Chatbots in Online English Composition Courses: A Mixed-Methods Study

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Table of Contents

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Chapter One: Introduction

Introduction

This exploratory, sequential mixed-methods study seeks to explore student and instructor perceptions of pedagogical chatbot use in online undergraduate English Composition courses., Many institutions of higher education, along with K-12 educational systems, moved exclusively to online instruction because of the COVID-19 pandemic of 2020 to maintain social distancing and provide safe virtual spaces for learning and teaching (Burgess & Sievertsen, 2020). There already was an increase in higher education online instruction with more institutions providing online and blended courses as well as full degree programs prior to the forced conversion to remote learning (Jarvie-Eggart et al., 2019).

Even as research demonstrates that students enrolled in online courses prefer in-person courses, registration in distance learning courses continues to increase (Tichavsky, 2015). This steady enrollment increase may be attributed to availability because of increased course offerings and convenience. Most students with full schedules because of employment or who have lifestyles requiring versatility depend upon the opportunity and flexibility online education affords (Berry, 2018).

One convenient aspect inherent to online courses is asynchronous communication which affords flexibility, but is also problematic (Kelly, 2017). The issues in asynchronous communication may have an impact on students' affective learning, cognition, and motivation (Baker, 2010). Additionally, students registered in online courses tend towards feeling isolated (Berry, 2018; Forbes, 2019; Huang, 2019) and consequently lose motivation. One solution to the

isolation caused by the absence of immediacy in asynchronous communication is the use of a pedagogical conversation agent or chatbot for the course.

Statement of the Problem

The absence of immediate access to the course instructor may cause the perception of instructor absence and the feeling that content should be self-taught (Tichavsky et al., 2015). Moreover, students taking online courses may undergo detachment because of working alone at a computer and experiencing extended wait times for feedback or responses than they would in a face-to-face course (Berry, 2018). Pedagogical chatbots may diminish this issue through seemingly natural interactions with students. Additionally, chatbots might scaffold students' understanding (Winkler, et al., 2020). Studies show students prefer timely asynchronous communication over in-person meetings even though students enrolled in online courses might feel isolated and prefer immediate responses (Li, 2011).This illustrates the need for timliness of reposes over social, face-to-face interaction. Pedagogical chatbots offer immediate feedback to questions while while concurrently composing a list of frequent inquiries for subsequent instructor action, either through whole-group communication or methodology revision.

While studies do illustrate inconsistent results for chatbot utilization in English language learner courses (Bii, 2013), there are no studies examining how chatbots are utilized in English Composition courses or the perception of the use of pedagogical chatbots in those courses. Especially in the current educational climate where most classes are required to go exclusively online because of the pandemic, a study determining the perception of pedagogical chatbots and their benefits may be helpful in supporting student success. Higher education instructors can utilize this information to enhance their courses and class communities.

Purpose

The purpose of this exploratory sequential mixed-method study (Morgan 2014; Plano Clark & Ivankova, 2016), is to research students' perception regarding the use of pedagogical chatbots in online English Composition courses. The results of this investigation will provide evidence to instructors whether there is an impact on the students' virtual classroom experience.

The first phase of the study will use an emergent, grounded theory design as touted by Glaser to so as to identify emerging categories and generate substantive theory (2017). That data will be open coded and analyzed for emergent themes that will be used to create an instrument for phase two. The second phase of this study will use a cross-sectional survey to targeted population sampling, a method which allows for inexpensive, systematic, and quick data collection (Creswell & Guetterman, 2019).

Research Questions

A mixed-method design is strongest when it approaches research with three types of questions: qualitative, quantitative, and mixed-methods (Creswell & Creswell, 2018). The mixed-methods question drives the integration of the qualitative and quantitative elements. Though both strands of a sequential mixed-methods study are conducted and analyzed independently, they work in tandem to answer one overarching research question which is question 3 below.

There are three research questions driving this study and they are listed below.

1. Qualitative: What is the perception of the use of chatbots in an online English composition course?
2. Quantitative: To what extent and to what effect are pedagogical chatbots used in online English composition courses?

3. Mixed-Methods: How does instructor intent of pedagogical chatbot use affect user perception of the chatbots and of the course?

Limitations

This study is limited by a lack of prior research that addresses the specific topic in a substantive manner. Also, data can only be remotely collected through phone interviews and email because of the nature of the student courses and schedules. Of course the biases of the participants and the researcher frame the responses and questions. Last, the chatbots used in Phase Two may vary from those used in Phase One and from those used by others in Phase Two.

Chapter Two: Literature Review

Introduction

Generally, in emergent grounded theory, a literature review before the study might hinder the creation of emergent theory (Dunne, 2011).While Phase One is a qualitative phase using grouded theory, it is necessary to understand the context of the scant research about pedagogical chatbots. Some studies show mixed success with pedagogical chatbot utilization in language learning classrooms (Bii, 2013). However, the literature is limited on practical pedagogical chatbot use in undergraduate, general studies courses. A review of the research literature shows a need for research in pedagogical chatbot use (Zawacki-Richter, 2019). This literature review indicates that students are less motivated in online courses when feeling isolated or confused. And though a chatbot does not and cannot replace instructors, the perceived benefits of using pedagogical chatbots merits further study. This is especially relevant in the current pandemic climate where students cannot choose online courses but must take them. If chatbot use can mitigate challenges undergraduates and their instructors face in online learning, they are worth further study.

Online Learning and Communication

There is a hierarchy of modalities and their associated success rates in online learning. In a recent study, face-to-face first year English courses attained the highest passing rate with at-home, asynchronous video learning managing the most failures. (Bourdeau et al., 2018). This might be attributed to a lack of interactivity. Research finds that in online courses, especially between student–instructor, interactivity is an important role in student resiliency and satisfaction (Croxton, 2014). Blended courses, with a focus on student transition and “comfort” with the

online segment of the course achieve the most success out of the online modalities (Futch et. al, 2016).

Communication, research shows, is important to students. Yet, even in face-to-face courses students are uncomfortable seeking face-to-face interactions with their instructors. In an interesting study, Li et al. found that, when face-to-face office time, virtual office hours, or an email-turnaround-time guarantee was offered to participants, students preferred the latter for communication (Li et al., 2011). While these studies do show the problems with communication in remote learning, they do not offer viable suggestions to rectify the issues.

Isolation

Because online courses are both solitary and asynchronous, they can lead to feelings of isolation. Students participating in remote instruction cite a perceived absence of instructor-student interaction as the primary reason for their preference of face-to-face courses. Lack of immediate access to the instructor causes a perception no instructor, which then leads to a sense of teaching oneself the course material (Tichavsky et al., 2015). Additionally, students feel they are isolated because of the slow pace and absence of instant response inherent in distance learning (Berry, 2018).

Online students are also subject to limited access during "office hours." In face-to-face classes, access to the teacher is immediate and affords clarification about assignment execution and course content. However, in online courses, the instructor must set pre-defined hours of availability for students to have their questions answered. Because an instructor must restrict availability to specific times and days, some learners will inevitably have conflicts with those set times (Wingo et al., 2017). Again, these studies present problems which are inherent with the format of online education, but do not address solutions to these issues.

Chatbots

Chatbots are an emergent technology. A chatbot, also referred to as a conversation agent, virtual agent, or virtual assistant, is a technology in the mode of mobile messaging or as a computer program or web application using natural language processing (NLP) which simulates human conversation. These applications process textual input or natural voice and respond appropirately (Georgescu, 2018). Improvements in the technology are constant, "AI-augmented machine learning has dramatically increased the accuracy of both automatic speech recognition (ASR) and related natural language processing" (Alexander et al., 2019). The implementation of chatbots in education will increase as the NLP of chatbots increase. Chatbots are already in use on university campuses: Georgia State's "Pounce" or Winston-Salem State University's "Winston" have both benefitted the universities through an increase in student retention and student responses (Bendici, 2018).

Other research corroborates the benefits of chatbot use in universities. Huang et al. (2019) found that graduate students perceived chatbots to be helpful in warding off feelings of isolation in a flipped-classroom study using three types of chatbots. Though the synchronous affordance of chatbots is useful to prevent isolation, the study also found that learners find it difficult to perceive a chatbot as a human being. Huang et al. did not specify whether this is a positive or negative aspect according to students.

Song and Oh (2019) determined a positive association between chatbot use and student success. In a study examining student participation in online classes and synchronous interaction with a chatbot, the quality of student-chatbot conversation reveals a substancial correlation with student achievement. Meanwhile, use of chatbos for informal education is an emerging trend. A structured literature review shows the current trend in the use and research of mobile pedagogical

chatbots and a general utilization of pedagogical chatbots for informal education (Hobert & Meyer von Wolff, 2019).

While chatbots can be used to mitigate isolation and increase student achievement, it is necessary to examine the types of chatbots that might benefit formal education. There are two forms of chatbots Cunningham et al. (2019) find especially well-suited for formal education. An FAQ Chatbot could reduce an instructor's workload through interactive responses to students' frequently asked questions while also addressing student needs, thereby reducing frustration and perceptions of isolation. A quiz chatbot implements an interactive assessment prompting students to justify their responses to multiple choice questions. While the chatbot addresses isolation, studnets receive immediate feedback along with a the chatbot "tutoring" the student through misconceptions to clarification (Cunningham et al., 2019). While these three variations of chatbots seem promising, they do not address the specific context of an online English composition course.

Summary

The slower pace of communication in asynchronous remote learning is frustrating for some college students. Online learning, while a necesity for some and a convenience for others, is isolating and de-motivating. As registration in online programs continues to increase, the achievement of learners is essential to the success and continued growth of institutions of higher learning. Pedagogical chatbots might be successful tools to ameliorate negative experiences and associations with asynchronous learning. Although there is a gap in research studies addressing practical pedagogical uses of chatbots in education, the immediate and responsive abilities of chatbots may address issues of isolation, confusion, and the subsequent loss of motivation.

Chapter Three: Methodology

Introduction

The intention of this exploratory sequential mixed-method study (Morgan 2014; Plano Clark & Ivankova, 2016), is to research students' perceptions regarding the use of pedagogical chatbots in online English Composition courses. The results of this investigation will provide evidence to instructors whether pedagogical chatbots affect their courses.

A mixed-method design is strongest when it approaches research with three types of questions: qualitative, quantitative, and mixed-methods (Creswell & Creswell, 2018). The mixed-methods question drives the integration of the qualitative and quantitative elements. Though both strands of a sequential mixed-methods study are conducted and analyzed independently, they work in tandem to answer one overarching research question which is question 3 below.

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Research Design

Mixed-method design "combines the quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study" (Johnson & Onwuegbuzie, 2004, p. 17). This study uses a sequential mixed-method approach. This approach is best suited for this

study because of the contribution the qualitative and quantitative approaches makes to each other. The qualitative data will be used to develop themes and theories and give deeper insight into the more generalized data explored during the quantitative phase. The sequential mixed-method approach offers the most successful means of integrating results from both qualitative and quantitative studies (Morgan, 2014). Both methods are used and their data analyzed to provide greater certainty to the overarching research question: How does instructor intent of pedagogical chatbot use affect user perception of the chatbots and of the course? The use of both provides additional coverage while one method informs the other (Morgan, 2014; Plano Clark. Ivankova, 2016). Because of the sequential approach of this design, the phases are described below in separate sections. There are two phases, the first is the qualitative phase, followed by instrument design based on data analysis from Phase One. Once the instrument is designed, tested, and finalized, Phase Two will begin with a survey and end with data analysis.

The over-arching methodology is summarized in Figure 1, followed by the research questions used to drive this study.

Figure 1.

Exploratory Sequential Design Procedural Flowchart

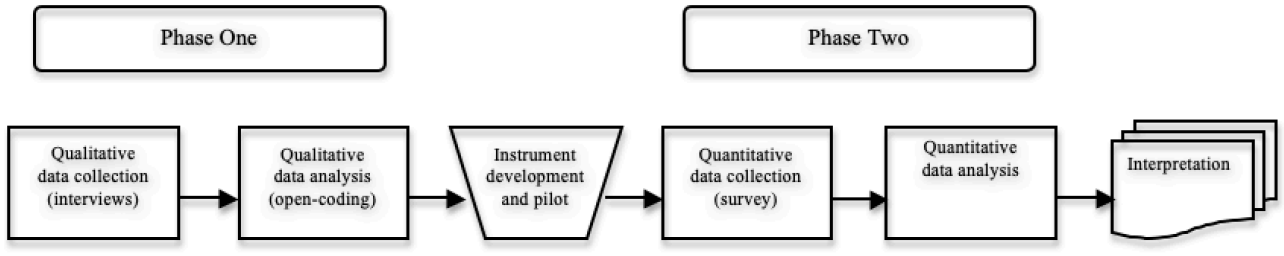

Table 1.
Research Questions, Data Types, and Data Sources.

Research Question	Data Type	Data Sources (Instruments)
What is the perception of the use of chatbots in an online English composition course?	Qualitative	Interviews Chatbot transcript
To what extent and to what effect are pedagogical chatbots used in online English composition courses?	Quantitative	Survey
How does instructor intent of pedagogical chatbot use affect user perception of the chatbots and of the course?	Mixed-methods	Integration of Qualitative & Quantitative Data

Phase One: Qualitative

This portion of the study is driven by the currently unknown perceptions of pedagogical chatbot use in the English Composition classroom. An emergent grounded theory model does acknowledge the researcher's bias while allowing the data collected to drive the resulting theory. The data analysis will utilize open coding which prevents limitations and affords the constant comparative method Glaser argues is essential to emergence of theoretical coverage and saturation (Glaser, 2004).

It is vital to address validity of a qualitative methodology using open-ended interview questions. The questions are structured and while the interviewer records the exchange, she will create memos with notes and ideas about the interviews and the developing categories. This is critical to grounded theory as it helps shape the analysis of extensive data (Creswell & Guetterman, 2019; Glaser, 2004). To develop the themes that can be extrapolated and applied to other populations, the information accessed through interviews and the chatbot transcripts must be detailed and coded. According to Creswell, "the value of qualitative research lies in the

particular description and themes developed in a context of a specific site" (2018). The generalizability of the study relies on detail.

Phase One Population and Sample

The target population for this portion of the study includes one online English Composition (writing) course in New Jersey City University, an urban university located in the northeast of the United States. At the time of this proposal, the class makeup is unknown but the average class size is 25. The sample size is convenience sampling that is dependent upon the class roster and the students' willingness to participate. To avoid any preferential treatment, the instructor will not know which students opted to participate in the study. Consent forms are required with parents/guardians required to sign for students under eighteen.

According to datausa.io's (n.d.) college profile, 2017 acceptance rate is 91.9% with a full enrollment of 8283 students, 67% of whom are full time. The 2017 data show that students enrolled at New Jersey City University in full-time undergraduate and graduate programs are broken down as follows: 36.4% Hispanic or Latino, 25.3% White, 21.4% Black or African American, 7.62% Asian, 1.77% two or more races, 0.483% Native Hawaiian or other Pacific Islanders, and 0.338% American Indian or Alaska Native. Most undergraduates are Hispanic or Latino female (24.5%), Hispanic or Latino male (16.2%), Black or African American female (14.7%).

Phase One Instrument

There are two instruments for data collection. The chatbot transcript is one instrument that will be downloaded at the end of the course. This transcript is a record of the dialog between the user and the chatbot. The transcripts will be open coded with memo taking and re-coding. The second instrument is a set of interview questions used to obtain open-ended responses from

telephone interviews. The interview questions will be piloted with 5 students. The pilot test is essential to the study to establish the validity of the questions; they will be used to revise the instrument (Creswell, 2015). The questions are attached as Appendix A.

Phase One Procedures

This portion of the study requires several steps.

- Fall 2020: Meet with Dr. Fish (instructor at NJCU) and Dr. Wilkinson (instructor and English Composition Coordinator at NJCU) for meeting to discuss the feasibility of the project, including chatbot questions, timing, and access.
- Fall 2020: Gain permission from Dr. Fisch, online English Composition instructor, to conduct the research in one of her online English compositions courses with a goal of Spring 2021 as implementation semester.
- Fall 2020: Draft sample consent forms (to include in IRB packet) for instructor, under-age students and of-age students. This is a requirement of the IRB process at NJCU. Sample consent forms are available through the IRB department.
- Fall 2020: Draft data collection instruments (interview questions) with special attention to wording and validity, which is vital to the study's credibility (Creswell & Cresswell, 2017).
- Fall 2020: Pilot the instrument and revise based on pilot (include in IRB packet with sample chatbot transcript)
- Fall 2020 Compose and submit IRB application as one packet to RB@njcu.edu and cc kresch@njcu.edu. Note: according to the department, *review takes 4-6 weeks.*
- Upon IRB approval, coordinate with Dr. Fisch to determine availability of courses for study.

- Fall 2020: Develop chatbot (snatchbot.me) with Dr. Fisch; indclude frequently asked questions and her guidelines for writing.
- Fall 2020: Test chatbot with five colleagues and students to ensure practicality and validity.
- Spring 2021: Implement chatbot use in course; troubleshoot issues that arise as needed.
- Spring 2021: Weeks four through six of semester, schedule and conduct interviews. Take memos. Download chatbot transcript to coincide with interview.
- Spring 2021: Weeks seven through sixteen of semester, code interviews using open coding
- Spring 2021: Weeks ten and eleven, using open-coding, review and revisit the data to find emerging themes and analyze the data. Use Emergent themes to develop and instrument for Phase Two.

Phase Two: Quantitative

The primary purpose of this portion of the study is to empirically establish usage of chatbot implementation in online undergraduate English Composition courses and the intention of use of the pedagogical chatbots. A survey method will best determine the practices of instructors and their implementation of pedagogical chatbots. The cross-sectional survey will be distributed through social media and targeted professional association listserves to increase targeted population sampling. This method allows for systematic, inexpensive, and quick data collection (Creswell & Guetterman, 2019). The data will be collected using a google form which automatically stores data in the cloud and outputs data into a spreadsheet for data handling.

Phase Two Population and Sample

The target population for this convenience sampling portion of the study is all online English Composition instructors in the United States who respond to a request to participate. Because this is a survey disseminated through social media and professional listservs, an IRB is not required. The researcher will post to the professional and social forums of which she is a member: twitter, facebook teaching groups, National Council for Teachers of English (NCTE) listservs, the New Jersey Council for Teachers of English (NJCTE) website, blog, and newsletter. and International Society for Technology in Education (ISTE) listservs. As the researcher belongs to these organizations and the listservs allow for research surveys, she will not need prior approval.

Phase Two Instrument

Input from the qualitative interviews will be used to design the survey questions for the online data collection. According to Creswell and Creswell (2017), "the qualitative data analysis will yield quotes, codes, and themes. The development of an instrument can proceed by using the quotes to write items for an instrument, the codes to develop variables that group the items, and themes that group the codes into scales" (p. 225). This along with solid instrument design and construction will yield valid and reliable survey questions.

Phase Two Procedures

Following the development of the instrument, the survey will need to be disseminated, analyzed and interpreted.

- Summer 2021: Construct an appropriate instrument using the data (quotes, codes, themes) from Phase One.
- Fall 2021: Pilot the instrument and incorporate revisions.

- Fall 2021: Determine specific listserv and social media among whom to distribute the survey based upon themes developed in analysis.
- Fall 2021: Draft a tailored request for posting to areas of dissemination (i.e. a request is worded differently if distributed to We Are Teachers Facebook group than to ISTE listserv or NJCTE blog).
- Fall 2021: Distribute the survey through social media, NCTE, ISTE NJCTE webstie, blog, newsletter, and twitter.
- Fall 2021: 1 week after initial post, post a follow-up reminder for the survey.
- Fall 2021: 2 weeks after initial post, close the form.
- Winter 2021: Analyze the data.
- Spring 2021: Combine and interpret data from both sources.

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Appendix

Open-ended Interview Questions

Instructor:

1. Tell me about your experience using the chatbot?
2. In what ways did your interactions with the students differ from previous years?
3. In what ways was using the chatbot beneficial?
4. In what ways was using the chatnot not helpful?
5. What is your overall impression of the chatbot in this class?

Student:

1. Tell me about your experience using the chatbot?
2. Why would you use the chatbot?
3. In what ways was using the chatbot beneficial?
4. In what ways was using the chatnot not helpful?
5. What is your overall impression of the chatbot in this class?
6. How does the chatbot effect how you feel about the course?