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Interaction, Student Satisfaction, and Teacher Time Investment in Online High School Courses

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A thesis submitted to the faculty of
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Master of Science

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ABSTRACT

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This case study explores what differences exist between two online course models by investigating the results of a student end-of-course evaluation survey and teacher communication logs in two online high school courses. The two course models were designed with different types and levels of interaction, one with high levels of student-content interaction, the second with high levels of student-content and student-teacher interaction. The majority of research on interaction in online learning has been conducted with adult learners at the university level. There is far less literature focusing on K-12 online learning while investigating interaction, student satisfaction, and teacher time investment. This case study addresses this gap by exploring the results of 764 student surveys and investigating the teacher time investments of four teachers. In this study the students' perception of their learning experience in both models met the online program's acceptable levels. In some dimensions of the course evaluation, the interactive course had a higher rating that was statistically significant. The teacher communication logs showed a higher teacher time investment in the more interactive courses, with the highest time investment coming from reaching out to inactive students. Due to the shortage of available literature in K-12 online settings regarding interaction, student satisfaction, and teacher time investment, the author recommends additional research in these areas. By continuing to research and understand better about K-12 online learners, this understanding could influence the development of course interaction standards, assist designers in building better courses, and ultimately lead to higher satisfaction for students.

Keywords: online learning, K-12, interaction, student satisfaction, teacher time investment

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DESCRIPTION OF THESIS STRUCTURE

This thesis, *Interaction, Student Satisfaction, and Teacher Time Investment in Online High School Courses*, is written in a journal ready thesis format.

In the first section I provide the research article, *Interaction, Student Satisfaction, and Teacher Time Investment in Online High School Courses.* This article is formatted to be submitted to journals, and references included in the article are provided at the end of the first section. There are several journals to which I am considering submitting this article. These include: *Journal of Online Learning Research*, a peer reviewed, international journal, which focuses on K-12 online and blended environments; and *Online Journal of Distance Learning Administration*, a peer reviewed journal, which focuses on the management of distance education programs.

There are appendices included in the last section for this thesis. Appendix A is a structured annotated bibliography, formatted by themes in the literature related to the research topic. Appendix B includes the instruments referred to in the thesis, the student end-of-course survey and teacher communication log.

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Introduction

Online learning enrollments continue to grow at both the K-12 and university levels. During the 2014-15 school year in the United States, over 2.6 million K-12 students enrolled in over 4.5 million supplemental online courses (Watson, Pape, Murin, Gemin, & Vashaw, 2015). This educational movement has altered the way schools are addressing the challenges of student retention and academic satisfaction of students (Cavanaugh, Barbour, & Clark, 2009). Consequently, this shift has generated a new type of learning institution, virtual schools, where students may never visit a physical facility. Both K-12 school districts and universities are investing time and resources to include online courses in their educational offerings (Hyman, 2012; Watson et al., 2015).

Historically, distance education began as an independent form of study, which allowed students to receive and submit material through the mail. Correspondence courses relied heavily on content interaction with the self-instructional course packet mailed to students to complete on their own. Correspondence courses looked to address and improve educational issues of access, efficiency, and scale (Annand, 2007). Independent study has been called self-directed learning, with course activities completed by a student with little to no oversight (Annand, 2007). Lack of supervision and appropriate interaction between the teacher and student, referred to by Moore (1993) as transactional distance, can lead to gaps in the learning process. In past iterations of independent study, students working independently, without instructor or peer interaction, was found to be difficult for some students (Anderson, 2003; Jung, Choi, Lim, & Leem, 2002). More recently, those researching K-12 online learning report higher levels of interaction in online courses can lead to improved student motivation (Murphy & Rodríguez-Manzanares, 2009),

higher completion rates (Hawkins, Graham, Sudweeks, & Barbour, 2013), and increased sense of presence (Borup, Graham, & Davies, 2013).

Attrition rates tend to range between 15 to 50 percent higher in online programs than in traditional classrooms (Bambara, Harbour, Davies, & Athey, 2009). Numerous research studies have investigated student concerns improved by online course interactions, such as isolation, dissatisfaction, technology issues and boredom (Garrison & Cleveland-Innes, 2005; Roblyer & Wiencke, 2003; Swan, 2001). Students sometimes begin an online course with preconceived expectations, and then leave the class because these expectations are not achieved (Allen & Seaman, 2015). Opportunities for student interactions in an online course can be critical in avoiding students feeling isolated, developing a sense of course community, and achieving academic success (Rovai & Downey, 2010). Students in Massive Open Online Courses (MOOCs) have experienced some of these same issues related to a non-interactive environment (Khalil & Ebner, 2014). MOOC designers are now implementing the addition of higher levels of student-student interaction as studies have found it helped with increasing learner participation and completion rates (Sunar, White, Abdullah, & Davis, 2017).

After 25 years of K-12 online learning practice in the United States, there are limited amounts of published research investigating if more interaction leads to higher student satisfaction in K-12 contexts (Barbour, 2010). The majority of current research in online learning tends to focus on adult learners in the university setting. A few studies, with college student participants, suggest a correlation when student-content, student-student or student-teacher interaction (Moore, 1989) goes up, and so does student satisfaction (Anderson, 2003; Bernard et al., 2009; Bernard, Borokhovski, Schmid, Tamin, & Abrami, 2014; Eom, Wen, & Ashill, 2006; Kuo, Walker, Schroder, & Belland, 2014; Swam, 2001). Barbour and Reeves

(2009) suggest that future K-12 online learning research should focus on student satisfaction, while other researchers note that few K-12 studies have deeply investigated the relationship of interaction and satisfaction in online learning (Barbour, 2010; Ferdig, Cavanaugh, DiPeitro, Black, & Dawson, 2009).

This case study explored the differences between two online course models by investigating the results of a student end-of-course survey and teacher time logs. The process used in this case study can best be explained as an exploration to examine current online course design, with improvement as the goal. This understanding could influence the development of course interaction standards, assist designers in building better courses, and ultimately lead to higher satisfaction for students.

Literature Review

Large numbers of students continue to take online courses at both the secondary and post-secondary levels, with the latest figures showing enrollments trending upward. The Digital Learning Compass organization (Allen & Seaman, 2017) released a report showing that over six million post-secondary students were taking at least one online course during the Fall 2015 term, a 3.9% increase over the number reported the previous two years. During the 2014-15 school year, it is estimated that over 2.6 million U.S. K-12 students enrolled in over 4.5 million supplemental online courses (Watson et al., 2015). Some proponents of online learning believe the growth can be attributed to online education filling a need for many non-traditional students looking for increased convenience and flexibility in their educational choices (Matthews, 1999; Swan, 2001).

While the first K-12 online schools and programs began 15-20 years ago, distance education has been used by students for over 100 years (Matthews, 1999; Watson et al.,

2015). Distance education allows instruction and learning to occur, even though the student and teacher are not geographically together (Matthews, 1999). In the evolution of distance education to online learning, opportunities for interactions have increased. Correspondence courses allow learners and instructors to interact. However, the time lag in providing feedback and communication can be substantial when communicating by mail. More recent technologies such as video conferencing, email, and learning management systems, have made it easier to promote higher levels of communication in the online environment. Also, those developing online learning models suggest more communication in learning environments leads to improved learning outcomes and increased student success (Bernard et al., 2009; Bernard et al., 2014; Borup et al., 2013; Garrison & Cleveland-Innes, 2005; Swan, 2001). Studies indicate a positive correlation between high levels of interaction and cognitive learning (Garrison & Cleveland-Innes, 2005), student motivation (Murphy & Rodríguez-Manzanares, 2009), and reduced anxiety (Garrison & Cleveland-Innes, 2005). Therefore, "failure to fully consider the relational dynamics in the online setting may produce greater feelings of isolation among distance learners, reduced levels of student satisfaction, poor academic performance, and increased attrition" (Woods & Baker, 2004, p. 1). Given the continuous growth and developing communication tools, it is essential to look for ways to increase student satisfaction regularly.

Student Satisfaction

Moore (2011) defines student satisfaction as "Students are successful in learning online and are pleased with their experience" (p. 92). Student satisfaction, in any learning environment, can be difficult to measure. So why measure it? Students spend considerable time, effort and money to receive a quality education and should perceive their online learning experience as being high value (Bollinger & Erichsen, 2013). Studies have shown that student satisfaction can

influence student motivation (Borup et al., 2013). The Online Learning Consortium (OLC) state in their Five Pillars of Quality Online Education that "Student satisfaction reflects the effectiveness of all aspects of the educational experience" (Sinclaire, 2013, p. 3). OLC also notes that the most critical key to continuous learning is student satisfaction (Sinclaire, 2013). Lastly, there is research that suggests student satisfaction can decrease attrition rates and influence students to take more online courses (Hawkins et al., 2013). Many educational entities view their online students as customers, making their satisfaction essential to retention and recruitment efforts (Emery, Kramer, & Tian, 2001).

Students today participate in a highly interactive world communicating through social media and by text messages. Many students prefer an active learning environment, engaging with the material, participating in class and collaborating with peers. Students expect the same experience in their online courses (Dziuban, Moskal, Kramer, & Thompson, 2013). Online instructional designers and teachers can play an important role related to student satisfaction in online courses. In a study involving 397 students, Eom et al. (2006) identified several factors essential to student satisfaction related to teacher interactions. The study highlighted that students wanted frequent teacher feedback, teacher facilitation of learning in the course, and teachers having strong content knowledge. In a similar study, conducted over three years at a university, researchers surveyed 553 undergraduate and graduate online students to investigate levels of satisfaction with online learning (Cole, Shelley, & Swartz, 2014). The data showed that 54% of students were dissatisfied with their online course. The highest dissatisfaction, noted by 33% of students, was lack of teacher and peer interaction. Another 8% of students were dissatisfied with their teacher's facility with online instruction (Cole et al., 2014). This research adds to the evidence that online interactivity links to student satisfaction.

Interaction Linked to Student Success

The interactions students experience in the online environment are much different than in face-to-face. For example, in the traditional classroom verbal and nonverbal communication can close the psychological distance between the teacher and student. Online teachers are limited in many instances to written communications, which does not have the benefits of voice cues or body language (Collison, Elbaum, Haavind, & Tinker, 2000). What remains the same is that interaction is an essential element in all types of educational settings, perhaps if not more so in the online environment (Swan, 2001). The positive influence of interaction in online learning has been documented by educational researchers in both postsecondary (Eom et al., 2006; Swan, 2001) and K-12 settings (Borup et al., 2013; Cavanaugh et al., 2009).

Before the explosive growth in online learning, Moore (1989) developed a theoretical framework for distance education interactions. Moore's interaction classification has been used thoroughly to examine online learning interactions in higher education settings. The framework identifies a three-part interaction scheme that includes student-content, student-teacher, and student-student interaction.

Student-content interaction refers to how students interact with textbooks, instructional videos, and other learning materials. This form of interaction tends to be one-sided as information flows to the student from the subject matter. Kuo et al. (2014) reported a positive correlation between student-content interaction and student satisfaction at the postsecondary level. There is limited literature on K-12 studies that have investigated and found a positive effect from student-content interaction on student achievement in online courses.

Student-teacher interaction includes asynchronous communications through discussion boards and email or synchronously through chat and video conferencing (Anderson, 2003). This

form of interaction is a two-way communication between the student and teacher. Moore (1989) believes high quality and frequency of student-teacher interaction is required to have a successful distance learning experience. A few online K-12 studies have reported a positive effect between this form of interaction and motivation (Murphy & Rodríguez-Manzanares, 2009), attrition (Roblyer, 2006), and academic dishonesty (Watson, 2007). The post-secondary research has presented a much more robust case related to student-teacher interaction and a positive effect on student perceived learning and satisfaction (Jung et al., 2002; Kuo et al., 2014).

Student-student interaction refers to communications between students. This form of interaction includes collaborative learning that can help develop critical thinking skills and more in-depth knowledge (Anderson, 2003). There is little research in online K-12 settings regarding student-student interaction. A couple studies have documented students' desire for interpersonal communication (Cavanaugh et al., 2009) and that the lack of student-student interaction could lead to higher attrition rates (Weiner, 2003). Post-secondary research regarding student-student interaction has reported mixed results. Some studies indicate this interaction has little to no positive effect on student satisfaction (Jung et al., 2002; Kuo et al., 2014) while another study reports it helps increase achievement (Anderson, 2003).

The need for interaction will vary in each online course depending on the types of learners, the personality and philosophy of the teacher, and the course design. Designers and teachers should be made aware of the importance of interactions occurring in their courses. They should continue to explore ways to cope with the difficulty of communication in the online environment, increase opportunities for content impact, and explore new ways for students to engage with one another. Many studies have focused on the definition and description of online interactions such as learner-content, learner-instructor, and learner-learner in online education

(Moore, 1989). However, there is little evidence in the K-12 literature that has focused on how high levels of interactions affect student satisfaction.

Instructor Time Investment

Research suggests that quality online teaching requires a more substantial time investment from the teacher than the face-to-face classroom (Cavanaugh, 2005; Pattillo, 2005). What seems to be missing from the literature is more research on the distribution of teacher time investment in the various aspects of online teaching. Researchers have suggested that the amount of time required to teach online varies, depending on teacher experience, enrollments, course design, content area, and other factors (Mupinga & Maughan, 2008; Rockwell, Schauer, Fritz, & Marx, 1999).

Van de Vord & Pogue (2012) surveyed 30 faculty members regarding online teaching time investments. Faculty reported that next to grading, student-teacher interaction was the second most time-consuming aspect of online teaching. Mandernach, Hudson, & Wise (2013) conducted a study that surveyed 80 full-time online faculty members measuring their time investment estimates spent on different activities during an average week of teaching online. Faculty reported spending their most considerable weekly time investment of 52% grading assignments and providing student feedback. The second largest time investment, at 45%, was student-teacher interactions, such as initiating one-on-one contact with students and answering phone calls and email.

The majority of current research compares online teacher time investment to face-to-face time investment. As online learning research continues, it is crucial to identify and understand the factors that affect the responsibilities of teaching online efficiently. Instructional designers must understand the time investment of teachers when designing courses to get the most efficient

use of interactions. The online administration needs this information to decide on the best course design model to use, to fairly pay teachers and to create training for teachers.

Theoretical Framework

The theoretical framework used for this study was the interaction equivalency theorem as proposed by Terry Anderson. The theorem succeeds and builds on Moore's (1989) three-part model of interaction. In the interaction equivalency theorem, Anderson (2003) asserted:

> Deep and meaningful formal learning is supported as long as one of the three forms of interaction (student–teacher; student-student; student-content) is at a high level. The other two may be offered at minimal levels, or even eliminated, without degrading the educational experience.
>
> High levels of more than one of these three modes will likely provide a more satisfying educational experience, though these experiences may not be as cost or time effective as less interactive learning sequences. (p. 4)

Anderson (2003) suggested learning effectiveness will be achieved as long as an instructional designer designs the course with at least one of the three types of interactions at a high level. Other forms of interaction may be included at lower levels or excluded altogether, and not affect the quality of learning. If a course provides multiple types of interaction, all at a high level, it increases the likelihood of student satisfaction.

Miyazoe and Anderson (2010) proposed that the interaction equivalency theorem focuses on interaction regarding quality and quantity. For example, the theorem assures a quality learning experience in an online course with high levels of student-content interaction, no student-student interaction, and no student-teacher interaction. The second part of the theorem refers to the quantity of interaction. A second example course with high levels in both student-

content and student-teacher interactions would likely produce higher student satisfaction but may also increase the workload and time commitment for the student and the teacher.

This study explores differences in student satisfaction and teacher time investment between two online models (a) an independent study model that emphasizes student-content interaction and minimizes other interactions, and (b) a model that adds a teacher who proactively reaches out to interact with students. This understanding could influence the training and development of online teachers, assist designers in building better courses, and ultimately lead to higher satisfaction and academic success for students.

Method

The research question investigated in this study was:

1. What differences exist between a correspondence model and a teacher-led model of K-12 online learning based upon examining the Student End-of-Course Evaluation Survey and the Teacher Communication Log?

Research Design

The purpose of this study was to explore what differences exist between two online course models by investigating the results of a student end-of-course survey and teacher time logs in high school online courses. This cross-case study approach, based on two data sources, further explored online learning student satisfaction and the time investments of the online teacher. Case studies are commonly used in online learning research due to the flexible method and application to a wide variety of contexts (Graham, 2016). Yin (2003) identified case studies as an appropriate methodology for explanatory research because they can analyze contemporary events and can explore descriptive questions.

The process used in this case study can best be explained as an exploration to examine current online course design, with improvement as the goal. For this case study, investigating teachers' interactions with students, student satisfaction data, the topics of interactions such as grading and content questions, and teacher time investments were explored. Yin (2003) noted that a case study is ideal when looking to explore, explain or describe events in the contexts in which they occur. A case study also investigates and brings out details from the perspective of the participants (Yin, 2003). Eysenck (1976) wrote, "sometimes we simply have to keep our eyes open and look carefully at individual cases – not in hope of proving anything, but rather in hope of learning something!" (p. 9). Eysenck describes the case study as an exploration, and rather than always working to prove new findings; researchers should give some credibility to the notion of better understanding a topic.

Participants

The participants in this study were high school students enrolled in secondary level math and English online courses. At the time the data was collected, there were 1025 students enrolled in the four courses. With open enrollment and a year to complete a course, this is just a snapshot in time, as students were still enrolling and working in the courses. To encourage participation in the course evaluation process, students were told the survey was anonymous, therefore it does not include age, ethnicity or gender. Hence, demographic information of participants is not included in the analysis. This research was exempt from IRB review due to the following (a) use of existing student data that was a part of regular educational practices that was anonymous even to the online learning program (b) use of existing data time logs for instructor-student communication that was part of the regular business practices of the online learning program and were de-identified.

Setting

This study was conducted at a nonprofit online educational program in the western U.S. The online program sponsored by a private, denominationally affiliated university, offers more than 550 online courses. Enrollments come from university, high school, and middle school students throughout the United States and in over 90 foreign countries. There are approximately 100,000 online course enrollments per year. Registration is open year-round, with a full year given to complete most courses.

The online program referred to in this study offers two model types of high school online courses and students self-enroll. This study focused on two high school math and two English classes, as both models exist in these subject areas. The two models emphasize different types and levels of interaction (see Figure 1). Model One courses are designed with a high level of student-content interaction and a low level of student-teacher interaction. Model Two courses are designed with high levels of both student-content and student-teacher interaction, and with a low level of student-student interaction.

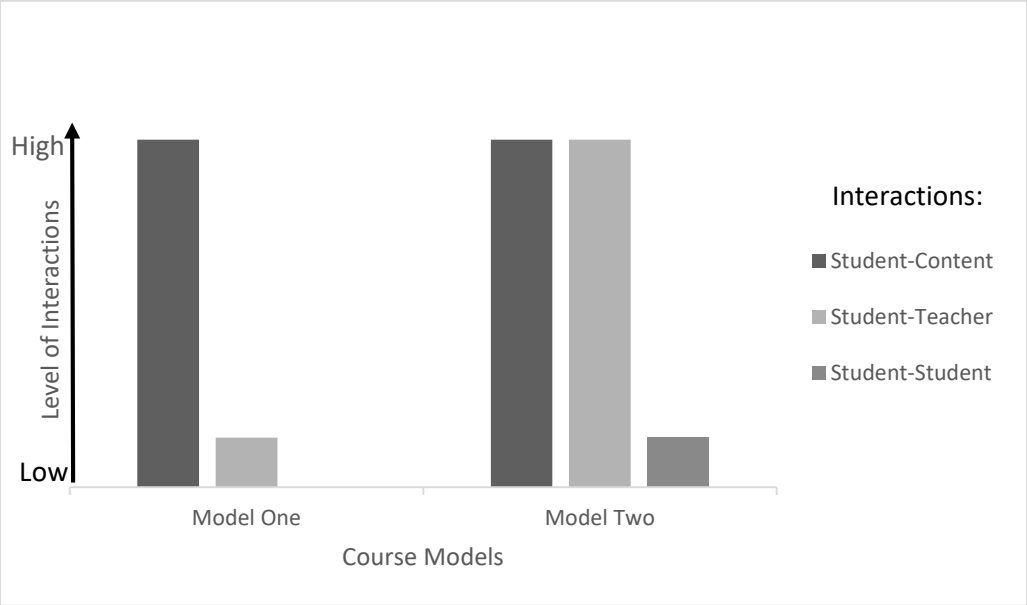

Figure 1. Levels of different types of interactions designed into online courses.

The two models exhibit similarities and differences in the course experience. Both models are self-paced, allow a year for completion, include a certified teacher, the same course content, and tutoring/technical support. Table 1 displays the differences in the course experience related to each model's course design.

Table 1

Course Models Descriptions

Descriptions	Model One	Model Two
Interaction design	Student-content	Student-content and student-teacher
Assignments	Asynchronous	Asynchronous and synchronous
Teacher feedback	Limited	Multiple
Communications	Student initiated	Teacher and student initiated
Virtual interactions	None	Live teacher lessons and office hours
Peer-to-peer interactions	None	Discussion boards (handled by TAs)

Teacher responsibilities for both course models included providing feedback on assignments and answering student-initiated email regarding course content and grading questions. Model two teachers, in addition, conducted synchronous lessons, virtual assignments, and provide live feedback while reviewing work with students. Model two teachers were also expected to post an announcement or send a general email blast weekly to students and contact five to seven students weekly with a personalized email.

Instruments

The information used for this study was collected from two instruments, an end-of-course student survey and a teacher communication log. Both instruments used in this study were self-reported by participants, which creates a limitation and may not provide an accurate reflection of students' perceptions and teacher activity. Participating teachers were instructed how to track communications, with examples given, and clarification after certain points during the study.

Instrument one. The online Student End-of-Course Evaluation Survey (SECES) was developed and currently in use by the online program. The survey contained 12 questions (with multiple parts) related to course and overall experience and was estimated to take students about 10 minutes to complete. For context, the online program has set acceptable standards for courses at 5-8 on the Likert scale questions and a 70% response score on Yes/No questions. This survey was distributed to all students during the end-of-course completion process. All students received a notification that the volunteer survey was anonymous and would not impact their grade in any way.

Instrument two. A Teacher Communication Log (TCL) was created for this study to capture student-teacher interaction information for each communication. The log included eight questions and expected teachers to take two to three minutes to complete per

interaction logged. Teachers self-reported the information, such as who initiated the communication, how much time the communication required, the mode of communication, and reason for communication. Figure 2 is a screenshot of the communication log with the names of students and teachers concealed.

	A	B	C	D	E	F	G	H	I	J	K
1	Timestamp	Instructor Name	Date of Communication	Minutes spent on commu	Who initiated communica	Student Initiated	Teacher Initiated	Student Name	Action Taken (Notes)		
2	10/13/2017 20:33:51		10/13/2017	5-10 minutes	Student Initiated	Grading question			Student wanted to request final exam, but is missing several assignments (including the		
3	10/16/2017 10:21:16		10/16/2017	Less than 5	Teacher Initiated		Personalized email		emailed student reminding him about appointment he scheduled. Also, to inquire what h		
4	10/18/2017 19:04:58		10/18/2017	Less than 5	Teacher Initiated		Email blast		Welcome to the course email.		
5	10/18/2017 19:17:32		10/18/2017	5-10 minutes	Teacher Initiated		Announcement		Announcement reminding students about outside resources for help.		
6	10/18/2017 19:29:25		10/18/2017	5-10 minutes	Teacher Initiated		Personalized email		Reminder to get onto the course and work as well as assignments that need to still be cc		
7	10/18/2017 19:34:15		10/18/2017	5-10 minutes	Teacher Initiated		Personalized email		email reminding student to continue working on the course and on the last few assignme		
8	10/18/2017 19:37:48		10/17/2017	Less than 5	Teacher Initiated		Personalized email		Reminder to continue working on the course (hasn't been on in over 3 months)		
9	10/18/2017 19:43:58		10/18/2017	5-10 minutes	Teacher Initiated		Personalized email		Encouraged student to resubmit assignments and to prepare for and take the final exam		
10	10/18/2017 19:46:52		10/18/2017	Less than 5	Teacher Initiated		Personalized email		Email reminding student to work on the course. (hasn't been on in 3 months)		
11	10/18/2017 19:53:30		10/18/2017	5-10 minutes	Teacher Initiated		Personalized email		Reminder to continue working on course and that the midcourse essay still needs to be c		
12	10/18/2017 19:54:12		10/18/2017	Less than 5	Teacher Initiated		Personalized email		Reminder to continue working on course (has been 3 months).		
13	10/19/2017 7:48:41		10/19/2017	Less than 5	Student Initiated	Content question			Student wanted to let me know she is planning on attending exploration meeting tonight.		

Figure 2. Teacher communication log example (with teacher and student names concealed).

Procedures

All students were encouraged to complete the existing SECES during the end-of-course completion process. Students received a notification that the survey was anonymous and would not impact their grade. The 764 SECES respondents included in this study completed the course over the last two years (January 2016- February 2018). An online program administrator collected the data, then shared the requested results with the researcher. The SECES data collection and organization was already in place as part of the online program's course assessment process.

Four online teachers (two for each model) tracked both student and teacher-initiated communications using the TCL. The logs represented communications with all students enrolled in the courses during a four-month period (October 2017- February 2018) and included both students that completed and did not complete during the four-month period. The log was in survey form that allowed the researcher to export the collected data to a spreadsheet for analysis.

Data Analysis

Table 2 describes the analysis of the survey data and the communication log. Descriptive statistics were used to summarize the quantitative data in this study as summarized in Table 2. One sub-section of the teacher communication log was coded, the communication topic of teacher-initiated and response to teacher interactions. Inter-rater reliability was calculated using two raters and eight possible coding categories into which the interactions were classified (a) content, (b) grading, (c) tech/policy forwarded, (d) encouragement, (e) welcome, (f) inactive, (g) policy, and (h) gratitude. In each category, there was at least 80% initial agreement between coders. Discrepancies were discussed until 100% agreement was reached.

Two researchers individually read and identified themes from the original teacher notes. Themes were categorized based on their perception on the underlying data. Following this step, the two researchers adjusted and integrated their individual coding rubric into a unified coding rubric. The two researchers then attempted a trial coding of the data using the unified rubric to determine ease of use, needed clarification, and categories that could be eliminated or combined. Several iterations were necessary prior to finalization of the coding rubric.

Using the established coding rubric, the first phase of coding was independently conducted by two raters coding the teacher notes into categories. A percent agreement of 86% was reached out of all the coding decisions (529/615) by the two raters. The two raters then revisited and discussed each coding non-agreement through collaboration, using consensus agreement, and the ratings were finalized.

Table 2

Data Analysis

Research Question	Instrument/Data	Analysis
1. What differences exist between a correspondence model and a teacher-led model of K-12 online learning based upon examining the Student End-of-Course Evaluation Survey and the Teacher Communication Log?	Student End-of-Course Evaluation Survey	Means and standard deviation of student satisfaction ratings based on data from the Student End-of-Course Evaluation Survey was charted for two courses in the two models. T-tests were run to indicate if the differences between means in the two models were statistically significant.
	Teacher Communication Log	The quantity of student/teacher interactions was summarized for the two course models. Teacher notes were coded and reported based on developed categories in order to understand the nature of student-teacher communication.

Results

Findings were organized into four areas related to the research question (a) student perceptions of course quality, (b) student satisfaction, (c) course completion, and (d) teacher time investment.

Student Perceptions of Course Quality

Tables 3 & 4 provide a summary of 764 total student end-of-course evaluation survey results collected for the case study. For context, the online program has set acceptable standards

for courses at 5-8 on the Likert scale questions and a 70% response score on Yes/No questions on the SECES. An independent-samples t-test was conducted to compare the Model One and Model Two course means for each SECES question, with an Alpha value set at $p < .05$.

Both the math and English course models met the acceptable levels set by the program in all areas but two. Both the math and English Model One courses scored below the program's acceptable levels in *Meaningful instructor feedback* and *Timely instructor response time*. Overall, the SECES results displayed slightly higher ratings in the Model Two versions of the courses, with only two mean scores receiving an equal score for each model. However, the differences were only statistically significant in a few instances as shown in Tables 3 and 4.

The Model Two Math course results are slightly higher than the Model One course in all areas, except *Course was challenging* ($M = 6.0$), where the results were the same. The largest mean differences between the Model One and Two courses were displayed in *Timely instructor response time* (+3.0), followed by *Meaningful instructor feedback* (+2.8), and *Instructor rating* (+1.0). These same three areas, indicated by the t-test, showed a significant difference at the .05 level between the model means, *Timely instructor response time* ($p < .001$), *Meaningful instructor feedback* ($p < .001$), and *Instructor rating* ($p < .001$).

Table 3

End-of-Course Student Evaluation Math Courses

	Model One (n=250)	Model Two (n=54)	t-test
Intellectual skills were developed	5.2	5.6	.277
Assignments were meaningful	5.3	5.6	.449
Learning material was engaging	5.0	5.2	.795
Meaningful instructor feedback	3.6	6.4	.000*
Timely instructor response time	3.2	6.2	.000*
Course was challenging	6.0	6.0	.957
I learned a great deal	5.7	6.0	.517
Instructor rating	5.0	6.0	.000*
Goals Achieved	87%	89%	.688
Recommend to a friend	77%	79%	.753
Satisfied with experience	79%	81%	.744
Comparing this course with others	5.0	5.3	.195

*$p < .05$

The Model Two English course also showed slightly higher ratings than the Model One course in all areas except *Learning material was engaging* (M = 5.8), where the results were the same. The largest mean differences between the Model One and Two courses were in *Timely instructor response time* (+3.6), followed by *Meaningful instructor feedback* (+2.7). For English courses there were statistically significant differences at the .05 level in the t-test scores of four areas (a) *Meaningful instructor feedback* ($p < .001$), (b) *Timely instructor response time* ($p < .001$), (c) *Instructor rating* ($p < .001$), and (d) *Goals achieved* ($p = .005$).

Table 4

End-of-Course Student Evaluation English Courses

	Model One (n=400)	Model Two (n=60)	t-test
Intellectual skills were developed	5.8	6.1	.380
Assignments were meaningful	5.8	6.0	.385
Learning material was engaging	5.8	5.8	.914
Meaningful instructor feedback	3.6	6.3	.000*
Timely instructor response time	3.1	6.7	.000*
Course was challenging	5.8	5.9	.918
I learned a great deal	5.9	6.1	.452
Instructor rating	5.7	6.5	.000*
Goals Achieved	92%	98%	.005*
Recommend to a friend	88%	97%	.005*
Satisfied with experience	92%	97%	.075
Comparing this course with others	5.6	6.3	.001*

*p < .05

Student Satisfaction

Three questions on the SECES were categorized as related to student satisfaction (a) *Recommend to a friend*, (b) *Satisfied with experience*, and (c) *Comparing this course with others*.

Student ratings met the program's acceptable level for both Model One and Model Two Math courses on the three questions. The Model Two Math course showed a 0.3 positive difference in *Comparing this course with others*, and a 2% positive difference in *Satisfied with experience* and *Recommend to a friend*. For *Recommend to a friend* (p = .753*), Satisfied with experience* (p = .744), and *Comparing this course with others* (p = .195), the t-test revealed that the model means did not differ significantly at the .05 level.

The Model One and Model Two English courses also met the program's acceptable level for the three student satisfaction questions. The Model Two English course showed a 0.7 positive difference in *Comparing this course with others*, *Satisfied with experience* showed a 5%

positive increase and *Recommend to a friend* showed a 9% positive increase. The t-test results for *Satisfied with experience* ($p = .075$) did not differ significantly, however, for both *Recommend to a friend* ($p = .005$) and *Comparing this course with others* ($p = .001$), the t-test indicated that a significant difference between model means was present. Overall, student satisfaction results were slightly higher in English courses than math courses.

Course Completion

Table 5 provides a summary of enrollments, time to complete, and completion rate for both models in the study. Enrollments are higher in both the Model One courses. Students were able to complete both the Model One courses in a shorter time frame. Students took an average of five weeks longer to complete the Model Two Math course and three weeks longer to complete the Model Two English course. The Model Two Math course completion rate is 5% higher than the Model One course. The Model Two English course completion rate is 3% higher than the Model One course.

Table 5

Course Model Enrollments, Time to Complete, and Completion Rate

Course	Model	Enrollments	Avg. Time to complete	Completion rate
Math	Model One	2728	13 weeks	38%
	Model Two	801	18 weeks	43%
English	Model One	1683	16 weeks	53%
	Model Two	151	18 weeks	56%

Teacher Time Investment

Time spent and who initiated the communications were tracked in both course delivery models (see Figure 3). Across all four courses, over a four-month period, a total of 707 communications were made, 3% (n=21) in the Model One courses, and 97% (n=686) in the Model Two courses. Teachers tracked interactions selecting from a time range of (a) less than 5 minutes, (b) 5-10 minutes, (c) 10-15 minutes, and (d) more than 15 minutes. Total time estimates were reached by using the following categories (a) less than 5 minutes= 5 minutes, (b) 5-10 minutes= 10 minutes, (c) 10-15 minutes=15 minutes, and (4) more than 15 minutes=16 minutes.

In Model One courses, where all interactions were student-initiated, there were a total of 21 interactions. The most common time investment being less than 5 minutes (n=14, 66.7%) per student interaction, followed by 5-10 minutes (n=5, 23.8%), 10-15 minutes (n=1, 4.7%) and more than 15 minutes (n=1, 4.7%). The total time investment for student interactions for the two Model One teachers was estimated at 151 minutes (2.5 hours) over a four-month period.

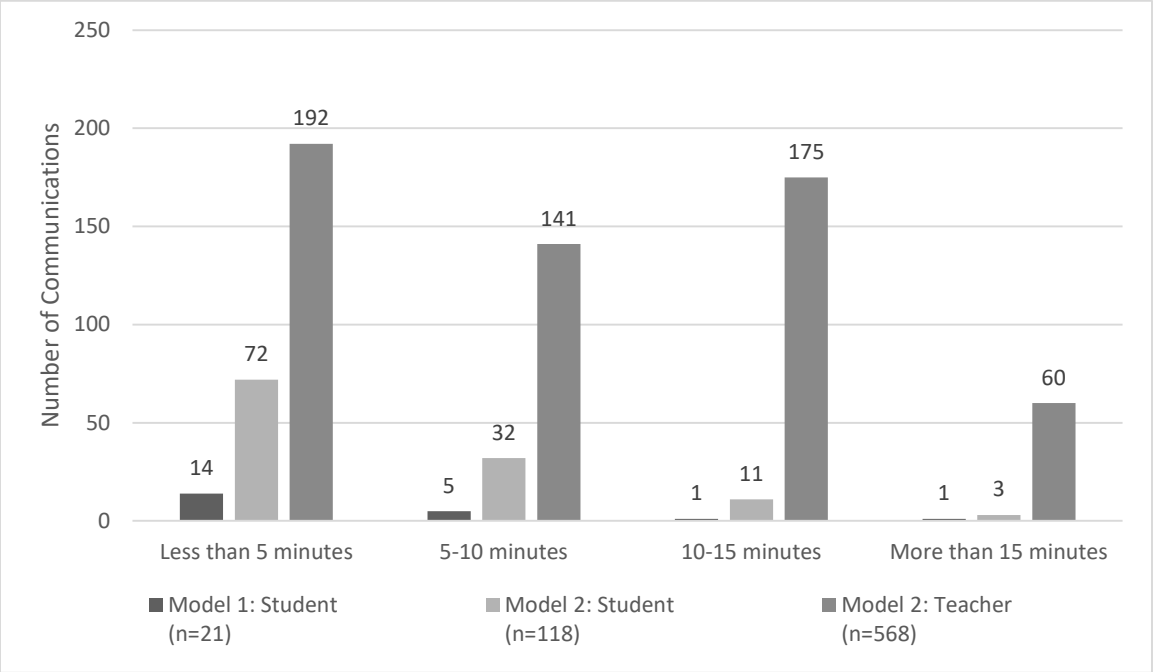

Figure 3. Teacher time spent and who initiated communication.

The Model Two courses also included student-initiated communications. There was a total of 118 interactions. The most common time investment being less than 5 minutes (n=72, 61%) per student interaction, followed by 5-10 minutes (n=32, 27.1%), 10-15 minutes (n=11, 9.3%), and more than 15 minsutes (n=3, 2.5%). The time investment for student-initiated communications for the two Model Two teachers was estimated at 893 minutes (14.9 hours) over a four-month period.

In Model Two courses, teachers also initiated proactive communications (n=568) with students. Teachers most frequently spent less than 5 minutes (n=192, 33.8%) per student interaction, followed by 10-15 minutes (n=175, 30.8%), 5-10 minutes (n=141, 24.8%) and more than 15 minutes (n=60, 10.6%). The time investment for proactive communications for the two Model Two teachers was estimated at 5,955 minutes (99.1 hours) over a four-month period.

The total time investment for the two Model Two teachers, combining student and teacher-initiated communications was estimated at 6,848 minutes (114.1 hours) over a four-month period.

Teacher method of communication. Teachers tracked their method of communication with students (see Figure 4). Of the 568 teacher-initiated communications, the highest percent of interactions (n=463, 81.5%) were in the form of a personalized email to an individual student. About 11% (n=65) of teacher communications were an email blast, containing the same message for a large number of students. The remaining communications were sent by announcement (n=18, 3.2%) and conducted by video conference (n=22, 3.9%). None of the teachers used a phone call as a method of communication.

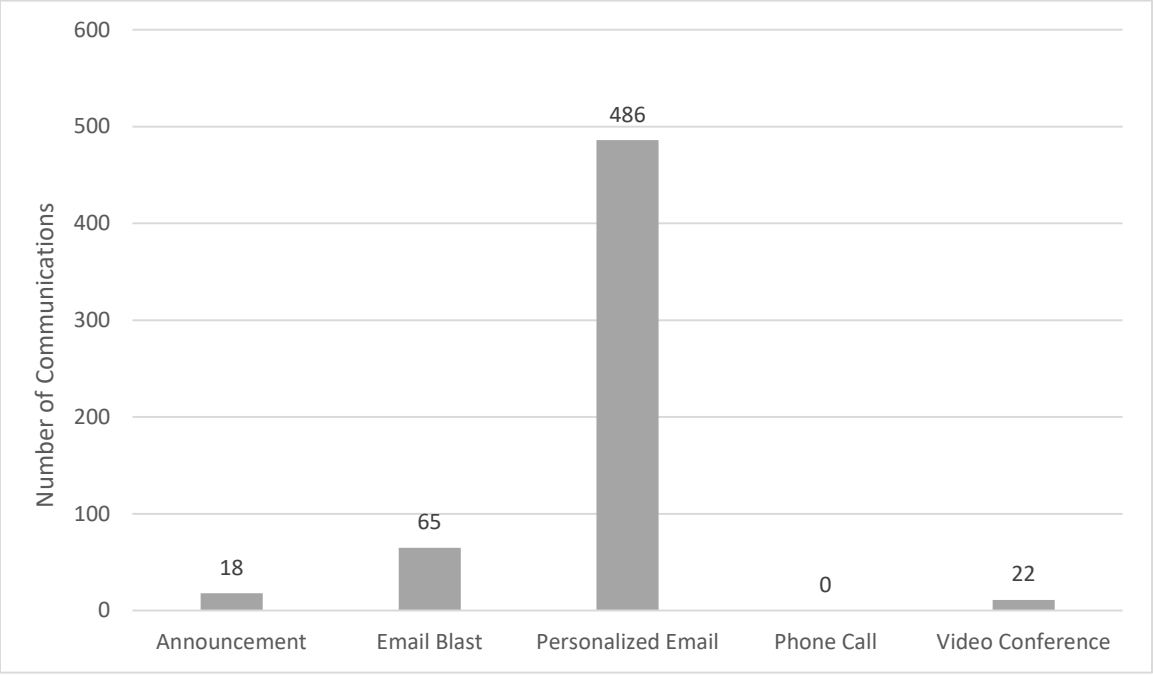

Figure 4. Teacher-initiated communication methods.

Communication topics. Communication topics between teachers and students were organized into eight categories (see Figure 5). Overall the highest category reported was

reaching out to inactive students (n=361, 51.1%), followed by grading questions (n=104, 14.7%), encouragement to students (n=81, 11.5%), and content questions (n=58, 10.4%).

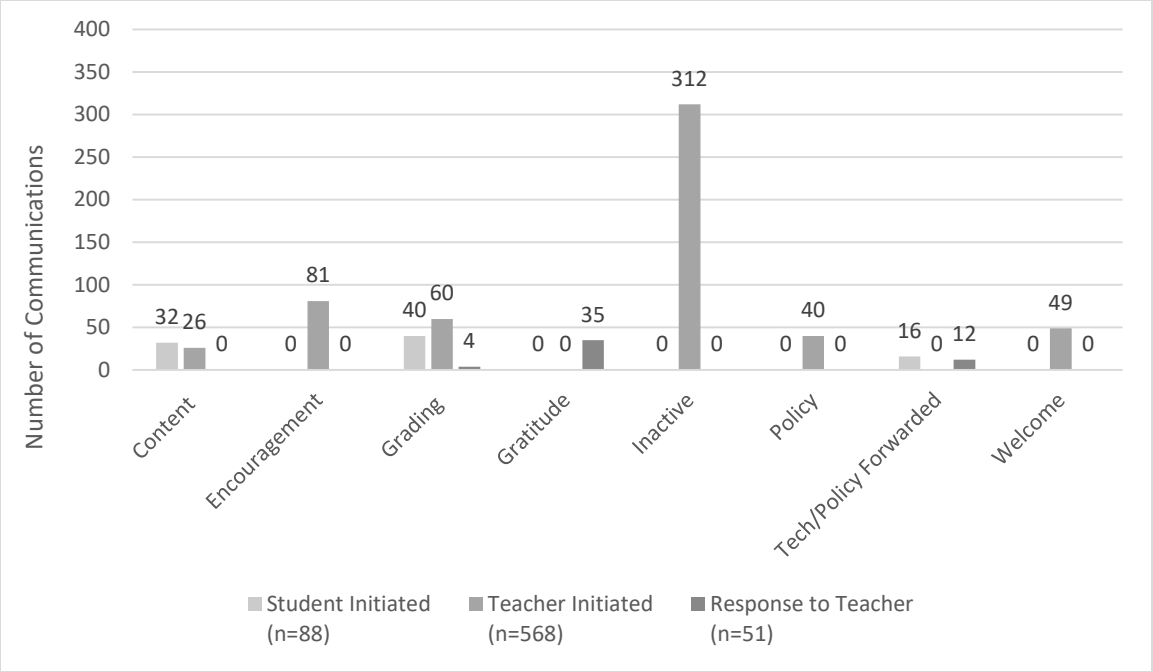

Figure 5. Student and teacher communication topics.

Student-initiated topics were highest regarding grading questions (n=40, 45.5%), followed by content questions (n=32, 36.3%), and tech/policy questions that were forwarded to another area (n=16, 18.2%). Teacher-initiated topics were highest in reaching out to inactive students (n=361, 58.5%), followed by encouraging students (n=81, 13.1%), and providing grading information (n=60, 9.7%). When students responded to a teacher-initiated communication, the highest category was gratitude (n=35, 68.6%), a tech/policy question forwarded (n=12, 23.5%), and grading questions (n=4, 7.8%).

Charting interactions. Two scatterplots (see Figure 6 & 7) were constructed to examine differences between the number of teacher-initiated interactions and number of student-initiated interactions per student. The size of the bubble represents the number of students on a particular point on the graph. Figure 6 displays the interactions that took place in the Model One courses

over a four-month period. Model One courses allowed proactive communication from students (n=21) and reactive communications from teachers. Over the four months of the study, 16 students reached out to the teacher one time, three students reached out twice, and two students contacted the teacher four times. Teachers did respond to each student communication, but did not engage with students in a proactive manner.

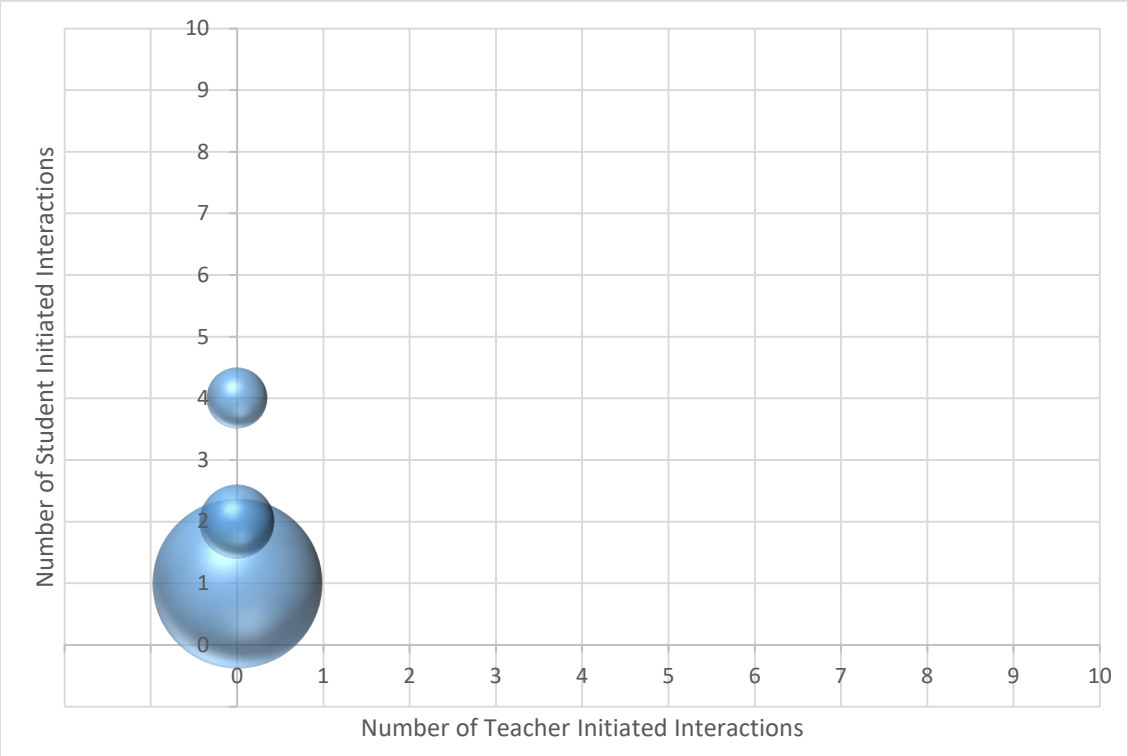

Figure 6. Number of student and teacher-initiated interactions per student in Model One.

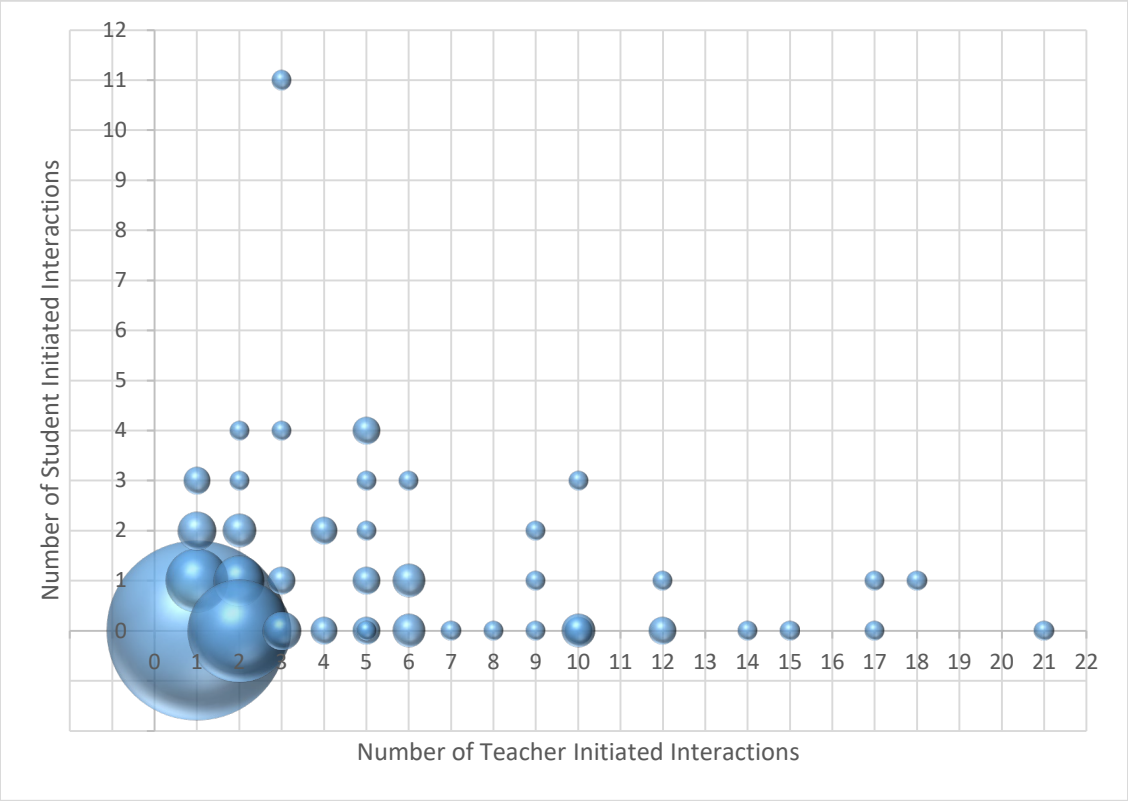

Figure 7. Number of student and teacher-initiated interactions per student in Model Two.

Figure 7 shows the number of teacher and student-initiated interactions per student in the Model Two courses over a four-month period. The largest area (n=92) is the teacher contacting the student one time with no return communication. The next largest areas are the teacher reaching out twice with no return communication (n=30), followed by the teacher reaching out once with the student communicating once as well (n=11). The largest amount of student-initiated communications by one student was eleven, with four teacher-initiated communications. The largest amount of teacher-initiated interactions toward one student was twenty-one, with no response from the student. The largest area of correspondence is in the 1-6 range for teacher interactions, which resulted in the 0-4 range of student interactions

Discussion

This study examined what differences existed between two online course models by investigating the results of a student end-of-course survey and teacher time logs in high school online courses. As proposed as the theoretical framework for this study, Anderson's Interaction Equivalency theorem (2003) was explored. The theorem states that as long as one type of interaction in the online course (student-student, student-content, student-teacher) is at a high level, meaningful learning will be supported and the student experience will not be degraded. Additionally, Miyazoe and Anderson (2010) presented findings that reported higher quality and quantity of interaction are likely to result in greater satisfaction but may also increase the workload and time commitment for the student and the teacher. The results from this study appear to partially agree with these claims. This discussion will review in detail what affects interaction had on student perceptions of course quality, student satisfaction, course completion, and teacher time investment.

The Model One courses were designed to be an independent study model, with only high levels of student-content interaction, with very little opportunity for teacher and no peer interaction. Previous research had reported that working independently, without an instructor or peer interaction was difficult for many students (Anderson, 2003; Jung et al., 2002). The results from our study appear to show that the model works as designed and that many students can be successful in an independent study model course. The online program has set an above 5 response score on the Likert scale questions and a 70% response score on the Yes/No questions as an acceptable standard for courses. The Model One courses met the program's acceptable standard level in all areas but two, *Meaningful instructor feedback* and *Timely instructor response time*. This finding reflects other studies that have reported issues with lack of feedback

and instructor's untimely response time as the most unsatisfactory element in a students' online learning experience (Cole et al., 2014; Eom et al., 2006).

Model Two courses were designed to be a teacher-led model, enabling high levels of both student-content and student-teacher interactions. Overall, the SECES results displayed slightly higher ratings in the Model Two versions of the courses, with only two mean scores receiving an equal score for each model. However, the differences were only statistically significant in a few instances. The largest differences of means between the two models, with positive differences toward the Model Two courses, were *Timely instructor response time*, *Meaningful instructor feedback*, and *Instructor rating*. It is interesting that the highest rated areas for the Model Two courses were all related to the instructor. Does this mean a teacher can have an effect on the student's perceptions of course quality? One possibility is that feedback and timely responses may act as a motivator for students. This may lead students to pay more attention to course content and learning activities after receiving quality feedback and timely communications with the teacher. As reference previously, this is in line with research noting the importance of feedback and timely responses to the students' online learning experience (Cole et al., 2014; Eom et al., 2006).

This study also explored the relation between interaction and student satisfaction. Three questions on the SECES were identified as being related to student satisfaction. A number of studies conducted with college student participants, suggest a correlation when interaction goes up, so does student satisfaction (Anderson, 2003; Bernard et al., 2009; Bernard et al., 2014; Eom, et al., 2006; Swam, 2001). Kuo et al., (2014) identified the importance of student-teacher interaction and student-content interaction were among the predictors of student satisfaction in online programs. In the aforementioned study, student-content interaction was measured as the

strongest predictor of student satisfaction (Kuo, et al., 2014). Jung et al. (2002) noted in another study that regardless of the interaction type, students experienced a more positive view of online learning. In this study, student-teacher and student-content interactions were the main features of the course design, and both models scored at the program's acceptable level. When comparing the student satisfaction levels between the two models, the math course displayed a slightly higher rating in the Model Two courses, but the t-test results did not show a significant difference between the two models. The English courses also displayed a higher rating in Model Two courses, and did show a significant difference through the t-test for two of the three satisfaction questions. We were surprised however that none of the satisfaction questions in the math course with increased student-teacher interaction were statistically different from the version without the interaction. We expected to see that timeliness in responding to students, meaningful feedback, teacher and student enthusiasm would play a significant role in student satisfaction (Eom et al., 2006). This could be due to student expectations when taking a math class versus an English class. In English classes there are many opportunities for students to receive feedback when they submit assignments such as rough drafts, and in math, feedback may be limited to getting a math problem right or wrong. Miyazoe and Andersons' (2010) claim that higher quality and quantity of interaction will result in greater satisfaction looks to be supported in the English courses, but not in the math courses.

This study also examined how interaction affects a student's time to complete a course and overall course completion rates. The Model One courses on average were completed at a quicker pace. Students were able to complete the Model One math course 5 weeks quicker and the Model One English course 2 weeks quicker. These results do match a previous study results that found when there are higher quality and quantity of interactions, it will result in a higher

time investment for the student (Miyazoe & Anderson, 2010) which can lead to longer completion times. The longer student time investment for Model Two courses may be related to the higher amount of assignments and the requirement to meet multiple times virtually with the teacher during the course experience. The length of time for the student to complete the Model Two courses is more closely related to the length of time it takes a student to complete a class in the regular classroom. In this study, completion rates are slightly higher in the Model Two courses. These results correlate with other studies that have found higher completion rates in online courses with higher student-teacher interaction (Hawkins et al., 2013) and in MOOCs with higher student-student interaction (Sunar et al., 2017).

Previous research suggested that online teaching requires a larger time investment than the regular classroom (Cavanaugh, 2005; Pattillo, 2005). Other research suggest that this time increase is related to variables, such as, number of enrollments, content area, and course design (Mupinga & Maughan, 2008). Enrollments did not seem to have an effect on this study, as Model One courses had many more enrollments and resulted in lower teacher time investment. The course design did have an effect in that Model Two courses were designed to be more interactive, encouraging communications between the student and teacher. Two related studies (Mandernach, et al., 2013; van de Vord & Pogue, 2012) found that grading and student communications were the teachers largest time investments. The findings in this case study support a more substantial time investment for the participating online teachers in the Model Two courses, with the highest communication time investment related to trying to contact inactive students. These results relate back to the different course designs of the two models. This did not explore the time distribution of the teacher time investment, as in how many hours were spent grading, teaching lessons, communicating with students, etc. In this study, the cost

related to the teachers' higher investment of time in the Model Two courses was minimal. The online program does not pay the Model Two teachers substantially more than the Model One teachers for the additional duties. All online programs have different pay structures, but knowing the higher time investment of teachers teaching highly interactive courses could be important to know. Another question raised by the teacher time investment data is if the mode of communication, mostly email, made a difference or not. It could be that teacher email was being caught in a spam filter. Would more students had responded if sent a text message, or a phone call? Further research investigating other ways to interact with students could provide important findings. Since this study only focused on teacher interactions with students, it could be beneficial to investigate how to better involve the students' proximate community of engagement (Oviatt, Graham, Borup, & Davies, 2016; Oviatt, Graham, Borup, & Davies, 2018) including supporting roles, such as counselors, parents, and mentors.

Teacher time investment is an area that needs further investigation at the K-12 level. As online programs investigate course design models, those choosing more interactive models will need to consider the time investment of the teacher (Eom et al., 2006). Teachers may require more training in time management and guidance in creating assignment feedback and frequently asked questions templates. They may also need coaching in how much time they invest in reaching out to inactive students, versus how much time they invest in helping and encouraging students that are being successful.

Though not a focus of this case study, motivation of students has been found to affect student satisfaction in online education (Murphy & Rodríguez-Manzanares, 2009; Borup et al., 2013). Eom at al., (2006) suggested that students displaying self-motivation may encourage a student to learn above what is required and succeed in situations where there is not adequate

support. This suggest that even with high efforts from teachers to interact with students, there may be situations when students may not appear motivated, or engaged with the content and teacher feedback. For some communications some students may not expect the need to respond to a teacher communication or the teacher may not expect a response as well. For example, if the teacher sends a course policy email reminder, the teacher and student may figure no response is needed. Results show that while some students never responded to the teacher, some students did respond. While we don't have data to support these interactions made a difference, the communications may have motivated or encouraged the students who responded or reach out to teachers to be successful. This warrants further research on interaction's relation to student satisfaction, grades, and course completion data be examined over an extended period of time, so not to be interpreted as limited to a single study and to ensure reliable interpretation.

Overall this study has reported many similarities and differences between two online course models. Some statistical significances found between the models through the t-test were related to instructor feedback, timely instructor response time, and the instructor rating. Other statistical significances were found in the student satisfaction results in the English courses. These findings about the importance of the teacher related to course quality, student satisfaction and course completion rates could be called a practical significance that this study has identified. The other practical significance identified is the higher teacher time investment identified in the Model Two courses.

Finally, looking at the results of this study as a whole, both models worked as designed. Both models resulted in an acceptable form of course quality, student satisfaction, and allowed students to have a meaningful learning experience through course completion. Jung et al. (2002)

noted in another study that regardless of the interaction type, students experienced a more positive view of online learning, which appears to be the case in both models.

Limitations

There are several limitations of this study that should be addressed by future research. First, this study was conducted at one institution in only two subject areas. This context limits the generalizability of the findings to other educational institutions similar to this study. Second, this study used a self-reported survey to measure and identify students' impressions of course experience and overall experience related to satisfaction. This limitation does not allow an accurate reflection of verification of the students' survey responses. Third, the participants in this study self-selected the type of online course they desired. Due to self-selection, there may be some differences between the participants who want to take the course and those who choose not to, such as motivation, student expectations, and preferred learning styles. Fourth, peer to peer interactions were not examined in this study due to the interactivity equivalency theorem stating only to investigate high levels of interaction. The courses in this study had none or very low levels of peer to peer interaction.

Future Implications

Most studies investigating interaction in online courses and the correlation between teacher time investment and student satisfaction have been in postsecondary settings. These studies focus on specific interactions such as learner-content, learner-instructor, and learner-learner (Moore, 1989) in online courses (Jung et al., 2002; Kuo et al., 2014). K-12 research studies have addressed the importance of interaction in online classes related to increased completion rates (Hawkins et al., 2013), increased motivation (Borup et al., 2013), a more positive learning environment (Weiner, 2003), and a decrease in academic dishonesty (Watson,

2007). Hawkins et al. (2013) note little evidence in K-12 online learning research identifying the correlation between interaction and student satisfaction.

This study adds to the limited research focusing on online interactions in the K-12 context. The insights gained from this research could influence the development of K-12 online course interaction standards and teacher professional development, such as outlining what to do when a student doesn't respond to 21 email messages from an instructor. It could be switching the communication tool, or contacting an adult mentor. This information, in turn, could assist designers as they build online courses and look for ways to improve student satisfaction and interaction in the online environment. The accumulated information on interaction could add to the foundation of knowledge and best practices for online administrators as they try to decide which online learning model is best for their institution. Ultimately, this study could lead to higher satisfaction and academic success for future online students.

Conclusion

This case study explored the differences between two online course models by investigating the results of a student end-of-course survey and teacher time logs. The process used in this case study can best be explained as an exploration to examine current online course design, with improvement as the goal. Both course designs appear to be functioning as designed, with students having a meaningful learning experience, as indicated by the student end-of-course survey results. Most participants in this study reported acceptable levels of student satisfaction, but experienced a general increase in satisfaction in areas in a course with higher levels of interaction. The data gathered from this case study related to teacher time investment supports what previous studies have found, that there is an increased student and teacher time investment in an online class with higher levels of interaction. This case study has explored how much of a

teacher time investment might be required when moving from an independent study model to a more teacher involved model. The data is preliminary, so student satisfaction in K-12 online learning should be explored further through full research studies. Due to the shortage of available literature in K-12 online settings, the author recommends additional research in this area. By continuing research and expanding our knowledge of K-12 online students, we can better improve teacher development on time management for online teachers, better support the needs of learners with different learning styles, and improve the course design in the overall experience for online students.

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APPENDIX A: **Instruments**

Student End-of-Course Evaluation Survey

Q1 What is your current student status? (Please mark one option that describes you best.)

- ❍ Home school student (high school, middle or junior high school) (1)
- ❍ Junior high or middle school student (3)
- ❍ High school student (2)
- ❍ University student (currently attending and earning a degree on campus) (4)
- ❍ Bachelor of General Studies (5)
- ❍ Other college degree-seeking student (formally admitted to another college) (6)
- ❍ Seeking admission to a college or university (7)
- ❍ Taking courses for personal interest, not seeking to earn a degree (8)
- ❍ Other (Please describe.) (9) _____

Q2 Please rate your course experience according to the following scale:1 = Very Strongly Disagree, 2 = Strongly Disagree, 3 = Disagree, 4 = Somewhat Disagree, 5 = Somewhat Agree, 6 = Agree, 7 = Strongly Agree, 8 = Very Strongly Agree, NA = Not applicable

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	NA (0)
This course helped me develop intellectual skills (such as critical thinking, analytical reasoning, integration of knowledge). (1)	❍	❍	❍	❍	❍	❍	❍	❍	❍
The graded assignments were meaningful and helped me apply the concepts taught in the course. (2)	❍	❍	❍	❍	❍	❍	❍	❍	❍
The learning material was engaging and intellectually stimulating. (3)	❍	❍	❍	❍	❍	❍	❍	❍	❍
The instructor or tutor provided useful feedback on my assignments. (9)	❍	❍	❍	❍	❍	❍	❍	❍	❍
The instructor or tutor responded to my questions in a timely manner. (4)	❍	❍	❍	❍	❍	❍	❍	❍	❍
This course was challenging. (11)	❍	❍	❍	❍	❍	❍	❍	❍	❍
I learned a great deal in this course. (12)	❍	❍	❍	❍	❍	❍	❍	❍	❍

Q3 Please comment on the strengths and/or weaknesses of the course material:

Q4 Please indicate an overall rating for your instructor:
- ❍ Very Poor (1)
- ❍ Poor (2)
- ❍ Somewhat Poor (3)
- ❍ Fair (4)
- ❍ Good (5)
- ❍ Very Good (6)
- ❍ Excellent (7)
- ❍ Exceptional (8)

Q5 Please comment on the strengths and/or weaknesses of your instructor:

Q6 How did you contact customer support while taking the course? Select all that apply.
- ❑ I did not contact customer service. (1)
- ❑ phone (2)
- ❑ email (3)
- ❑ fax (4)
- ❑ chat (5)
- ❑ in person (6)
- ❑ mail (7)

Q7 Please rate your customer service experience. You may skip this question if you did not contact customer support.

	Very Poor (1)	Poor (2)	Somewhat Poor (3)	Fair (4)	Good (5)	Very Good (6)	Excellent (7)	Exceptional (8)
Accuracy (1)	❍	❍	❍	❍	❍	❍	❍	❍
Timeliness (2)	❍	❍	❍	❍	❍	❍	❍	❍
Professionalism (3)	❍	❍	❍	❍	❍	❍	❍	❍

Q8 Please help us understand your rating of our customer service:

Q9 Overall Experience	Yes	No
Did you achieve the goals you had when you started the course? (1)	❍	❍
Would you recommend this program to a friend? (2)	❍	❍
Overall, were you satisfied with your experience? (3)	❍	❍

Q10 Comparing this course with other courses you have taken (online or in person), please indicate an overall rating from the following:

- ❍ Very Poor (1)
- ❍ Poor (2)
- ❍ Somewhat Poor (3)
- ❍ Fair (4)
- ❍ Good (5)
- ❍ Very Good (6)
- ❍ Excellent (7)
- ❍ Exceptional (8)

Q11 The instructor and course contributed to the Mission of the University:

- ❍ Very Strongly Disagree (1)
- ❍ Strongly Disagree (2)
- ❍ Disagree (3)
- ❍ Somewhat Disagree (4)
- ❍ Somewhat Agree (5)
- ❍ Agree (6)
- ❍ Strongly Agree (7)
- ❍ Very Strongly Agree (8)
- ❍ Not Applicable (9)

Q12 Why did you choose to take this course through this program?

Teacher Communication Log

Q1 Teacher Name:

Q2 Date of Communication:

Q3 Minutes spent on communication

- ❍ Less than 5 minutes
- ❍ 5-10 minutes
- ❍ 10-15 minutes
- ❍ More than 15 minutes

Q4 Who initiated communication
- ❍ Student-Initiated
- ❍ Teacher-Initiated

Q5 Student-Initiated Communication
- ❍ Content question
- ❍ Grading question
- ❍ Question forwarded to Instructor Support/Tech Support
- ❍ Response from teacher-initiated email

Q6 Teacher-Initiated Communication
- ❍ Announcement
- ❍ Email blast
- ❍ Personalized email
- ❍ Phone call
- ❍ Video conference

Q7 Student name:

Q8 Action taken (Notes):

APPENDIX B: **Annotated Bibliography**

Introduction

The purpose of my annotated bibliography is to explore the question, "What differences exist between a correspondence model and a teacher-led model based upon examining the Student End-of-Course Evaluation Survey and the Teacher Communication Log?" My research was not focused on making claims, but an exploration in examining two different course design and report differences. Through my research, I have identified a gap in the literature regarding interaction, student satisfaction and teacher time investment at the K-12 level. The annotated bibliography is divided into five categories. The first contains an overview of three online learning theories, specifically pertaining to interaction in the online environment. In comparison to other educational areas, there are limited theoretical frameworks to draw from specific to online learning. The following categories deal more specifically with (2) investigating teacher time investments in the online classroom, (3) examining the relationship between interaction and online learning outcomes, (4) what contributes to student success, and (5) exploring published literature and research in the K-12 level, to provide background information and recommendation for future research.

Search Strategy

Literature was located using the ERIC, PROQUEST, and PsycINFO databases. The criteria for years of search and language was articles published in English from January 1999 through January 2017. The following key words and combinations were used to search the databases: interaction, student satisfaction, teacher time investment, interaction AND student satisfaction, interaction AND teacher time investment, interaction AND K-12, and K-12 AND online learning. Articles were limited to those that included studies conducted after the year

1998, focused on secondary and university settings, were qualitative and/or quantitative, and published in scholarly journals. Online learning reports were also included for providing background information.

Theory

In relation to other educational research, online learning has few theoretical frameworks focusing on what makes it so unique. One of the first online learning theories (Moore, 1993) provides guidance to instructional designers, in helping suggest levels of structure, dialogue, and autonomy in the course. This guidance is suggested to minimize the transactional distance and maximize student learning. The second article (Anderson, 2003) describes how the interaction equivalency builds on prior interaction theory (Moore, 1993) and how meaningful learning can be achieved by offering high levels of interaction. The third article (Miyazoe & Anderson, 2010) focuses on three studies investigating the interaction equivalency theorem. The three studies held in a different context, while applying different research methodologies, agreed that the first and second thesis regarding interaction equivalency is supported. The research also found that the most valued form of interaction (student-teacher, student-content, student-student) varied among the studies.

Anderson, T. (2003). Getting the mix right again: An updated and theoretical rationale for interaction. *The International Review of Research in Open and Distributed Learning, 4*(2), 9-14. doi:http://dx.doi.org/10.19173/irrodl.v4i2.149.

This article defines a theoretical framework proposed for use in the online environment called the interaction equivalency theorem as proposed by the author. The theorem succeeds and builds on an earlier three-part model of interaction (student-teacher, student-content, student-student). The author suggests learning effectiveness will be

achieved as long as an instructional designer designs the online course with at least one of the three types of interactions at a high level. Other forms of interaction may be included at lower levels or excluded altogether, and not affect the quality of learning. If a course provides multiple types of interaction, all at a high level, it increases the likelihood of student satisfaction. The author believes there are many combinations of interaction that can be successful but recommends we focus on creating the most cost-effective and accessible alternatives for lifelong learning opportunities.

Miyazoe, T., & Anderson, T., (2010). The interaction equivalency theorem. *Journal of Interactive Online Learning, 9*(2), 94-104.

The article explores studies focusing on the interaction equivalency theorem's two theses, which provide guidelines for effective online course design. Thesis one states that meaningful learning may occur as long as one high level of the three interactions is present (student-teacher, student-content, student-student) in the online course. The other two interactions may be offered at a low level, or not at all, and will not decrease the level of learning. Thesis two states that high levels of two or more forms of interaction will provide a higher level of satisfaction, but may be more expensive and involve higher time investment from the teacher. The three studies mentioned in the article found (1) students valued the interaction with teachers and content most highly, (2) students in face to face valued teacher interaction highest, while online students valued content interaction highest, with both theses one and two being supported, and (3) not all combinations of interaction treatments necessarily strengthen achievement and attitude.

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretic principles of distance education* (pp. 22-38). London, England: Routledge. Retrieved from http://www.c3l.unioldenburg.de/cde/found/moore93.pdf

The Transactional distance theory may be the first pedagogical theory developed outside the regular classroom, focused on analyzing teaching and learning conducted through technology. In this paper, the author describes that physical separation can cause a psychological and communication gap between the instructor and student. This gap can lead to potential misunderstanding in the learning process. The author believes there are elements of transactional distance in all education settings, even where the teacher and learning meet face to face. The author suggests that in distance education, where the separation between teacher and student can be more significant, that special strategies must be used. The success of the learning can be determined by the opportunity and standard of communication set by the teacher or online program.

Teacher Time Investment

The articles in this section focus on the comparison of teacher time investments in online and face-to-face teaching at the university level. This is an area that lacks current research at the secondary level. As more institutions implement online learning opportunities, analysis of this area will be important for influencing teacher perceptions that online learning requires larger time commitments that the regular classroom (Rockwell et al., 1999). The three other studies focused on which tasks for teachers were more time consuming in online learning versus the regular classroom. Findings include, the number of students enrolled predicts the instructor time investment at a proportional rate (Cavanaugh, 2005), online faculty spent their highest time

investment communicating with students (Mandernach et al., 2013), and spent more time on grading than in the classroom (van de Vord & Pogue, 2012).

Cavanaugh, J., (2005). Teaching online - A time comparison. *Online Journal of Distance Learning Administration Content, 8*(1), 1-9.

This study compares two courses, one online and one in person, analyzing the time spent teaching and examining why online courses require additional time to teach. Time logs were kept for each class, separating teaching time into four categories, class preparation, teaching responsibilities, office hours, and end of class. The study found three key takeaways (1) the teacher time investment doubled in the online classroom, (2) a direct relation to teacher time investment and the number of students in the class, and (3) the course design quality relates to the teacher time investment. The increased time investment was mostly attributed to individualized attention provided to online students. Even with larger time investments, teachers felt teaching online was less onerous due to work being performed at their convenience.

Mandernach, B. J., Hudson, S., Wise, S. (2013). Where has the time gone? Faculty activities and time commitments in the online classroom. *Journal of Educators Online, 10*(2), 1-15.

This study investigates what tasks and time commitments are required of online faculty to effectively teach in the online environment. A survey was distributed to 80 full-time online faculty members, who each taught four online undergraduate courses during a semester. The full-time online faculty in this study reported spending roughly 37% of their time grading assignments and almost 15% of their time facilitating discussion threads. A little over 45% of their time was spent answering emails and telephone calls. This study did not find that discipline contributed to higher or lower teacher time

investments. Unique to this study, faculty members had a required time investment expectation of 40 hours per week but averaged a slightly higher amount.

Rockwell, S. K., Schauer, J., Fritz, S. M., & Marx, D. B. (1999). Incentives and obstacles influencing higher education faculty and administrators to teach via distance. *Online Journal of Distance Learning Administration, 2*(4), 1-18.

This article identifies what university faculty and administrators perceive as positive and negative aspects of designing and teaching in the online environment. A survey was distributed to faculty members to rank/categorize whether certain factors were incentives or obstacles. Incentives included peer recognition, intrinsically rewarding, providing innovative instruction and extending educational opportunities to place-bound students. Obstacles included needing assistance or support with technology, time taken away from research, and the extra time required to teach the course.

van de Vord, R., & Pogue, K., (2012). Teaching time investment: Does online really take more time than face-to-face? *International Review of Research in Open and Distance Learning, 13*(3), 132-146.

This article questions the veracity of the perception teachers have about online teaching is more time consuming because of the depth of engagement required. A mixture of online and on-campus faculty, teaching a range of courses from marketing to molecular bioscience, tracked their time using logs for six weeks. Activities tracked included, student communications, grading assignments, content design/lecture preparation, and helping students with technical issues. Face-to-face faculty spent more time teaching content and personally interacting with students. Online faculty spent more time evaluating student work and preparing for lectures or making modifications to the course.

Online Interaction

Interaction is at the center of the teaching and learning process. When interaction is moved to the online environment, it changes the way students connect with their learning. While keeping students engaged with their peers, the content, and the instructor, it can allow students to learn more actively with concepts and people. In the early discussions regarding interaction, the focus was placed on defining interaction (Moore, 1989) and proposing interaction models and frameworks (Woods & Baker, 2004). As the topic became more defined, researchers began to explore the correlation of interaction with other variables in the university setting. Studies were conducted investigating interaction effects on student attitude (Jung et al., 2002), deep learning (Garrison & Cleveland-Innes, 2005) and student satisfaction (Kuo et al., 2014). More recently, the study of interaction effects on grades (Borup et al., 2013) and completion rates (Hawkins et al., 2013) was conducted at the K-12 level. Results of these studies vary in their findings related to the effects of interaction type and online learning.

Borup, J., Graham, C. R., & Davies, R. S. (2013). The nature of adolescent learner interaction in a virtual high school setting. *Journal of Computer Assisted Learning, 29*(2), 153–167. doi:10.1111/j.1365-2729.2012.00479.x

This study investigates the results of a survey administered in a freshman high school English course to evaluate the three kinds of interactions (student-instructor, student-student, student-content) experienced during the course. Students' perceived learning, grades, and course satisfaction were evaluated as well. Students perceived that student-instructor and student-content to have higher educational value, however, student-student did show a stronger correlation with the course outcomes. Due to this, the researchers recommend that course design allows the instructor more time to focus on challenging

students to learn new concepts, while using higher level thinking skills. The authors also suggest that their results are similar to other studies where student-instructor interaction has been shown to affect learning and student motivation. Hence, the suggestion that instructors use student interaction opportunities effectively, possibly letting others deal with items such as technical issues.

Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: Interaction is not enough. *American Journal of Distance Education, 19*(3), 133-148.

This article conducted a study to monitor engagement in four university courses involving 75 graduate students. The level of interaction between student and teacher varied between courses. Here are the differences between the courses (1) Low instructor involvement, high level of overall interaction, medium reflective assignment requirements, (2) Low instructor involvement, medium level of overall interaction, low reflective assignment requirements, (3) Median instructor involvement, high level of overall interaction, low reflective assignment requirements, and (4) High instructor involvement, low overall interaction, high reflective assignment requirements. The main goal of the study was to evaluate the deep approach of learning (or lack thereof) that occurred between the four classes. The researchers suggest that how students approach their studies are influenced by teaching approach and course design. The researchers claim that teaching presence appears to enhance a student's approach to deep learning and interaction by itself has little effect to promote a deep approach to learning. Recommendations are made that interactions must be strategic in the course design and consistently implemented for it to have an effect on student learning.

Hawkins, A., Graham, C. R., Sudweeks, R. R., & Barbour, M. K. (2013). Academic performance, course completion rates, and student perception of the quality and frequency of interaction in a virtual high school. *Distance Education, 34*(1), 64–83. doi:10.1080/01587919.2013.770430

The researchers of this article conducted a study in a virtual high school investigating the effects of interactions on student perceptions, completion rates, and academic performance. Surveys were completed by 2,269 students who were in various enrollment status, such as requested a final exam, earned a grade, or had been enrolled for a determined time frame. The surveys collected information about three types of interactions (1) academic feedback, (2) organizational/procedural, and (3) social interactions. The findings from this study conclude that the higher the quality and quantity of interaction, the more likely students are to complete a course. Also, in this study, interaction had no significant effect on the grade awarded. The researches attributed this to the fact that students may be more concerned with course completion than the grade itself. Based on the findings, the researchers encourage teachers to begin interactions on the first day of class, as students may be more motivated for engagement earlier in the process.

Jung, I., Choi, S., Lim, C., & Leem, J. (2002). Effects of different types of interaction on learning achievement, satisfaction and participation in web-based instruction. *Innovations in Education and Teaching International, 39*(2), 153–162. doi:10.1080/14703290252934603

This study focuses on the relationship between interaction and the overall student experience in an online course. The three asynchronous interaction groups included in

the course designs were (1) content centered academic interaction (student-teacher and student-content), (2) collaborative interaction between learners (student-student), and (3) social interaction between learners and instructor (student-student and student-instructor). The 124 undergraduate students from Seoul, Korea were enrolled in one of the interaction groups listed above. Each group experienced the same content existing of five modules, with five assignments to measure learning achievement. Results of the study showed the collaborative and social group participated more frequently on the discussion board. The collaborative interaction group indicated the highest level of satisfaction. The social interaction group scored the highest in learning achievement. The authors claim that to achieve student satisfaction and learn successfully in an online course, collaboration, encouragement, and assistance must be intentionally included in the course design.

Kuo, Y.-C., Walker, A. E., Schroder, K. E. E., & Belland, B. R. (2014). Interaction, internet self-efficacy, and self-regulated learning as predictors of student satisfaction in online education courses. *The Internet and Higher Education, 20*(1), 35–50. doi:10.1016/j.iheduc.2013.10.001

This descriptive correlational study examines the impact of self-regulated learning, internet self-efficacy, and three types of interaction (learner-content, learner-teacher, learner-learner) on student satisfaction. An online survey was administered to collect data from 180 undergraduate and graduate students at one university. First, the five variables were investigated separately for an effect on student satisfaction. The study found all three types of interactions to have a positive correlation with student satisfaction. Learner-content interaction had the highest correlation with student satisfaction, with learner-teacher and learner-learner displaying lower correlations. Both

self-regulated learning and internet self-efficacy displayed a low correlation with student satisfaction. Second, all five variables were used at the same time to investigate the effect on student satisfaction. Learner-content and learner-instructor were the highest predictors of student satisfaction.

Moore, M. G. (1989). Three types of interaction. *The American Journal of Distance Education, 3*(2), 1–6.

This article starts with identifying a problem in education of identifying concepts and terms, describing them in imprecise and general ways, and giving them multiple meanings. The author suggests distance educators agree on a common distinction between the three types of interaction used in the online environment. The first interaction, learner-content interaction, is an interaction between the learner and the subject of study. This could be text, video, lecture, and is described as internal conversation learners have with themselves about content. The second interaction, learner-instructor interaction, is an interaction between the learner and an expert in the field of content the learning is happening in. The instructor is charged with planning the content, motivating the learner, evaluating the learner, and supporting them through the learning process. The instructor can be extremely important responding to the learner when there is application of new knowledge. The third interaction, learner-learner interaction, is an interaction between peers, alone or in a group, with or without the presence of the instructor. This interaction helps build group functioning, allows presentations and discussions between learners, and can develop and assess expertise. The author identifies what he believes the main weakness of many distance education programs as only offering one medium of interaction. Recommendations are made to

further study the importance of interaction in distance education and encourage educators to do more in planning the use of all three interactions more consistently.

Woods, R. H., & Baker, J. D. (2004). Interaction and immediacy in online learning. *International Review of Research in Open and Distance Learning*, *5*(2), 1-13.

The authors of this article propose new definitions of interaction and immediacy and a new model to use them in the online environment. The authors claim that too much focus has been placed on what things are interacting (learner, content, peers) and what is missing is the nature of the interaction. The proposed new model describes limited communication or engagement to meet a specific need as transaction and more substantive communication or engagement as interaction. Interaction is a step above transaction in the effort of communication. An example of the new framework would be an online course that includes just instructor notes and tests, would be labeled as a learner-content transaction, not a learner-content interaction. The new model puts the learner in the center, with the opportunity to engage with content, environment, instructor and other learners. The learner may engage in transactional and/or interactive communication with any of the four areas, depending on the depth of engagement.

Student Satisfaction

What features should be included in learning to maximize student satisfaction? Studies have been conducted in both face to face and online classrooms to investigate this question. Some researchers have focused on the learners themselves, finding levels of ambivalence (Dziuban et al., 2013) and personality types (Bollinger & Erichsen, 2013) may or may not play a role in student satisfaction. One study (Eom et al., 2006) reported that student motivation and self-regulation levels had no correlation with student satisfaction. Others investigating course

design found a correlation between higher peer and teacher interactions (Sinclaire, 2013; Swan, 2001) resulted in higher satisfaction. Some students reported the convenience of online learning contributed most highly to their satisfaction (Cole et al., 2014). Again, missing from the research literature, are studies focused in the K-12 online environment.

Bollinger, D. U., & Erichsen, E. A. (2013). Student satisfaction with blended and online courses based on personality type. *Canadian Journal of Learning & Technology, 39*(1), 1-23. This article analyzes general student satisfaction in blended and online class based on student personality types at two U.S. universities. A total of 72 students completed a personality scale and an online survey. Student satisfaction in both settings was high. Students reported the highest satisfaction with course content and the amount and quality of student to student and student to teacher interaction. Results showed interaction importance slightly higher by feelers than by thinkers in both environments and course content mentioned more by judgers in both settings. Overall, there were no visible differences between personality types in both learning settings.

Cole, M, Shelley, D. J., & Swartz, L. B. (2014). Online instruction, e-learning, and student satisfaction: A three-year study. *International Review of Research in Open and Distance Learning 15*(6), 111-131. doi:10.3200/JOER.98.6.331- 338 This article focuses on a three-year study conducted at one university investigating student satisfaction in online learning courses. Researchers conducted a series of surveys to collect data from 553 participants regarding online and partially online courses, specifically focusing on what factors contributed to their satisfaction and dissatisfaction. On average, 57% of students in online or partially online classes reported being “very satisfied” or “satisfied.” Analysis of factors contributing to student satisfaction ranking

highest to lowest were reported as convenience, course structure, and learning style. Lack of interaction with the instructor and classmates, was the highest rated area of student dissatisfaction, followed by course structure and instructor's facility with online instruction.

Dziuban, C., Moskal, P., Kramer, L., & Thompson, J. (2013). Student satisfaction with online learning in the presence of ambivalence: Looking for the will-o'-the-wisp. *Internet and Higher Education, 17*(1), 1-8. doi: 10.1016/j.iheduc.2012.08.001

This study investigates the connection between how students evaluate their online learning experience related to the level of ambivalence they express toward their online course. The authors analyzed 64, 502 student responses on an end-of-course evaluation instrument. The data showed the highest correlation in that as student ambivalence decreases, so do the number of elements used to evaluate their course experience. When ambivalence is low, students used more general elements, such as course design, course engagement, and progression assessment, to evaluate their experience. As the number of elements increase, the student view of the course becomes more complex, making judgments more independent of each other. As ambivalence increases, other factors such as course pace, instructor responsiveness, expectation rules, and instructor engagement are added to the course evaluation. The authors acknowledge that student satisfaction can be affected by student sensitivity during the learning experience.

Eom, S. B., Wen, H. J., & Ashill, N. (2006). The determinants of students' perceived learning outcomes and satisfaction in university online education: An empirical investigation. *Decision Sciences Journal of Innovative Education, 4*(2), 215–235. doi:10.1111/j.1540-4609.2006.00114.x

This study applied structural equation modeling to examine the factors of student satisfaction and perceived learning outcomes in online courses. The researchers examined 372 survey responses from students, focusing on potential determinants such as course design, motivation, instructor, student self-regulation and course interaction. The findings suggest that extrinsic motivation and self-regulation have no correlation with satisfaction and learning outcomes. Intrinsic motivation had a positive impact on learning outcomes, but not on student satisfaction. Researchers also found that student satisfaction and learning outcomes were most significantly affected by course design, the instructor, student-student interaction and student-teacher interaction.

Sinclaire, J. (2013). An empirical investigation of student satisfaction with college courses. *Research in Higher Education Journal*, *22*(2), 1-21.

This article explores the relationship between the organizational behavior concept of job satisfaction and student satisfaction with college courses. The study was conducted with 560 student taking face to face computer and informational technology classes at one university. Students rated highly in relation to student satisfaction the areas of faculty communication, facilitation of the course, and timely grading. Delving deeper, participants rated being supportive and quickly responding to communications as important or very important. The author suggests further research investigating positive faculty characteristics and interaction, as those factors are rated the highest by students.

Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education, 22*(2), 306–331.

This study examines asynchronous online courses for factors that affect student satisfaction and perceived learning. Approximately 1,108 students enrolled in 73

asynchronous online courses across 64 institutions spread across the state of New York, U.S.A. participated in the survey. The study identified three factors that contributed significantly to the success of an online course. First, online courses with straightforward course design and structural consistency among course modules lead to higher student perception of learning, satisfaction, and interaction with the instructor. Second, the analysis showed that students who reported high levels of interaction with the instructor reported higher levels of satisfaction and perceived learning. Third, students who reported high peer interaction during their course experience, reported higher satisfaction and high levels of learning. The researcher believes that these three combination of factors encourages the support and development of communities of inquiry in the online environment.

K-12 Online Learning

Online learning continues to grow in its popularity at the K-12 level. The amount of published research in this area is limited, but there seems to be substantial published literature on a variety of related topics. Large documents have been assembled discussing how online learning is different than the regular classroom, reporting growth rates, and roles and responsibilities of online teachers (Watson, 2007; Watson et al., 2015). Other literature has explored what a virtual school looks like (Barbour & Reeves, 2009) and how they can help prevent dropouts (Roblyer, 2006). While others have asked students and teachers what is needed to be a successful online student (Murphy & Rodriguez-Manzanares, 2009: Weiner, 2009). Some researchers have brought to the forefront the lack of K-12 online learning research, making recommendations to investigate design and delivery methods (Barbour, 2010), characteristics of

successful online learners (Cavanaugh et al., 2009), and establishing best practices for online learning (Ferdig et al., 2009).

Barbour, M. K. (2010). Researching K-12 online learning: What do we know and what should we examine? *Distance Learning, 7*(2), 6–12.

This article discusses the limited amount of published research on K-12 online learning. The author presents the case that most of the published literature is based on personal experience, expressing opinions of their duties related to online learning. Some of the research has methodological flaws and lacking systematic data collection and analysis. Some future research should include moving beyond comparing student performance and investigating issues of design and delivery of K-12 online learning. Another recommendation was to investigate K-12 online learning through a design research approach. Having researchers work together with education professionals to identify and solve problems unique to the online environment. Research should include how to ensure a lasting impact.

Barbour, M. K., & Reeves, T. C. (2009). The reality of virtual schools: A review of the literature. *Computers & Education, 52*(2), 402–416. doi:10.1016/j.compedu.2008.09.009

This article discusses the benefits, challenges, and misconceptions found in the literature about virtual schools. The three most common methods of classification for virtual schools are independent, asynchronous, and synchronous. Students who attended virtual schools were mostly classified as those who were self-motivated and high achievers. The literature discusses the benefits of online learning to include providing excellent educational opportunities to more people, teaching students real world skills, and increased flexibility to meet learning needs. The authors suggest that more research is

needed to support these often made claims. One of the challenges of online learning are the assumed skills needed to be successful, such as time management, are typically found in adult learners. The current field of research regarding online learning is mostly investigating adult learners in the university setting. The researchers recommend further investigations into K-12 online learning environments.

Cavanaugh, C., Barbour, M. K., & Clark, T. (2009). Research and practice in K-12 online learning: A review of open access literature. *The International Review of Research in Open and Distance Learning, 10*(1), 1–22.

The authors of this article conducted a meta-synthesis of the current literature related to online learning. The amount of published research associated with K-12 online learning is very limited, is focused upon descriptive work, and tends to describe the benefits and challenges of operating a virtual school. Based on the limited research, the authors recommend four areas for future K-12 online learning research. The first area is to conduct systematic research to establish best practices for teaching online courses. The second area is to identify the characteristics of a successful online learner and how to help provide remediation for students lacking in these characteristics. The third area is to identify more ways to include interaction and build learning communities for students. The fourth and final recommendation is to examine how to provide high-quality learning experiences to help lower performing students.

Ferdig, R. E., Cavanaugh, C., DiPietro, M., Black, E. W., & Dawson, K. (2009). Virtual schooling standards and best practices for teacher education. *Journal of Teacher Education, 17*(4), 204–226.

This article synthesizes existing documentation and research of K-12 online learning standards into best practices for educators. Thirteen online learning best practices and guideline documents are identified. The authors note that while reviewing the documents many concerns were identified, such as lack of research about the variation of content and lack of identification of various roles within the online environment. The researches then synthesized the documentation and identified roles within online learning like the teacher, instructional designer, mentor, and administration. The best practice standards in the thirteen original documents were then assigned to the identified roles. The role of the teacher received the most identified best practice standards. The authors recommend further research to identify best practices focusing on pedagogy, technology, and content. They further recommend research addressing online teacher professional development, standards that include the variation of roles in online learning, and better data collection to make informed decisions regarding more best practices.

Murphy, E., & Rodríguez-Manzanares, M. A. (2009). Teachers' perspectives on motivation in high-school distance education. *International Journal of E-Learning & Distance Education, 23*(3), 1–24.

This study interviewed 42 Canadian high school online teachers to explore student motivation from a teacher's perspective. Teachers were asked questions, such as how they motivate and engage students, how do you know if they are engaged, and how is motivating online students different than face to face students. Teachers reported that it is important to establish relationships with students, in helping them to not feel isolated in the online environment. Consistent interaction back and forth between teacher and student through assignment feedback, discussion boards, and face-to-face meetings allow

connections to be established. Teachers also reported items they used to encourage intrinsic and extrinsic motivation, like offering credit for discussion forum participation, creating a readiness quiz to evaluate students' ability to be an independent learner, and encouraging students to have a support structure. Teachers suggested that online courses be designed with learners in mind, offering interactivity and multi-media features to engage students in their learning.

Roblyer, M. D. (2006). Virtually successful: Defeating the dropout problem through online school programs. *Phi Delta Kappan, 88*(1), 30–35. doi:10.1177/003172170608800107

This article investigates the characteristics that can lead virtual schools to be successful or a failure. The author spoke with five directors of different virtual schools to explore five common strategies that help their programs succeed. First, prepare students for success. Good virtual programs provide checklists, self-test, and orientations to get students acquainted with online learning. Second, prepare teachers for success. Each program should have extensive training for their virtual program, including teaching an online course with a mentor. Third, design courses with collaboration and interaction in mind. Virtual programs require students to work together. This is done by including project-based assignments that can be done cooperatively. Fourth, monitor and support teachers. High success in virtual programs is due supporting teachers and evaluating them to ensure they are meeting the high expectations set for them. Teacher interaction with students is extremely important in course success. Teachers must be online frequently to provide timely grading and communications with students. Fifth, monitor and support students. Teachers are required to make personal contact with each student

through email and interviews. Monitoring each student ensures that no one falls through the cracks.

Watson, J. (2007). *A national primer on K-12 online learning.* Vienna, VA: North American Council for Online Learning.

This 42-page document serves as an introduction to online learning, providing the who, what, where, why and how of this growing educational field. One main area of the document focuses on the role of the online teacher and their responsibilities in the online environment. Online teachers are sometimes responsible for developing the course content and structure. Online teachers provide guidance through consistent communication with students by providing feedback, assessing student learning, answering content questions, and facilitating group discussions. Teachers are also responsible for encouraging academic integrity and monitoring the authenticity of student work. This can be accomplished by using plagiarism checking software and comparing student work samples across their course experience.

Watson, J., Pape, L., Murin, A., Gemin, B., & Vashaw, L. (2015). *Keeping pace with K-12 digital learning: An annual review of policy and practice*. Evergreen Education Group. Retrieved from https://files.eric.ed.gov/fulltext/ED570125.pdf

This 122-page document provides a snapshot of the growing activity of online learning through visual data representation, exploring how online practices are evolving and identifying state policies that impact online learning. Both K-12 school districts and universities are investing time and resources to include online courses in their educational offerings. During the 2014-15 school year, it was estimated that over 2.6 million U.S. K-12 students enrolled in over 4.5 million supplemental online courses. Three groups are

identified as suppliers of online learning to students. Vendors, who supply content, tools and services, intermediate providers like virtual schools, and public school programs.

Weiner, C. (2003). Key ingredients to online learning: Adolescent students study in cyberspace. *International Journal on E-Learning, 2*(3), 44–50.

This case study describes K-12 students' attitudes, beliefs towards learning, and motivational issues in the virtual learning environment. Students in the case study reported that being disciplined in studying and having self-motivation was extremely important. Students reported that their friends or peers would not be able to succeed in a virtual classroom because they were not dedicated enough to complete the class. The study found without structure in the learning environment, it is nearly impossible to succeed in the virtual classroom. The teacher should clearly state their expectations, outline the course requirements, offer time sheets and study guides, and most importantly, set concrete deadlines. Social interactions in virtual classes are just as important as they are in a traditional classroom. If social interaction is limited, students can feel frustration, loss, and loneliness. The role of the teacher in the virtual classroom is also very important. Students appreciated teachers who took the time to get to know them, skillfully presented meaningful learning material, communicated regularly and timely, and encouraged them to be successful.