students' Perceptions by COVID19 Demarcation

	In COVID19 Period			Pre-COVID19 Period		
Variable	n	M	SD	n	M	SD
Course Structure/ Flexibility	255	1.84	0.61	768	1.78	0.52
Dialogue/Interaction	255	4.01	0.66	768	3.99	0.62
Learner Autonomy	255	4.08	0.60	768	4.14	0.56
Course Quality	255	4.17	0.71	768	4.16	0.65
Instructor Effectiveness	255	4.11	0.78	768	4.11	0.72

Table 26 summarizes students' opinions on online learning before and within the COVID19 period. Without violating any of the assumptions, One-Way Analysis of

Variance procedures (ANOVA) indicated no statistically significant differences between the two groups.

This study did not set out to determine whether the transactional distance is predictive of students' performance. Since students provided their final grades, it would be educative to test the related prediction potential. Regression analysis with student grade as the dependent variable, course structure, dialogue/interaction, and learner autonomy as the independent variables would compute the necessary coefficients to show the predictive relationship. The null hypothesis (H_0: $\beta_1 = \beta_2 = \beta_3 = 0$), is that all the population correlation coefficients (β_i) are 0. The alternative hypothesis (H_1: $\beta_i \neq 0$) is that at least one population correlation coefficient is not 0. The tests of assumption for multiple linear regression were necessary:

1. The first test is the absence of influential data points and significant outliers. Data screening procedures produced no value checking and coding errors and no missing data. A test for univariate outliers did not identify any student grade records whose z scores were less than -2.3. None were greater than .92. The limits for the univariate outliers, +2.5 (3.0) to -2.5 (3.0), were informed by Hair et al., 2010, as cited in Meyers et al., 2013. Influential data points and significant outliers may create an undue influence on the model, rendering it less representative of your data. Additionally, SPSS creates the Cook's Distance statistic for each participant, and values over 1 are likely to be significant outliers. In our study, no such instances have occurred, the highest value being .01769.
2. The sample size of regression analysis requires at least 20 cases per independent variable in the analysis. The independent variables are Course Structure,

Dialogue/Interaction, and Learner Autonomy in the current study. A sample size of 1049 far exceeds the 60 cases requirement for three IVs.

3. There is a precondition for a linear relationship between the outcome variable and the predictors. Scatterplots show whether there is a linear relationship or not. A visual inspection of the scatterplots showed a linear relationship between the outcome variable, students' grades, and independent variables.
4. The independent variables are not highly correlated (No Multicollinearity), which may be tested using the Variance Inflation Factor (VIF) values. Our tests did not produce multicollinearity. Correlations of more than 0.8 may be problematic. The highest correlation we got was r =.577. We also tested the multicollinearity assumption from the coefficients table to formally check that predictors (or IVs) are not too highly correlated. VIF and Tolerance statistics assessed the assumption. The VIF scores were well below 10, the highest was 1.668, and the tolerance scores were above 0.2, the lowest being .591.
5. The test, whether the values of the residuals were independent, utilized the Durbin-Watson statistic. The statistic can vary from 0 to 4, but the closer the value is to 2, the better. Values below one and above 3 are cause for concern and may render your analysis invalid. In our study, the value was 1.920.
6. The residuals are normally distributed (Multivariate Normality). We tested for multivariate normality (normal distribution of the residuals) by charting the P-P plot. An inspecting the P-P plot for the model, we found our dots lay close to the diagonal line, confirming that the residuals were normally distributed.

7. The variances of error terms are similar across the values of the independent variables (homoscedasticity). A plot of standardized residuals against predicted values shows whether points are equally distributed across all predictor variables' values. The assumption of homoscedasticity, which requires that the residuals' variance is constant, was also tested with a graph. The graph plotted the standardized values the model would predict against the standardized residuals obtained. The assumption was not violated.
8. MLR requires at least two independent variables: nominal, ordinal, or interval/ratio level variables. Our study has three independent variables (course structure, dialogue/interaction, and learner autonomy), exceeding the requirement of at least two. All the assumptions for multiple linear regression were fully met; none has been violated.

MLR determined the extent to which transactional distance variables (course structure, dialogue/interaction, and learner autonomy) predict students' performance. MLR allowed us to find the overall fit (variance explained) of the model and each predictor's relative contribution to the total explained variance. Table 27 depicts that a significant regression equation was found F (3,1019) = 19.823, $p < .001$, with an R^2 of .055, accounting for 5.5% of the students' performance variance. The participants predicted that students' performance = 4.792 - .513 * (Course Structure). The equation indicates that there would be an increase in students' performance with every improvement in flexibility. The average increase in students' performance for a 1-unit increase in course structure flexibility was .513. Only one variable added statistically, significantly to the prediction, $p < .05$. The alternative hypothesis (H_1: $\beta_i \neq 0$) was thus

adopted to indicate that one transactional distance independent variable (course structure) can predict students' online learning performance.

Table 27

Summary of Multiple Regression Analysis for Variables Predicting Students' Performance (n = 1023)

	Students' Performance		
Variable	B	SE B	β
Course Structure	-0.513	0.090	0.236*
Dialogue/Interaction	0.121	0.077	0.063
Learner Autonomy	-0.119	0.085	-0.050
R^2		0.055	
F		19.823*	

Note: $*p < .05$

The survey had an open-end answer item that invited the respondents to share any other information and observations on their online course experience. Of the 1049 respondents, 761 shared their experiences. Participant comments were coded on the primary substance addressed and whether their connotation was positive or negative with respect to the previously identified study constructs. Four themes accounted for 604 (79.2%) of the 761 responses: Positive Course Quality, Negative Course Structure, Positive Learner Autonomy, and Negative Dialogue/interaction observations and experiences. Table 28 summarizes the findings.

Table 28

Qualitative Themes on Online Course Experience (N = 761)

Overarching Theme	N	%	Cumulative %
Course Quality - Negative	38	5.0%	5.0%
Course Quality - Positive	227	29.8%	34.8%
Course Structure - Negative	177	23.2%	58.0%
Course Structure - Positive	26	3.4%	61.4%
Dialogue/Interaction - Negative	94	12.3%	73.8%
Dialogue/Interaction - Positive	40	5.2%	79.0%
Instructor Effectiveness - Negative	29	3.8%	82.8%
Instructor Effectiveness - Positive	15	2.0%	84.8%
Learner Autonomy - Negative	10	1.3%	86.1%
Learner Autonomy - Positive	106	13.9%	100.0%

Two hundred and twenty-seven (29.8%) of the participants shared observations and experiences that indicated good course quality. A random sampling of three quotes to this effect are:

- "It was a great experience that I had. Their teaching was excellent."
- "I thought everything was good, the experience was definitely a positive one, and I liked being able to do it online."
- "Overall, I was very impressed. I did not see any difference in the instruction quality between online and in-person learning."

A hundred and seventy-seven (23.2%) of the participants shared observations and experiences that implied wanting course structure. A random sampling of three quotes to this effect are:

- "The experience was not a good one because the webpage used for our assignments was not properly structured. Also, the management did not communicate clearly what needed to be done."
- "It was frustrating to not always have clarity on assignments with multiple components."
- "The grading seemed arbitrary at times, based primarily on how well you parroted what the professor believed."

A hundred and six (13.9%) of the respondents shared observations and experiences that signified an appreciation of learner autonomy. In the LA dimension, subthemes on flexibility in time, pace, and place appeared with regularity. Another notable subtheme was self-efficacy, where the students felt that online learning demands one to be self-disciplined, self-motivated, self-driven, and responsible. A random sampling of three quotes to this effect are:

- "It was a great experience. I appreciated the flexibility of the course and the ability to complete assignments at my own pace."
- "Online courses may not be for everyone for a number of different reasons, but sometimes they could be the only option and can be a great way to learn self-discipline."

- "I noticed that I'm more attentive in online classes as opposed to traditional classroom settings. If I have a camera pointed at me, I have more of a responsibility to be mentally present."

Ninety-four (12.3%) of the participants shared observations and experiences that spoke of undesirable dialogue and structure. A random sampling of three quotes to this effect are:

- "We didn't really have much chance to communicate with the instructor, and class on Zoom was pretty boring."
- "I believe the course should have been more interactive to allow more communication; otherwise, students are left on their own in regard to understanding the materials."
- "The online course was very similar, in my opinion, to a regular class, with the exception of my interactions with other students. I interacted far less in an online course than with an in-person course."

There were more positive comments (414) than negative (347), an indication of comfort and acceptability of online learning. Although unfavorable online learning comparisons against face-face classes were made in at least 35 observations, they seemed to be borne of poor online course design. There were also comments specifically related to technology.

Conclusion

In summary of the main findings, transaction distance and students' perceptions of course quality and instructor effectiveness in online learning were positively and significantly correlated at 99% confidence level, and the magnitudes, or strengths, of the

associations, were approximately moderate (Figure 16). Course Structure, Dialogue/Interaction, and Learner Autonomy were identified as predictors of students' perceptions of course quality and instructor effectiveness in online learning (Figure 17). All four alternate hypotheses were accepted.

Path analysis confirmed the assumptions of the conceptual framework and model adopted for the study. Students of distinct age categories illustrated significant differences in perceptions of course quality and instructor effectiveness in online learning. Black or African American students' perceptions of course quality and instructor effectiveness in online learning differed significantly from students of other races, except the Hispanic or Latino. Lastly, students in distinctive program majors revealed significant differences in perceptions of course quality and instructor effectiveness in online learning. The next chapter, which concludes the study, will delve into a discussion of the findings. It will present interpretations, conclusions, and recommendations grounded on the study and prior literature.

Figure 16

Transactional Distance and its Components Correlate Positively with Moderate Strength to Course Quality and Instructor Effectiveness

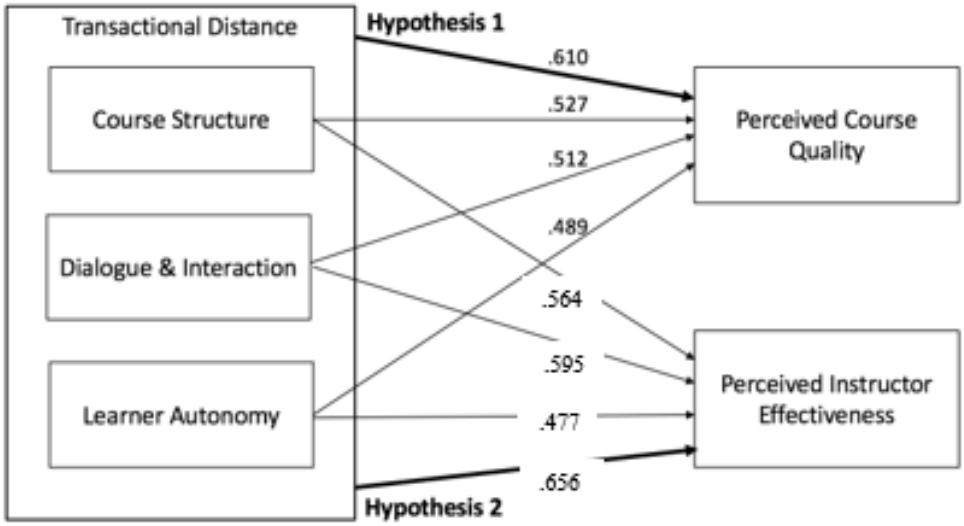
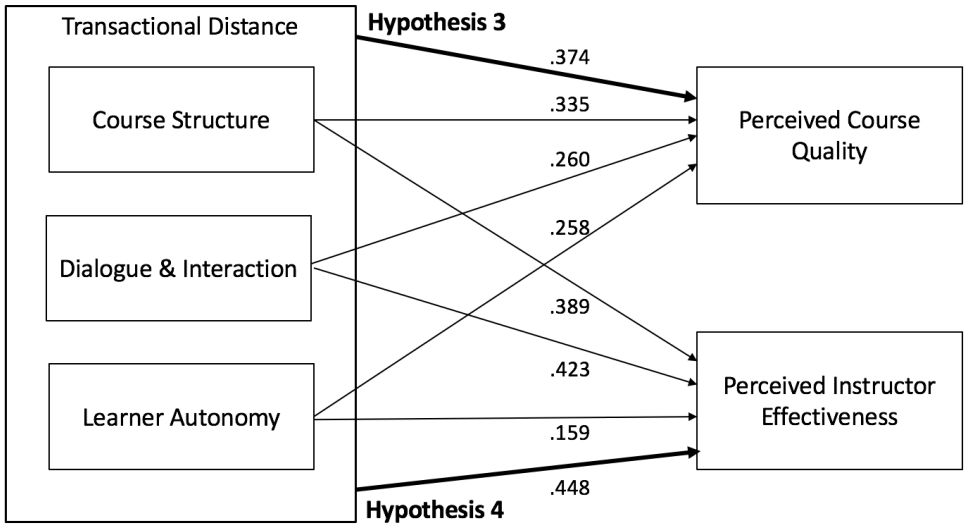


Figure 17

Transactional Distance and its Components are Predictors of Course Quality and Instructor Effectiveness



CHAPTER 5: DISCUSSION

Introduction

This study was purposed towards establishing the effect of transactional distance on students' perceptions of course quality and instructor effectiveness in online learning. A quantitative study was conducted at a national level in the USA to understand the relationship between transactional distance and college students' perceptions of course quality and instructor effectiveness in online learning. Transactional distance theory was used to test whether course structure, dialogue/interaction, and learner autonomy have the potential to improve and predict course quality and instructor effectiveness in online learning. Overall, the previous chapter's empirical evidence supports that the constructs of course structure, dialogue/interaction, and learner autonomy have a significant relationship to course quality and instructor effectiveness, as assessed by online student's perceptions. Students' perceptions of course quality and instructor effectiveness also correlate significantly and positively to specific dimensions of transactional distance. The hypotheses that improvements in the pillars of transactional distance were also more likely to improve the quality and the instruction of online courses were also supported. In an unanticipated discovery, the participants' performance data showed that transactional distance (course structure, specifically) could predict student achievement. Chapter five will focus on arguments arising from the results in chapter four and will seek to identify the congruence between the study's findings and the prior literature positions in chapter two. This chapter will delve into the theoretical, practical, and future implications of the findings. It will also divulge the study's limitations and make some recommendations for future practice and research.

Implications of Findings

This research's results make a valuable contribution to scientific knowledge about transactional distance and teaching effectiveness in online learning settings. The study unpretentiously boasts of overflowing theoretical, practical, and future implications.

In this research effort, TD's three pillars were applied as independent variables acting on course quality and instructor effectiveness. In the literature presented in chapter two, the same facets of transactional distance (course structure, dialogue/interaction, and learner autonomy) have been applied repeatedly as independent variables that act upon some dependent variable in the academic arena. Benson and Samarawickrema (2009) aimed to calculate optimal TD levels that produce the highest academic achievement. Dialogue was the independent variable in studies by Wang and Morgan (2008) and Zhou (2014). Transactional distance is thought to increase when there is greater learner autonomy, more structure, or less dialog (Ekwunife-Orakwue & Teng, 2014). Since the relationship between course structure, dialogue/interaction, and learner autonomy, and their effect on transactional distance has been well established, a theoretical implication may be a consideration for deliberate investigation of TD (or one or a combination of any of its dimensions) as the outcome variable rather than an independent variable. For example, identifying and researching variables that have significant effects on learner autonomy, or the other TD dimensions, may ultimately strengthen the transaction distance theory or lead to new concepts.

A potential practical implication is the consideration of transactional distance in designing high-quality courses for online learning. For example, including optimal interaction in course design may help avoid perceptions and feelings of student isolation

and control attrition rates (Johnston & Barbour, 2013; Woods & Baker, 2004; Vonderwell, 2003). In the first major finding, transactional distance and students' perceptions of course quality in online learning were found to be positively and significantly correlated at 99% (α =.01) confidence level; and the magnitude of the association was moderate, r (1038) = .610, $p < .001$. Course quality also had individual significant and positive relations to specific components of transactional distance: course structure, r (1038) = .527, $p < .001$; Dialogue/Interaction, r (1038) = .512, $p < .001$; and learner autonomy, r (1038) = .489, $p < .001$. Though a predictive relationship is not claimed at this point, the statistics imply that the students who scored the dimensions and items of transactional distance highly also scored items of course quality similarly, and vice versa. The scores increased or decreased together. The 227 (29.8%) out of 761 positive comments on course quality also provide invaluable insight. A student who comments, "This was an excellent course, well prepared and totally packaged... it was easy to follow, yet still quite engaging," believes that a high quality (excellent course) also exhibits good course structure (well prepared and totally packaged), and greater opportunities for dialogue/interaction (quite engaging). Thus, the practical implication is that improvements in course structure, dialogue/interaction, and learner autonomy herald students' positive view of course quality. When a course is designed to have optimal transaction distance (optimal flexibility in structure, optimal opportunities for engagement, and optimal student participation in determining their academic journey), the students' perceptions of desirable course quality follow in tandem.

Another potential practical implication would consider transactional distance in ensuring instructor effectiveness in online learning. In a student's comment, "If I could

get all my classes on caliber with her course, I would do so in a heartbeat. Very clear, very competent, very transparent teaching style, grading style, and course content," the rating and recommendation (get all my classes… I would do so in a heartbeat) of a professor is clearly tied to course structure (grading style and course content), and mildly to dialogue/interaction (Very clear, very competent, very transparent teaching style). Another comment, "I enjoyed learning at my own pace. This was the best online class I have taken, all because of the friendly and responsive professor," seems to connect the rating (friendly and responsive professor) of a professor to learner autonomy (learning at my own pace). In the second major finding, transactional distance and students' perceptions of instructor effectiveness in online learning were positively and significantly correlated at 99% ($\alpha = .01$) confidence level; and the strength of the association was moderate, $r\,(1019) = .656$, $p < .001$. Instructor effectiveness also had significant relation to individual components of transactional distance: course structure, $r\,(1019) = .564$, $p < .001$; dialogue/interaction, $r\,(1019) = .595$, $p < .001$; and learner autonomy, $r\,(1019) = .477$, $p < .001$. Except for learner autonomy, the data revealed that transactional distance was more correlated to students' perception of instructor effectiveness ($r\,(1019) = .656$, $p < .001$) than course quality ($r\,(1038) = .610$, $p < .001$.) Similarly, one witnesses the dual rise in transactional distance scores, as instructor effectiveness scores rise, and the opposite too. This, too, has the implication that improvements in course structure, dialogue/interaction, and learner autonomy may indicate students' positive views of instructor effectiveness, and vice versa.

Regression algorithms are an aspect of causal research (explanatory research) were variations in one variable determine causality by the measurable change caused in the

other variable or variables. In the third and fourth major findings of the study, Course Structure, Dialogue/Interaction, and Learner Autonomy were identified as predictors of students' perceptions of course quality and instructor effectiveness in online learning. In the results TD accounts for approximately 37% (R^2 = .374) of course quality variance, and for approximately 45% *(R^2 = .448)* of instructor effectiveness variance. TD also predicts course quality and instructor effectiveness. The prediction equation for course quality, *CQ = .642 + .335 * (CS) + .260 * (DI) + .258 * (LA),* implies an increase of .335, .260, and .258 in course quality (CQ), for every unit increase in course structure (CS), dialogue/interaction (DI), and learner autonomy (LA), respectively. The prediction equation for instructor effectiveness, *IE = .389 * (CS) + .423 * (DI) + .159 * (LA),* similarly implies an increase of .389, .423, and .159 in course quality (CQ), for every unit increase in course structure (CS), dialogue/interaction (DI), and learner autonomy (LA), respectively. The results have the fundamental implication that with all other factors held constant, the design and improvement of online courses that incorporate the best of course structuring, dialogue/interaction, and learner autonomy unquestionably guarantees increased course quality and effective teaching. Moreover, the potential measure of the increase can be calculated by the predictive equations.

A cursory view of future ramifications reveals that the research results may not only bridge gaps in existing literature but also create an opportunity for the possible development of new theories.

Relationship to Prior Research

Benson and Samarawickrema (2009) suggested that TDT may analyze significant implications for e-learning design, which the context of learning gives rise to. Kawka, Larkin, and Danaher (2012) suggested that structure, dialogue, and learner autonomy can be utilized to understand emergent learning environments. Best and Conceição (2017) applied TDT to explore the impact of dialogic interactions on student satisfaction in international blended learning. Hence, the literature confirmed that TDT is useful in studying online education contexts, that TDT was an adequate framework to analyze course quality and instructor effectiveness in online learning. The current study's experiential findings where significant positive correlations were identified between TDT's facets (course structure, dialogue/interaction, and learner autonomy) and effective teaching (course quality and instructor effectiveness) reinforce the deduction.

Additionally, the explanatory power of 37% and 45%; and the predictive power of TDT elements over perceptions of course quality and instructor effectiveness in online learning indisputably connects the two sets of constructs. Prior literature identifies dialogue as the least controversial and the critical determinant of transactional distance (Ekwunife-Orakwue & Teng, 2014; Goel et al., 2012). This study had similar results. The statistics identified the dialogue/instruction as the most dominant pillar in the sample, with strong effects on all other variables. Amusingly, the question begs, in the absence of a course structure (i.e., course), what would the dialogue/interaction be about?

The findings of this study on dialogue/interaction were consistent with the literature. Individually, DI was significantly and positively correlated to course quality (r (1038) = .512) and instructor effectiveness (r (1019) = .595). DI was also found to be a predictor for CQ and IE. The results converge with Dewey's (cited in Anderson, 2003) description of interaction as a vital component of the education through which a student converts information into knowledge. The support for this finding is in numerous articles including Zimmerman, (2012); Abrami, Bernard, Bures, Borokhovski, and Tamim, (2011); Hawkins, (2011); Schlosser and Simonson, (2009); and Keegan, (1996), that identify interaction as a critical constituent of educational transactions. Beldarrain (2006) argued that interaction is a feature that makes a difference between having successful or unsuccessful online learning experiences. Ekwunife-Orakwue and Teng (2014) found that student interactions in online and blended learning environments impacted student learning outcomes. In their respective studies, Best and Conceição (2017), Fullwood (2015), Mbwesa, 2014, Lewis (2011), Strachota (2003), and Jung et al., 2002 concluded that dialogic interaction dimensions of transactional distance could impact student satisfaction. Hence dialogue/interaction play a vital role in the evaluation of course quality and instructor effectiveness. Borup et al. (2013); Hawkins (2011); and Woods and Baker (2004) are categorical that instructors who engage in ineffective interactions, or delay student feedback, and are unclear in their directions run the risk of producing feelings of isolation and boredom, resulting to inferior performance, and possibly increased attrition.

The course structure includes the development and design of the course curriculum, instructional strategies and methods, resources, scheduling, and planning before, during, and after a course is taught (Garrison, Anderson, & Archer, 2000). In this study, the aspects of interest in course structuring were: the clarity of course goals and grading procedures; organization of learning activities; clarity and accessibility of course presentations and materials; efforts to accommodate personal pace; and fair grading of tests, papers, and assignments. Eom, Ashill, and Wen (2006) concluded that the course structure significantly impacts student satisfaction. Gray and DiLoreto (2016) found significant correlation at 99% confidence level between course structure and learner interaction, r (187) = .51, $p < .001$; student satisfaction, r (187) = .66, $p < .001$; and perceived learning, r (187) = .62, $p < .001$. The findings on course structure were consistent with the literature. Separately, CS was significantly and positively correlated to course quality (r (1038) = .527) and instructor effectiveness (r (1019) = .564). CS was also a strong predictor for course quality (B = .335), and instructor effectiveness (B = .389). PCA had indicated that 37.5% (R^2 = .375) of variances in Course Structure could be explained by Dialogue/Interaction.

Benson (2001), Brockett and Hiemstra (1991), Holec (1981) described learner autonomy as the ability to take control of one's learning, with the learner having the responsibility to set the goals, choosing learning methods, materials, and activities, and selecting criteria for evaluation. Moore, (1993, p.31) is quoted stating that "Learner autonomy is the extent to which in the teaching/learning relationship, it is the learner rather than the teacher who determines the goals, the learning experiences, and the evaluation decisions of the learning program." In correspondence with the definitions, the

tests for the related component were crafted around his definition. The mean scores for the LA items were: I understood the purpose of the course, *M* = 4.4, *SD* =.72; I shared in the setting of learning goals for the course, *M* = 3.8, *SD* = 1.04; I took responsibility for my learning experiences, *M* = 4.4, SD =.71; I took the initiative in planning and executing learning activities, *M* = 4.1, *SD* =.86; I took responsibility for evaluation decisions in this course, *M* = 4.0, *SD* =.92; and I regularly reviewed my learning and evaluated how effective it was, *M* = 4.0, *SD* = .95. Other than being a predictor, learner autonomy correlated significantly and positively with course quality (*B =.258, r* (1038) = .489, $p < .001$) and with instructor effectiveness (*B=.159, r* (1019) = .477, $p < .001$). In congruence with this study's results, Peters (2000) and Zimmerman (2000) asserted that autonomous students self-motivate, rely on their academic skills, set goals, deal with challenges, and progressively acquire knowledge. Moore (2007) argues that taking responsibility for the learning process, participating actively, and dealing with geographical distance barriers are characteristics of students with high learner autonomy levels.

Lynch and Dembo (2004) identified motivation (self-efficacy and goal orientation), Internet self-efficacy, time management, study environment management, and learning assistance management as the five components of learner autonomy critical for a distance learner's success. The frequency of appearance of the same terms in the students' open-ended comments is uncanny:

- "You need to be very motivated to succeed in online courses."
- "Self-motivation is a must; pace yourself according to what you can manage."

- “My only real problem faced was technology-based, like conflicting hardware/ software, some things not loading correctly, …”
- “There were some technical issues with the internet connection.”
- “I would prefer to take classes in person, but an online class is very good for time management.”
- “I like online courses, it saves time rather than driving to school, and I can do the work on my own time.”
- “It was a positive experience in that I was able to work at my own pace at my own time. I did not have to rush up to campus after work. I think online courses can work well for those who are self-motivated and can work independently.”
- “I think online learning takes a lot of personal dedication and focus. It requires you to take the initiative because it's so different from in-person learning. I think I experienced a lot of personal growth from my online course experience.”
- “Group projects really are a challenge in the online environment. They are best if avoided.”
- “Online learning was disorganized and unfair. Some students are at a disadvantage with their distance learning environments.”

Limitations of the Study

The application of quantitative methods to the study opens it to all the related threats to statistical conclusion, internal and external validity. However, significant steps were taken to eradicate, minimize, or mitigate their effects, including having a considerable sample size and rigorously assessing the model, and testing all statistical procedures' assumptions.

The data source was still identified as a limitation. It was felt that instructor and student interviews; more open-ended survey items; e-mail and discussion board communication; students' official performance records, such as grade point average, instructor surveys, and other school records (Borup et al., 2014), would have enriched the study. Such other sources provide a triangulation point and confirm the veracity of data. However representative, the hosting companies claim them to be and however well-publicized the study was, students who did not have access to online survey platforms, e.g., Survey Monkey and Amazon MTurk at the time of the study may have been denied the opportunity to present the views.

Recommendations for Future Practice

In considering recommendations, some insights were gathered directly from students' comments. The largest area, which most students identified for improvement, was course structure followed closely by dialogue/interaction, as presented in Table 29. The student recommendations have noticeable overlaps in thematic concepts. Most instructor effectiveness failures (which we saw as potential indicators of an unsatisfactory rating and possible non-recommendation of the professor) were related to course structure, and dialogue/interaction. Failures in learner autonomy could be inferred from many recommendations on course structure. Just as in Reinhart and Schneider (2001), our findings identify the areas in online education that may be crucial to learners in providing quality online programs for designers, educators, and administrators. Therefore, a primary recommendation would be the adoption of a TDT-guided strategy in the design and development of all facets of an educational program or course.

Table 29

Qualitative Themes on Online Course Recommendations by Students (N = 641)

Thematic Grouping	N	%
Course Quality	22	3.4%
Course Structure	239	37.3%
Dialogue/Interaction	229	35.7%
Instructor Effectiveness	94	14.7%
Learner Autonomy	57	8.9%

In dialogue/interaction, the students had issues with the inadequacy of interaction and student engagement, lack of timely feedback, and lack of enthusiasm in teaching, amongst other reasons. Instructors must choose user-friendly Learning Management Systems that embed interactive rich media to increase the prospect of student interaction and fulfillment (Kuo et al., 2014). They also need to adjust the interactions according to online learners' demands and preferences (Anderson, 2003). In going back to the basic principles, the main thrust should always be learning, and not teaching, Holmberg (1976); and, not distance but "learning" as recommended by Picciano (2000) and Belanger and Jordan (2000). The value of feedback to students and its timeliness has been in literature over the years. Egan and Gibb (1997) noted that students' decisions on whether to stay in a course are based on initial assessment feedback. Comeaux (2006) put it succinctly, that what and when students get feedback can affect learning. Angelo and Cross (1993) reinforce the argument by noting that students who get feedback are more likely to participate and perform better in their academic work. The current study students have a

radical proposal that course designers should consider adding "Frequently Asked Questions and Answers" to their courses, a practice commonly seen in commercial product support.

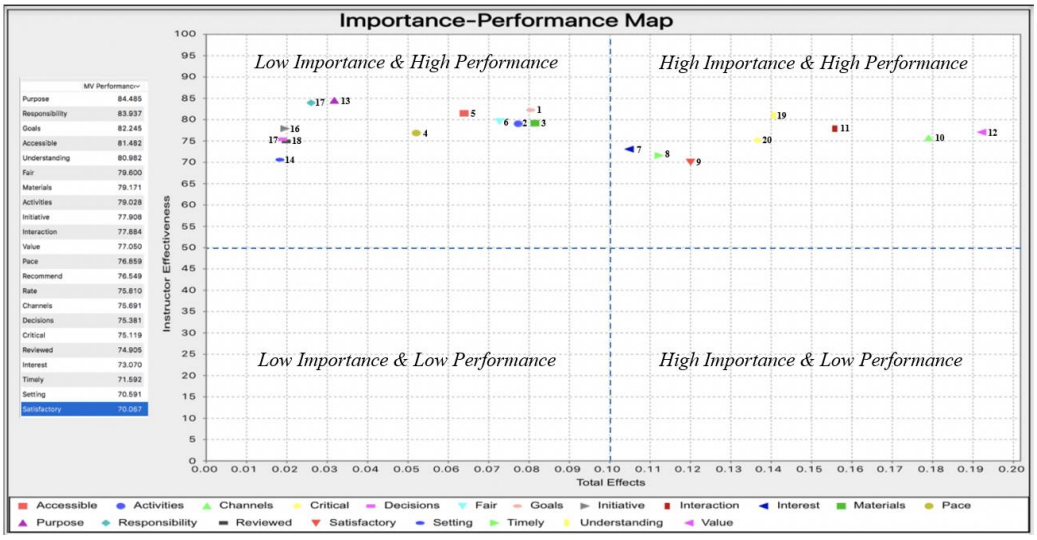
In course structure, instances of dissatisfaction rose from accessibility and quality of teaching materials; lack of flexibility, inadequate time, grading; lack of clarity in goals and learning objectives; and technology amongst other reasons. Interestingly enough, some recommendations were at cross purpose, e.g., when one student advocated for an increase in an area, another would recommend a decrease in the same. An appreciation of student learning differences anchored in their diverse entry behaviors explains the apparent contrast. Therefore, course designers must reorganize course structures to cater for diversity in demography, multi-culture, and cross-disciplinary pursuits to fully engage students, as similarly recommended in Gunawardena and Zittle, (1996); Panitz, (1996); and Warschauer, (1997).

Recommendations that specifically had the word "instructor," "professor," or "teacher" were assumed to be more targeted to instructor effectiveness. Instructor ineffectiveness was derived mostly from what the instructor did not do or provide; knowledge of the subject matter; and inadequate technology skills. Learner autonomy failures mentioned lack of variety in teaching programs, learning activities, teaching materials, and tests and examinations; limited choice in hours of consultation; lack of crystalizing the purpose of the course with real-life examples, amongst other reasons. Since there are also various widely accepted standards for quality in online learning (as discussed in earlier chapters), this study recommends that educators familiarize themselves with them, make informed choices, and restructure their programs courses

accordingly. Policymakers are called upon to make available the necessary funds and regulatory frameworks that ease the implementation, utilization, and continued improvement of best practices in online learning. Consistent with this study and recommendations, others (Song, Singleton, Hill, and Koh, 2004) found that a course's instructional design is a critical factor that impacts students' perceptions of an online course.

Figure 18

Importance Performance Map Analysis identifies priority areas for online educationists.



When analyzed for specific areas of immediate concern, the data identified "The instructor satisfactorily answered student questions"; "The instructor responded to students work in a reasonable amount of time"; and "The instructor conveyed interest and enthusiasm in the subject matter" for instructor effectiveness as illustrated in Figure 18. The named indicators were all from Dialogue/Interaction and exhibited large importance rating in their explanation of instructor effectiveness but had a relatively lower performance than others (Hair et al., 2018), (Höck et al., 2010), (Ringle & Sarstedt,

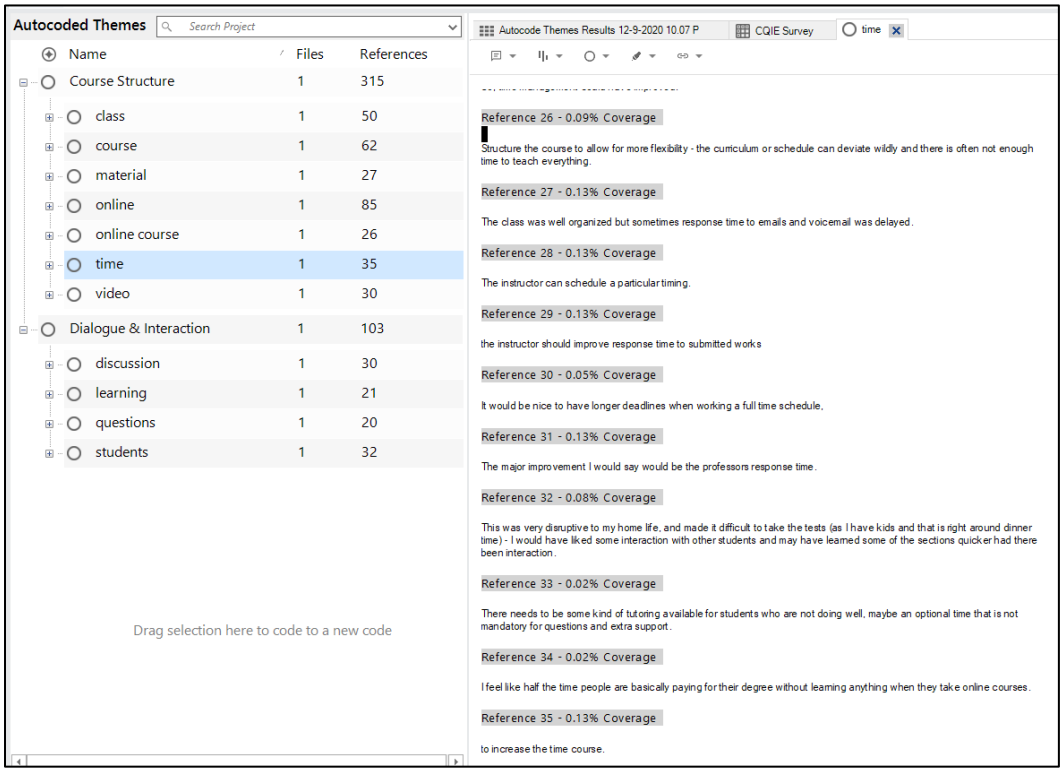
2016), (Rigdon et al., 2011), and (Schloderer et al., 2014). The three areas form the priority concerns for practice.

Recommendations for Future Research

The current study was domiciled in the USA. Comparative research studies across countries or regions, states, and colleges may help identify universal factors and concepts while removing cultural and other biases due to demographic and operational characteristics. Course quality and instructor effectiveness have also been contentious topics where the definition of the constructs differ (with reasonable arguments) depending on whether one is a student, an institution administrator, a regulatory authority, or a public member. For example, Feigenbaum (1983), Crosby (1979), Deming (1986), and Juran (1989) opine that quality should not be based on conformity to specifications defined by providers of service and should include perceptions of consumers. As such, studies that capture the richness of perspectives may develop a more wholesome understanding.

This study adopted a non-experimental quantitative research approach. The study had two qualitative questions. When analyzed with NVivo (Figure 19), the open-ended questions were a mine for data and insights. The value of explanations to add context, allow respondents to be more speculative, and answer beyond quantitative items' limitations was noted. It is a strong recommendation that some future research efforts in this area may utilize qualitative strategies.

Figure 19 *NVivo Autocode Identified 11 Themes from Student Recommendations. Time, a Sub-Theme of Structure, had 35 Coded Instances*



The current study explained approximately 37.5% to 42% of variances in course quality and instructor effectiveness. What factors explain the outstanding 62% to 58%? TDT does not claim dominion over distance education theory. Therefore, it would greatly benefit the domain if other conceptual frameworks of online learning and their related quality standards are applied in similar studies. Such studies would vary the dimensions of measure and explain factors held constant in the current study.

Conclusion

This study set out to determine the effect of course structure, dialogue/interaction, and learner autonomy on students' perceived course quality and instructor effectiveness in an online learning environment. Using Moore's (1993) theory of transactional distance as a conceptual framework, the researcher collected data from postsecondary learners (N = 1049) across the USA who took online courses between Fall 2014 and Fall 2018. The online courses, the students completed the survey about, varied in academic domain, semester, year, and level. The study was quantitative in methodology design, and non-experimental in type, with correlation and regression as the main statistical analysis techniques. All participants completed a Course Quality and Instructor Effectiveness Survey (TDT CQIE) as a measure of transactional distance (18 items), course quality (2 items), and instructor effectiveness (2 items), in which high scores indicated the desirable (least) transactional distance. It was found that course quality ($r = .610$, $N = 1038$, $p < .001$) and instructor effectiveness ($r = .656$, $N = 1019$, $p < .001$) exhibited significant, positive, and strong correlations with transactional distance scores at .01 level (99% confidence). Therefore, as the desirable transactional distance was achieved, there was an improvement in course quality and instructor effectiveness. Course quality had significant positive correlation to components of transactional distance: course structure (as flexibility), $r = .527$, $N = 1038$, $p < .001$; Dialogue/Interaction, $r = .512$, $N = 1038$, $p < .001$; and learner autonomy, $r = .489$, $N = 1038$, $p < .001$. Instructor effectiveness also had significant correlation components of transactional distance: course structure(as flexibility), $r = .527$, $N = 1019$, $p < .001$; dialogue/interaction, $r = .512$, $N = 1019$, $p < .001$; and learner autonomy, $r = .489$, $N = 1019$, $p < .001$. Multiple linear regression

(MLR) analysis demonstrated that transactional distance dimensions (course structure, dialogue/interaction, and learner autonomy) were predictive of course quality (F (3, 1036) = 205.95, $p < .001$, R^2 of .374) and instructor effectiveness (F (3,1024) = 276.21, $p < .001$, R^2 of .448).

Barbour and Plough (2012) concluded that a better understanding of learners' perceptions of online learning leads educational designers to develop quality online courses that decrease the transactional distance. The findings of this study confirmed that students' perceptions of course quality and instructional effectiveness are not only correlated to dialogue, structure, and autonomy, but that latter has predictive power over the first. Transactional distance explained 37% of variances in course quality and 45% of variances in instructor effectiveness. The findings are highly consistent with previous studies on teaching effectiveness in online learning. The students' recommendations indicate much to be done regarding the design of instruction that meets their satisfaction. The researcher has also provided ample practice and research suggestions. Based on the findings, educationists should consider the role of transactional distance dimensions during online instructional learning research, design, development, and delivery. It is a sincere hope that the study has moved, however minuscule, the needle of the subject domain to the right.

APPENDIX A: IRB APPROVAL

IRB-FY2021-58 - Initial: Initial - Exempt - St. John's

irbstjohns@stjohns.edu <irbstjohns@stjohns.edu>
Thu 9/3/2020 3:51 PM
To: Andrew G. Mungai <andrew.mungai16@my.stjohns.edu>; campbelj@stjohns.edu <campbelj@stjohns.edu>

ST. JOHN'S UNIVERSITY

Federal Wide Assurance: FWA00009066

Sep 3, 2020 3:51 PM EDT

PI: Andrew Mungai
CO-PI: James Campbell
Dept: Ed Admin & Instruc Leadership

Re: Initial - IRB-FY2021-58 THE EFFECT OF TRANSACTIONAL DISTANCE ON STUDENTS' PERCEPTIONS OF COURSE QUALITY AND INSTRUCTOR EFFECTIVENESS IN ONLINE LEARNING

Dear Andrew Mungai:

The St John's University Institutional Review Board has rendered the decision below for THE EFFECT OF TRANSACTIONAL DISTANCE ON STUDENTS' PERCEPTIONS OF COURSE QUALITY AND INSTRUCTOR EFFECTIVENESS IN ONLINE LEARNING .

Decision: Exempt

PLEASE NOTE: If you have collected any data prior to this approval date, the data must be discarded.

Selected Category: Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording).
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

Sincerely,

Raymond DiGiuseppe, PhD, ABPP
Chair, Institutional Review Board
Professor of Psychology

Marie Nitopi, Ed.D.
IRB Coordinator

APPENDIX B: INFORMED CONSENT LETTER

ST. JOHN'S UNIVERSITY

Online Course Quality and Instructor Effectiveness Survey

Survey Consent Form

This survey is about your experience in THE MOST RECENT ONLINE COURSE that you successfully completed at either the graduate or undergraduate level.

You have been invited to take part in a research study to explore students' perceived course quality and instructor effectiveness in an online learning environment. This study will be conducted by Andrew Mungai, School of Education, St. John's University as part of his doctoral dissertation. His faculty sponsor is Dr. James Campbell, School of Education.

If you agree to be in this study, you will be asked to complete an online questionnaire about your age, gender, ethnicity, and experience with an online course. Participation in this study will involve 10 minutes to complete the online questionnaire. There are no known risks associated with your participation in this research beyond those of everyday life.

Although you will receive no direct benefits, this research may help the investigator better understand students' perceived course quality and instructor effectiveness in an online learning environment. The study is also anticipated to contribute to the online learning academic domain through related publications while informing policymakers and practitioners.

The confidentiality of your research records will be strictly maintained. Your responses are anonymous. The study will not collect any identifying information such as your name, email address, or IP address.

Your participation in this research study is voluntary. You may choose not to participate. If you decide to participate in this research survey, you may withdraw at any time. If you decide not to participate in this study or if you withdraw from participating at any time, you will not be penalized. You have the right to skip or not answer any questions you prefer not to answer.

If there is anything about the study or your participation that is unclear or that you do not understand, if you have questions or wish to report a research-related problem, you may contact Andrew Mungai at
(423) 240 4438, andrew.mungai16@stjohns.edu, School of Education, St. John's

University, 8000 Utopia Pkwy, Jamaica, NY 11439 or the faculty sponsor, Dr. James

Campbell at 718-990-1469, campbelj@stjohns.edu, School of Education, St. John's

University, 8000 Utopia Pkwy, Jamaica, NY 11439

For questions about your rights as a research participant, you may contact the University's Institutional Review Board, St. John's University, Dr. Raymond DiGiuseppe, Chair digiuser@stjohns.edu 718-990-1955 or Marie Nitopi, IRB Coordinator, nitopim@stjohns.edu 718-990- 1440.

*** 1. Electronic Consent**

Please select your choice below. Clicking on the "agree" button below indicates that:
• You have read the above information
• You voluntarily agree to participate

If you do not wish to participate in the research study, please decline participation by clicking on the "disagree" button.

Agree

Disagree

APPENDIX C: RESEARCH QUESTIONNAIRE

Student Evaluation of Online Teaching

This evaluation of teaching gives you the opportunity to comment anonymously on the way this course was taught.

Please respond to all questions, including the comments at the end.

Demographic Information

Sex: Male
Female
Other
Not Prefer to Answer

Race: White
Black
Hispanic
Asian
Native
Other
Not Prefer to Answer

Age: 14-24
25-34
35-44
45-54
55-64
65 or older
Not Prefer to Answer

Course Information:

Major: Health/Medicine/Nursing
Law/Criminal Justice
Business/Management/Economics
Social/Political Science
Science/Math/Technology
Liberal Arts/Humanities
Engineering
Education
General Studies
Other

Sem: Fall
Spring

Year: 2014-2015
2015-2016
2016-2017
2017-2018
2018-2019

Level: Undergraduate
Graduate

Student Responses:

	Course Structure	Strongly Agree	Agree	Somewhat Agree	Disagree	Strongly Disagree	Not applicable
1.1	The course goals and grading procedures were clear.						
1.2	The learning activities were well organized.						
1.3	The course presentations and materials were clear and understandable.						
1.4	The course was structured to enable me to work at my own pace to meet the course goals and objectives.						
1.5	The instructor, course presentations, and materials were easily accessible to students.						
1.6	Tests, papers, and other assignments were graded fairly.						

	Dialogue/Interaction	Strongly Agree	Agree	Somewhat Agree	Disagree	Strongly Disagree	Not applicable
2.1	The instructor conveyed interest and enthusiasm in the subject matter.						
2.2	The instructor responded to students' work in a reasonable amount of time.						
2.3	The instructor satisfactorily answered students' questions.						
2.4	I communicated with other students through various channels (e.g., emails, phone, discussion board, and online chat).						
2.5	I actively engaged in dialogues with other students to construct and share knowledge						
2.6	I valued my communication with other students on course-related issues.						

	Learner Autonomy	**Strongly Agree**	**Agree**	**Somewhat Agree**	**Disagree**	**Strongly Disagree**	**Not applicable**
3.1	I understood the purpose of the course.						
3.2	I shared in the setting of learning goals for the course.						
3.3	I took responsibility for my learning experiences.						
3.4	I took the initiative in planning and executing learning activities.						
3.5	I took responsibility for evaluation decisions in this course.						
3.6	I regularly reviewed my learning and evaluated how effective it was.						

	Overall Course Quality	**Strongly Agree**	**Agree**	**Somewhat Agree**	**Disagree**	**Strongly Disagree**	**Not applicable**
4.1	*This course increased my understanding of the subject matter.*						
4.2	*This course increased my ability to think critically.*						
4.3	*I would recommend the instructor to other students.*						
4.4	*I highly rate the professor's teaching.*						

5.1 What improvements would you suggest your instructor make in this online course?

5.2 Any other information on your online course experience

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