Measure Thyself

A case study involving a self-observational method for assessing the

fidelity of implementation of an educational intervention

Chris Roddenberry & Tom Rankin

Wake Technical Community College

Abstract

The High Tech High Touch teaching method (HTHTTM) is an engagement-enhanced teaching protocol designed to improve student performance in online courses by fostering a sense of presence in the classroom. The efficacy of this method was tested in a randomized controlled trial involving community college instructors teaching online sections of introduction to psychology and introduction to business. HTHTTM Instructors deployed and documented their fidelity to the treatment protocol during the first two semesters of the randomized control trial using a self-observational method. Successful demonstration of the fidelity of intervention using this self-observational method required the creation of an efficient data collection process to integrate into the deployment model used by the instructors. This paper presents a description of the process, as well as lessons learned and suggestions for researchers interested in demonstrating fidelity of intervention in studies involving self-observation of behavioral interventions in online environments.

Keywords: online education, course management, instructional intervention, fidelity of intervention, Adobe Connect, texting, custom video

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Online education is becoming a major part of the post-secondary educational landscape, with over 70% of college executives believing that online education is critical to their school's long term strategy (Allen & Seaman, 2014). As such, questions of online course quality and student performance are paramount. One such nagging problem is the achievement gap in online education. The achievement gap that exists between minority and non-minority students across all levels of education also exists in online classes, with minority student achievement lagging significantly behind non-minority achievement. (Pitre, 2014; McGlynn, 2008; Jaggers, 2011; Jaggers & Hu, 2013).
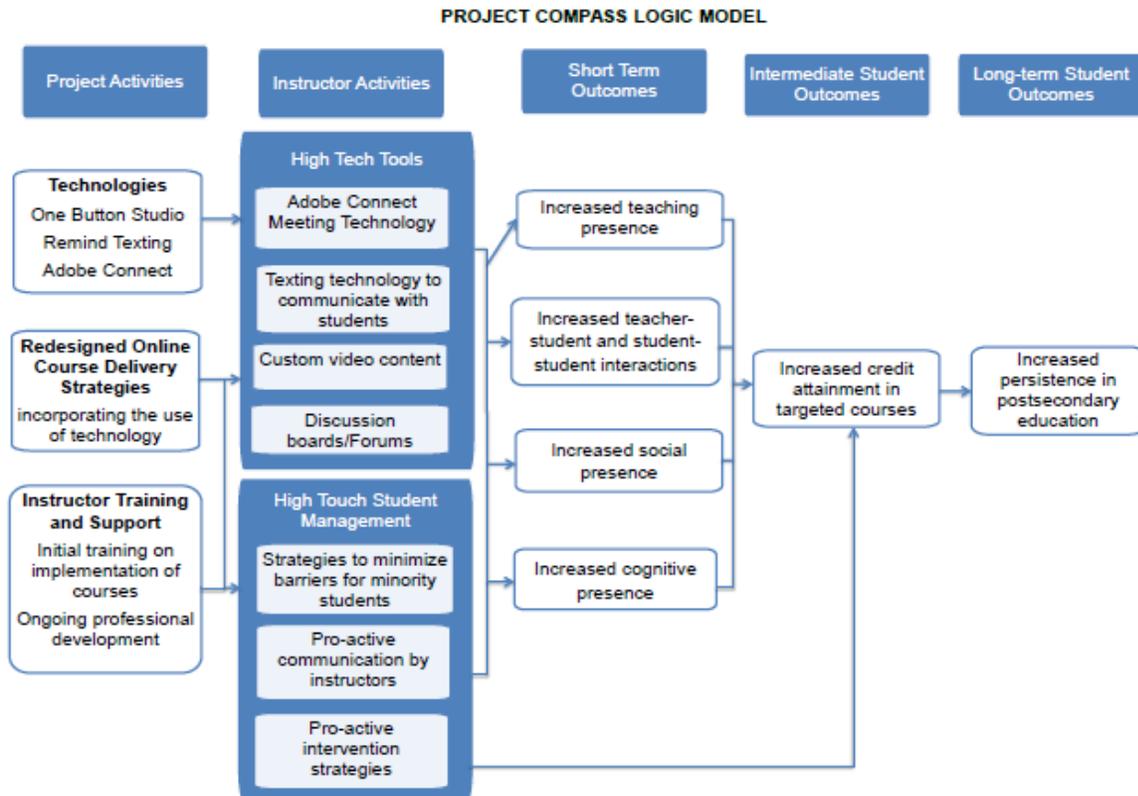
One reason this achievement gap may exist relates to the quality of the student instructor relationship in the educational setting. Research has suggested the importance of the student-teacher relationship quality and feelings of acceptance to minority students' success (Harper, 2009b, 2012; Wood & Turner, 2010; Wood, 2014). Unfortunately, online courses often fail in providing opportunities for meaningful relationship development between minority students and their online instructors. For this reason, any approach to improving minority retention and success in online education should focus on improving the quality of the relationship of the relationship between the student, and creating opportunities for engagement with the material and other course participants.

Improving Minority Success in Online Education with Project C.O.M.P.A.S.S.

Project COMPASS (Creating Online Models to Promote At-risk Student Success) is a 2.7 million dollar FIPSE grant to improve retention and success with an emphasis on students of color, with a particular focus on improving the success rates of students of color. The centerpiece of COMPASS was the High-Tech High-Touch Teaching method (HTHTTM), an engagement-enhanced online instructional model structured around the Community of Inquiry framework (Arbaugh, 2007; Garrison, Anderson, & Archer, 2001). The HTHTTM's impact was tested in a randomized control trial involving three online gateway courses at Wake Tech with high enrollment and historically poor student success rates.

Figure one contains the logic model for project COMPASS, with column two showing the HTHTTM. This protocol leveraged three inexpensive communication-enhancing technologies, web conferencing, secure texting, and videos, to engage in a repertoire of proactive communication and intervention behaviors. The protocol also included course design strategies aimed at making the courses more collaborative and inclusive. The belief was that these communication and relationship enhancing tools and course design strategies would improve students' perceptions of the three types of presence that COI describes as creating the optimal educational experience. These improved perceptions of social, instructional and cognitive presence would positively impact student retention and success. Furthermore, because the quality of the social experience is so valuable to them, these improvements in presence should be especially effective for improving minority student retention and success.

Figure 1: Project compass logic model

PROJECT COMPASS LOGIC MODEL

Project Activities	Instructor Activities	Short Term Outcomes	Intermediate Student Outcomes	Long-term Student Outcomes

High Tech Tools

Technologies
One Button Studio
Remind Texting
Adobe Connect

Adobe Connect Meeting Technology

Texting technology to communicate with students

Increased teaching presence

Redesigned Online Course Delivery Strategies
incorporating the use of technology

Custom video content

Discussion boards/Forums

Increased teacher-student and student-student interactions

Instructor Training and Support
Initial training on implementation of courses
Ongoing professional development

High Touch Student Management

Strategies to minimize barriers for minority students

Pro-active communication by instructors

Pro-active intervention strategies

Increased social presence

Increased cognitive presence

Increased credit attainment in targeted courses

Increased persistence in postsecondary education

Methods: Scaling the Protocol

The goal of this project was to test the impact of this instructional model on student perceptions, retention and success using a randomized control trial. In the first year of this study, student retention and success were compared between treatment instructors using the HTHTTM and control instructors for two online courses, introductory psychology (Psy 150) and introductory business (Bus 110). One of the primary goals, then, was to train the treatment instructors in the use of the protocol. This was complicated by the fact that treatment instructors were also asked to document their adherence to the treatment protocol while deploying it. Also, many of these instructors did not have much experience in the practical aspects of research.

Since this "self-observation" required the collection of data from different places and the following of specific data collection and reporting procedures, it was included as part of the instructor training process.

The project began with principal investigators and lead instructors collaborating to develop a fidelity of intervention matrix to guide the project activities. A shortened version of the matrix which includes the treatment protocols, data sources, and fidelity of treatment standard is included in the Appendix. For the first phase of this project, four psychology instructors and three business instructors at Wake Tech implemented the HTHTTM protocol, which they then used to teach online Psy 150 and Bus 110. While the selection process was not entirely random, there were no special requirements for instructor selection other than their willingness to participate in the project. Lead instructors for each discipline were trained in the protocol, then assisted in the training of the other treatment instructors, providing direct instruction and mentoring throughout the project. The onboarding procedure was quite robust with the initial training in the protocol and data collection procedures lasting two semesters. Furthermore, ongoing mentoring and oversight continued during the official data collection semesters to ensure instructor fidelity of implementation.

At the beginning of the first training semester, treatment instructors attended a half-day orientation workshop, where they received a briefing on the goals and methods of the project, as well as a handbook detailing the HTHTTM protocol. Throughout the first semester, instructors received training from lead instructors in the use of all three of the technologies and the high touch course management activities. Instructors were encouraged to use the semester as an experimental period to test the technologies and course management strategies where possible. At the beginning of the second training semester, treatment instructors again attended an

orientation led by lead instructors and support staff, where they received a second briefing,

which included an orientation regarding the data collection procedures. Throughout the semester,

instructors also attended bi-weekly training meetings led by lead instructors and support staff.

During the second semester, instructors were encouraged to use the tools and follow the protocol

as closely as possible. Instructors collected FOI data during the second semester. Though these

FOI data were not used, this practice run allowed the treatment instructors to familiarize

themselves with the data collection process. Additionally, this allowed the project leads time to

adjust the data collection process based on instructor feedback.

During this yearlong training period, an instructional design team also provided support

to all treatment instructors, assisting in course design, video production, and adherence to ADA

and UDL standards. Treatment instructors also attended several training events hosted by experts

in areas deemed important to model deployment. The actual experimental evaluation began the

third semester, and instructors were expected to deploy the HTHTTM and collect FOI data

during this semester. As with previous semesters, this semester began with a briefing for

treatment instructors. Lead instructors also met with treatment instructors regularly throughout

the semester to ensure adherence to the protocol standards.

Treatment instructors collected these FOI data from three sources; Blackboard logs,

Adobe Connect user logs, and treatment instructor self-reports. Instructors were primarily

responsible for collecting the data from these sources, then coding the data on a uniform Excel

spreadsheet provided to them by the grant's data analyst.

Gathering Results about Fidelity of Implementation

Initial Workflow

Because of the detailed nature of the treatment protocol, it seemed best to make the treatment instructor the primary data collector for the FOI evaluation. One of the main challenges of this self-observational method was to create a process allowing the treatment instructors to effectively deploy the HTHTTM while documenting the fidelity of their implementation accurately. It was important to develop a streamlined process for measuring FOI, as being both the participant teacher and experimental data gatherer was quite overwhelming to some of the treatment instructors, especially during the first semester deploying the teaching protocol.

Along with deploying a fairly labor-intensive teaching protocol, instructors documented over a dozen aspects of their online classes including the number of online webinars and custom videos created, their use of affirmative announcements, nudge assignment reminders, individual follow-ups for students missing assignments, proactive contacts with at-risk students, and the average response time for emails. Some of these items only required one time measurements, such as holding the course orientation or proactive contacts with at-risk students. However, other fidelity measures required multiple measurements by the treatment instructors. Examples of these included the documentation of weekly affirmations and nudges, which required the instructor to make multiple measures over the course of a semester. Further still, some data collection included keeping up with data from multiple individuals at multiple points. Examples of these included keeping attendance for adobe visitors, proactive meetings with at-risk students and follow-ups for students missing assignments. The challenge was to create a process that

allowed the treatment instructor to collect the required while still effectively deploying the treatment.

For the first semester, treatment instructors used a spreadsheet phone app called *Attendance II* to gather FOI data continuously throughout the semester. The thought process behind this was that instructors all had mobile devices, and could incorporate the FOI data gathering procedures into their weekly HTHTTM routine, collecting the FOI data automatically as they engaged in the treatment behaviors. For example, instructors were encouraged to take roll at the beginning of their virtual classes, just like they might do in their seated classes, collecting Adobe attendance during the semester. The same approach was used with other items, such as following up with students missing assignments. The instructor would send the follow-up email to the student missing the assignment, then open the phone app and record the data point at the time of the treatment behavior. In theory, the instructor's FOI data gathering would be complete at the end of the semester, with spreadsheets filled with data from each of the protocol measures. Instructors would then collect and transmit their individual spreadsheets to be collated with the data from other instructors into one large FOI data set.

However, this strategy proved non-optimal for two reasons. The first reason was that most instructors were not able to easily incorporate this continuous observation method into their teaching style. Since the teaching protocol already required the use of three technologies new to most instructors, many were resistant to learn\how to use the Attendance 2 data gathering app. Instructors reported being overwhelmed with being both a treatment instructor and a data collector during the semester, and had difficulty keeping up with both activities. Most of our treatment instructors were far from being experienced in data collections procedures. This led to the second problem, which was a lack of uniformity of data reports created by individual

instructors. The lack of uniformity in instructors' individually constructed spreadsheets made it more difficult to collate each instructor's data into a unified FOI data set, and connect it to the outcome and demographic data included in the primary analysis. Even though the spread sheet information was collected using the *Attendance II* app, instructors created their own final spreadsheets that were not always uniform in design, resulting in difficulty in aggregating the data. The most common problem was the lack of correspondence between the roster instructors thought they had and their actual roster based on the study inclusion criteria. This lack of correspondence resulted in some instructor confusion during the end of semester reporting.

One major fidelity measurement that was especially time consuming was the calculation of email response time, as it required instructors to archive all student emails, then search through them by hand at the end of the semester. To complete this labor intensive job, treatment instructors created folders in their email inboxes, archived all emails received during the semester, and calculated response time at the end of the semester by looking at the time stamps for emails received and sent. In order to balance the need for and instructors' time constraints, email response times were calculated from a subset of emails received during four semi-randomly selected weeks of the semester. Instructors calculated response times for all emails received during a randomly selected week of each of the four quarters of the 16 week semester. For example, during the spring 2018 semester, instructors measured email response time during week two, week six, week eleven & week thirteen. Times of these student emails and responses to these emails were compared to get a number, in minutes of instructor email response latency.

Revised Workflow

The data collection process changed significantly from the first to the second semesters of the study. The main change during the second semester of the study was the switch to a standardized data sheet for FOI collection. These standardized data sheets, provided by the grant's data analyst, included student identification numbers and organized all FOI coding into a uniform format. Switching to the standardized spreadsheet allowed the collected FOI data to be quickly and accurately integrated into the data used in the primary data analysis. An unintended positive consequence of this change is that the instructors least comfortable with the data collection app were able to circumvent its use and type their data directly into the standardized data spreadsheet. For the second semester, instructors received explicit permission to keep their data on the attendance app or type directly into the standardized data spreadsheet. Futher simplifying this matter was the fact that all of the FOI data could be collected from archived data sources. The data sources for each of the treatment protocols are listed in the second column of Table below. It was quite possible for treatment instructors to wait until the end of the semester to collect any FOI data.   While this was not encouraged, about half of the treatment instructors chose this approach during the second semester of the study.

To encourage instructors not using the *Attendance II* app to keep up with their data collection, an intermediate data collection point was created one month into the semester, where treatment instructors turned in a draft with initial FOI activities recorded. This information includes which at risk students were contacted, when the first week orientation, a list of attendees, and whether texting was advertised to students and how many chose to participate in texting. Instructors comfortable with the *Attendance II* app were still able to keep their running FOI data, with the extra step of entering this information into the standardized data spreadsheet

at the end of the semester. The process for measuring email response time was largely unaffected by the switch to standardized data sheet.

Although switching to the standardized data spreadsheet streamlined the data collection process for treatment instructors, it did have its limitations. Whereas dichotomous data points (present or not present) were more conducive to entering data into the spreadsheet at the end of the semester, the Attendance app seamlessly allowed for the measurement of multiple variations of the within a protocol. For example, office visits more easily coded as 1 (present) or 0 (absent) at the end of the semester on a spreadsheet, could easily be programmed to include what type of attendance (1 = office visit, 2 = phone visit, 3 = virtual visit). While this level of detail was not necessary for this particular study, these measurements may represent useful detail in other experimental settings. Where this level of detail information is necessary or desirable, the recording of continuous self-observation will be made require the ease and information detail of the data gathering app.

Conclusion

Fidelity of intervention analyses of educational interventions that involve detailed protocols may require that the FOI be completed by the person most intimately familiar with the course, the instructor. When the treatment instructors are also the data collectors, it is important to balance the need for detailed data with the workload of the treatment instructors tasked with the dual role of data creator and collector. Project C.O.M.P.A.S.S. represents an attempt to navigate this balance while creating a reliable and valid FOI measure to be used in the context of evaluating the HTHTTM online teaching intervention.

Two lessons emerged from the first two semesters using the self-observational method. The first lesson is that instructor resistance is the limiting factor, and must be taken into consideration in designing the FOI evaluation process. The detail and amount of data collected will be determined largely by the instructors' ability to engage in treatment and data collection behaviors simultaneously, and this very practical concern must be taken into account when designing measures of intervention fidelity. Because of the intensity of the HTHTTM intervention, it was particularly helpful to simplify the FOI evaluation process for treatment instructors through the use of a fairly simple standardized data spreadsheet with dichotomous values. However this standardization came at a slight loss of information with this streamlined data collection process. Depending on the complexity of the data needed to demonstrate an FOI, other researchers may have to use more complex data spreadsheets that cannot be streamlined. In these cases, special attention should be paid to training treatment participants who may not have backgrounds in experimental methods. Finally, researchers should take into account the cognitive load on instructors required by these data collection procedures when designing these types of "self-observational" studies.

The second lesson is the value of digital footprints to mitigate the limitations of instructor resistance to implementing and documenting complex interventions. Easy access to semi-permanent archives take the pressure of continuous recording away from instructors who feel pressured to keep up with both treatment protocol behaviors and data collection behaviors. In this particular study, Blackboard, Adobe Connect, and email data were easily archived and accessed by treatment instructors, making it easy for them to recreate their self-observations after the fact with little effort. Using archived digital footprints, it would be possible to create complex FOI self-evaluations of complex interventions with little to no impact on the quality of

instructors' ability to deliver an intervention. Furthermore, if captured, these digital footprints provide data archives that could be used later for secondary analyses by other researchers with other research questions.

Self-observation is a straight forward method for evaluating the fidelity of multidimensional educational interventions in online educational environments. However, practical concerns regarding the ability to simultaneously deploy an online intervention and gather FOI data simultaneously are real and should be considered carefully when designing the data collection procedures. These factors include the ease of data collection, instructor limitations, and the ability to access and use digital footprints. Hopefully, this case study provides some direction for those interested in using this methodology in their research designs.

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Appendix: Fidelity of Implementation including tools use, course design, and course management protocols

Treatment Protocol	Data Source	Fidelity at treatment-level
Use of Technology		
Week one orientation video	Blackboard	Instructor creates and deploys at least one week one orientation video
Weekly videos	Blackboard	Instructor creates and deploys videos in at least 8weeks
Use of Adobe Connect for orientation	Adobe Connect archive	Instructor holds an orientation around using Adobe Connect
Use of Adobe Connect for online events	Adobe Connect archive	Instructor uses Adobe Connect for three hours a week at least 12 weeks
Use of texting technology	REMIND texting archive	Instructor adopts and advertises secure texting
Course Design		
Use of minority images in course materials	Blackboard	At least 5 minority images used throughout the course
One major assignment with a multicultural component	Blackboard	One major assignment that involves multicultural perspective
Frequent use of assessments that provided automated feedback	Blackboard	Instructor incorporates at least 6 assessments
Provision of personalized feedback	Blackboard	Instructor provides personalized feedback on at least 80% assignments
Use of threaded discussions	Blackboard	Inclusion of 8 threaded discussions in course shell
Course Management		
Contact at-risk students prior to beginning of semester	Email archive	At least 80% of at-risk students were contacted by instructor
Weekly Affirmational Announcement	Blackboard	Instructor sends affirmations weekly for at least 12 weeks
Nudge reminders	Blackboard	Instructor sends reminders weekly nudges for at least 8 weeks
Weekly follow-up with students missing previous week assignments.	Email archive	At least 80% of students with missing assignments that week contacted by instructor
Attempt to contact students who have not logged into course for 7 days.	Email archive	At least 80% of students not logging in that week were contacted by instructor
Email responsiveness	Email archive	At least 80% of student emails replied to within 6 hours