7-2022

The Effects of Guided Notes in an Online Behavior Analysis Graduate Course

Natalya Theresa Gutierrez

The Effects of Guided Notes in an Online Behavior Analysis Graduate Course

by

Natalya Theresa Gutierrez

A thesis submitted to the College of Psychology and Liberal Arts of
Florida Institute of Technology
in partial fulfillment of the requirements
for the degree of

Master of Science
in
Applied Behavior Analysis and Organizational Behavior Management

Melbourne, Florida
July, 2022

We the undersigned committee hereby approve the attached thesis,
"The Effects of Guided Notes in an Online Behavior Analysis Graduate Course."
by
Natalya Theresa Gutierrez

_____

Catherine Nicholson, Ph.D., BCBA-D
Assistant Professor
School of Behavior Analysis
Major Advisor

_____

Bryon Neff, Ph.D., BCBA-D
Associate Professor
School of Behavior Analysis

_____

Felipa T. Chavez, Ph.D.
Assistant Professor
School of Psychology

_____

Robert A. Taylor, Ph.D.
Professor and Dean
School of Psychology and Liberal Arts

Abstract

Title: The Effects of Guided Notes in an Online Behavior Analysis Graduate Course

Author: Natalya Theresa Gutierrez

Advisor: Catherine Nicholson, Ph.D., BCBA-D

Guided notes are handouts with fill-in-the-blank spots, incomplete outlines, or PowerPoint slides with blank spaces identical to those used by the instructor during class lectures (Biggers et al., 2020). This note-taking strategy was initially created for those who have difficulty in the classroom, such as students with learning disabilities (Williams et al., 2012). However, guided notes became a supplemental note-taking technique used during lectures for non-disabled college students as well. The authors examined the impact of guided notes in an online course format, counterbalancing three conditions across participants and instructional units: Guided notes, learning objectives and no notes to determine which condition produces the highest test scores. The results indicated that guided notes did not have an overall increase in quiz scores in comparison to no notes, rather it was the opposite. When looking at the results of the individual participants, quiz scores of the guided notes condition were variable compared to the other two conditions. However, when analyzing the group graph for average scores across participants, the guided notes revealed similar effects in five out of eight units.

Table of Contents

Abstract iii

List of Figures vi

List of Tables vii

Dedication viii

Chapter 1 Introduction 1

Chapter 2 : Literature Review 2

Guided Notes 2

Research on Guided Notes 3

Meta-Analysis 6

Student Perceptions of Online Learning 8

Conclusion 8

Chapter 3 : Method 10

Participants 10

Course Description 11

Materials 12

Measures 13

Experimental Design 14

Potential Threats to the Internal Validity of the Adapted Alternating Treatments Design 15

Procedure 15

Guided Notes 16

Learning Objectives 16

No Notes 17
Participant Adherence to Procedures 17
Social Validity 18
Chapter 4 : Results 21
Jess 21
Sam 21
Cody 21
Taylor 21
Haley 21
Denise 22
Average Scores Across Participants 22
Average Scores Across All Students vs Participants 22
Chapter 5 : Discussion 24
References 30
Appendix 33
Recruitment Flier 33
Informed Consent 34
Guided Notes 37
Social Validity Survey 38

List of Figures

Figure 1: Results for Participant Jess 39
Figure 2: Results for Participant Sam 40
Figure 3: Results for Participant Cody 41
Figure 4: Results for Participant Taylor 42
Figure 5: Results for Participant Haley 43
Figure 6: Results for Participant Denise 44
Figure 7: Average Scores Across Conditions in All 9 Units 45
Figure 8: Scores of Online Students vs Participants 46

List of Tables

Table 1: Participant Characteristics.....47
Table 2: Participant Adherence to Procedures Across Conditions 48
Table 3: Summary of Quiz Scores for All Students Enrolled in Course.....49
Table 4: Summary of Average Quiz Scores Across Conditions for Each Participant 50
Table 5: Summary of Social Validity Ratings 51

Dedication

I dedicate this thesis to my parents, Denise and Marco, for their love and never-ending support. Thank you for always encouraging me to never quit and give it my all. This achievement would not have been possible without you.

Chapter 1
Introduction

In 2019 alone, the United States had a total of 19,637,499 undergraduate and graduate students, including those belonging to both online and traditional style courses, or a combination of the two (National Center for Education Statistics, 2019). These students had taken numerous notes and tests. One purpose of note-taking was and continues to be to increase test scores. The most significant contribution to note-taking was the invention of the spiral notebook in 1974 (Morehead et al., 2019). Laptops and tablets made note-taking even more accessible, although longhand was more successful than the use of electronics in terms of performance outcomes (Morehead et al., 2019). Furthermore, Austin et al. (2004) asserted that students were poor notetakers and only transcribe approximately 50% of the main ideas discussed during the lecture.

The purpose of note-taking is to help students recall the information taught during lectures, leading to increased test scores and overall performance throughout the course (Chen et al., 2017). On the contrary, poor-quality notes often correlate with lower test scores because of the high demands put on students, such as having to think, listen, and look (Heward, 2004), all while trying to determine what information is most significant to record for their future studying (Haydon et a., 2011). Still, no matter the effects on test scores, many studies concluded that students pay attention and are more engaged when using guided notes and prefer to use them over other note-taking strategies (Biggers et al., 2020, Heward, 2004). Heward (2004) also found that guided notes prompted students to ask more focused content questions during lectures, which aids in having complete and accurate notes.

Chapter 2 : Literature Review

Guided Notes

Guided notes are handouts with fill-in-the-blank spots, incomplete outlines, or PowerPoint slides with blank spaces identical to those used by the instructor during class lectures (Biggers et al., 2020). Guided notes reduce the high demands of notetaking while obtaining all necessary and vital information, with the idea that students attend and transcribe the fill-in-the-blanks throughout the lecture (Haydon et al., 2011). However, because the purpose of guided notes is to ease the demands of students, this note-taking technique was not invented for just any type of learner.

Guided notes were initially created for those with difficulty in the classroom, such as students with learning disabilities (Haydon et al., 2011, Williams et al., 2012). Research on note-taking strategies dates back 40 years and continue to be used today. Prior research suggested note-taking strategies increased student performance due to the requirement of attending and responding to instructors. In return, it also increased student engagement with course content and developed focused questions and comments from students (Biggers et al., 2020, Heward, 2004, Williams et al., 2012). Guided notes also provided students with complete and precise lecture notes, making this note-taking method beneficial while preparing for exams (Barbetta et al., 1995, Heward, 2004). In higher education, attending lectures required students to emit many behaviors at the same time. Students used critical thinking skills (e.g. multitasking, decision making) to recall information and were encouraged to take notes simultaneously (Biggers et al., 2020). Kauffman et al. (2011) stated that note-taking required learners to break down information to be utilized at a later date. Notes act as a prompt, developing stimulus control for students to refer to when studying. Obtaining all the necessary information was a difficult task. Guided notes facilitated learning via highlighting critical variables.

According to Heward (2004), guided notes prioritized the critical points of a lecture, helped the instructor remain on task, and provided improved access and learning for all

students. When creating guided notes, it was essential to delete the key facts and concepts from the outline and give a prompt such as a blank space to provide structure when following along with the lecture. Although it was not required for students to write complete sentences within the guided notes, it was suggested that plenty of blank space be provided (three to four times the space required) to write the missing information. Students preferred short phrases when filling in the blank compared to longer phrases as it lowered response effort. However, short and long phrases showed no difference in recall of information (Heward, 2004).

Research on Guided Notes

Austin et al. (2002) studied the effects of guided notes on responding and recall of information among 27 undergraduate students in an introductory behavior analysis course. The participants were not made aware of the experiment until consent to use grades and participation data was requested. Immediate recall of information and frequency of student responses were the variables measured. Immediate recall of information was measured by administering a 5-item quiz immediately following the lecture (no study time). The quiz questions only pertained to the information given during the lecture. Video recordings were used to measure the frequency of student responses during the middle 30 minutes of class.

A multielement design was used to compare differential responses in two conditions. The first experimental condition consisted of overhead only in which an outline of the lecture was provided with terms, definitions, key points, and examples. Students were allowed extra time to transcribe what was on the overhead along with anything the instructor stated. The second condition was overhead with guided notes. Guided notes were distributed immediately before the lecture. Results showed a slight increasing trend for quiz scores in the condition using guided notes with a quiz average of 4.14, compared to overhead only (3.85). There was a noticeable increase in student responding when provided the guided notes with a mean of 23.4, versus 19.33 in the overhead only condition. Austin (2002) recommended assessing the effects of guided notes on both students and teachers across different methods of instruction to determine if students have more significant results based on teaching style or class structure (Austin et al., 2002).

In a follow-up study, Austin et al. (2004) studied the effects of guided notes on recording (or transcribing) notes and remembering lecture content of undergraduate students in an applied psychology class instead of responding and recalling. Three conditions were compared: A traditional lecture (no notes provided), slides, and slides plus guided notes. The 23 students who participated were not provided details of the experiment until after the semester when asked for consent to use the notes students took.

The dependent measures were the percentage of critical points, percentage of examples, and extra points recorded in the notes. The percentage of critical points represented the amount of essential and required information students included in their notes. These critical points were provided throughout the lecture and because lectures were prepared in advance, assistant researchers pinpointed the critical points before reviewing notes. The same went for the percentage of examples. Finally, extra points were notes that students recorded but were not established as a critical point or example. The lowest percentage of recorded critical points occurred during traditional lectures (13%). The use of slides increased the recording of critical points to 26% while the highest percentage of critical points was recorded when slides and guided notes were combined (60%). However, the impact of guided notes on student learning was not measured.

Neef et al. (2006) also studied the effects and advantages of guided notes on quiz scores. Guided notes were considered as cues, such as blank lines to be filled in by students to record main points from a lecture. The effects of completed notes (all notes provided) were compared to filling in guided notes (PowerPoint slides with fill in the blanks). Guided notes increased student responding related to critical course content. Guided notes and complete notes alternated between lectures and were evaluated using a multielement design across two separate class sections during an eight weeks period. While the afternoon class received guided notes in weeks 1, 3, 5 and 7 and completed notes in weeks 2, 4 and 6, the evening class received guided notes for weeks 2, 4 and 6, and completed notes for weeks 1,3, 5 and 7. The participants included 46 graduate students in a behavior research methods course. The effects were evaluated based on weekly quiz performance that involved knowledge, comprehension, application and analysis questions.

Out of the five points available on the quiz, the mean number of correct responses for the guided notes was 3.1, whereas it was 3.4 for completed notes. However, for the evening class, the mean number of correct responses was 3.9 for guided notes and 2.9 for completed notes. The varied results may be due to the strategies used to increase student responding during lectures (choral responding, response cards and bonus point lottery). These additional strategies created a ceiling effect for guided notes, limiting improved student performance and scores between conditions. Before the experiment, students were told errors would not be penalized and there were multiple forms of answers. However, data showed that guided notes produced more correct responses for analytic questions than factual questions, concluding that guided notes may be more beneficial for complex material (Neef et al., 2006).

Williams et al. (2012) focused on the relative effects of traditional lectures versus guided notes lectures on test scores at a university. The guided notes distributed to students were considered complete outlines omitting key words or phrases that matched the omitted text in the slide presentation. The experiment included 71 undergraduate participants across two different psychology university classes (course unknown). An alternating treatment design was used to compare class quiz scores for traditional lectures and guided notes.

Each class started with a traditional lecture, then the implementation of alternating treatments took place by a flip of a coin before the beginning of class for the remaining lectures. The other condition would be used for the following lecture if a condition was conducted two consecutive times.

For Class 1, a quiz was delivered at the end of the lecture; however, students were allowed to review the class material for 5 minutes before the quiz. Students had 20 minutes to complete the quiz. For Class 2, quizzes consisted of the same structure but were delivered at the beginning of the next lecture. The structure for Class 2 allowed extra time (2 or 4 days) for students to study and review lecture material. All quizzes consisted of the same format, containing 15 multiple-choice, five true-false, and one short answer question, with the possibility of earning a quiz score of 25. The results suggested overall improved quiz scores for the condition of the guided notes across both classes but there was some

variability. In Class 1, quiz scores initially increased for traditional and guided notes conditions and decreased throughout the semester. However, guided notes produced higher average quiz scores (range = 19 - 23.5) compared to traditional lecture (range = 16 - 21.5). In Class 2, guided notes produced slightly higher scores (range = 15 - 19) compared to traditional lectures (range = 14 - 16.5). The decrease in scores across Class 2 was believed to be due to the delay in quiz taking (i.e., students did not use that extra time to study) (Williams et al., 2012).

Chen et al. (2017) also evaluated the effects of different note-taking strategies. However, Chen et al. used a quasi-experimental pretest-posttest-delayed posttest design. Sixty-five (male and female) students from Taiwan in two undergraduate general psychology courses participated. One group of students received an outline of the lecture and functioned as the control group while the other group of students were provided with an outline of the lecture and guided notes. Another interesting difference was that for the guided notes group, the number of blanks increased as lectures progressed, with the first lecture having 15 blanks and the last having 40.

An analysis of covariance (ANCOVA) was performed and results suggest that the guided notes group performed better in the delayed posttest with a mean of 3.62 compared to the control group (M = 2.86). Some confounding variables included using different subjects for each unit, making it difficult to determine how advanced the content was and whether the participants had a prior understanding of the topic. Therefore, the difficulty of the content can explain the differences in test performance. To fix this issue, future researchers should counterbalance the difficulty of units across conditions.

Meta-Analysis

Haydon et al. (2011) claimed that guided notes increased student attending, engagement and private events (i.e., thinking) during lectures and participation. Increases were hypothesized to occur because there was less response effort in determining which information was most important to record. Therefore, while reviewing articles, the experimenters made sure guided notes were the primary intervention. All participants (332) within the 13 studies used for review were those of grades K-12 (53% of participants) and

university (47% of participants), with 43% consisting of males and 57% women. Of the 332 participants, 79 (24%) had either a learning or intellectual disability or were diagnosed with emotional/behavior disorders.

Dependent variables were the number of correct responses on quizzes/exams, the accuracy of notes and student satisfaction. Providing guided notes during a lecture resulted in greater quiz/test scores, an increase in accuracy of notes and student also preferred guided notes. Other benefits of guided notes included less time writing, increased participation and more organized notes.

Larwin et al. (2013) reviewed 12 studies related to guided notes, seven of which were published and five of which were not, to review the impact on post-secondary student achievement. The purpose of including the non-published studies was to thoroughly examine all research available on the impact of guided notes regarding post-secondary student performance. Studies were grouped by topic and then described, classified and coded. When reviewing these articles, the research questions included whether the impact of guided notes on students versus students who did not receive guided notes and whether the year of publication, type of intervention, type of course, sample size or research design impacted student outcomes.

Within the 12 studies, 27 independent effect sizes were measured and there was a total of 1,529 participants. Results concluded that there was indeed a positive impact from the use of guided notes. Twenty-one of the 27 effect sizes were positive, showing that guided notes positively impacted learning and performance. Fourteen of the 27 studies suggested guided notes made a moderate impact on student achievement. One study did not show any effect and the remaining five suggested that when students wrote individual notes or were provided with full lecture notes, learning effects were greater than when guided notes were used. Haydon et al. (2011) found similar results after reviewing 13 studies but the purpose of this review was to evaluate the impact of guided notes for students who had difficulty in the classroom.

For future research, the experimenters suggested examining the impact of guided notes across multiple subjects with participants of different skill deficits and studying whether the use of guided notes offers support to increase self-regulating note-taking behaviors or assists with the ability to summarize the content learned during lecture (Haydon et al., 2011). Biggers et al. (2020) also suggested further research evaluate different forms of guide notes, the best time to deliver guided notes (lecture prior or day of) and further examination of the impact of guided notes on student participation, especially for those in an online program considering there have been no published studies on the impact of guided notes in an online format.

Student Perceptions of Online Learning

According to the National Center for Education Statistics, 1,000,566 graduate students attended online courses exclusively and an additional 300,121 were enrolled in distance learning and traditional courses. This suggests more than 37% of all United States graduate students are enrolled in an online course (NCES, 2019).

After learning about the number of students enrolled, some research made it a point to study student satisfaction with online classes. One of the most common components identified in regards to student satisfaction was the interaction with peers and faculty. Nevertheless, many online programs have a high count of students, making it challenging to engineer these types of interactions (Holzweiss et al., 2014).

Although some studies were conducted to find areas of improvement in graduate learning, there is a lack of research concerning the quality of online education (Holzweiss et al., 2014). Guided notes may increase satisfaction, if recommendations such as incorporating activities, asking students what they want or need, adding tutorials, and creating an active learning environment are incorporated into online programs (Fedynich et al., 2015).

Conclusion

Current research suggests guided notes produce positive learning outcomes in the classroom across learners of all ages (kindergarten to postsecondary) compared to other note-taking strategies. However, prior research has not extended to online learning. Thus,

there is little information on student performance and preference for guided notes in an online class format. The purpose of this study is to test the effects of guided notes versus no notes in an online behavior analysis course.

Chapter 3 : Method

Participants

Prior to the beginning of the semester, a recruitment flier (see Appendix A) was emailed to all students enrolled in an online Concepts and Principles of Behavior Analysis course offered through a university in the Southeastern United States. A gift card for $15 was offered for anyone who completed the study. Ten students reached out for more information and of those, eight chose to participate. Participants attended an online meeting via Zoom to review the experimental procedures and ask questions. Each participant signed an informed consent form (see Appendix B) agreeing to participate. Of the eight students who agreed to participate, six completed the study.

To be included in the study, participants had to be enrolled in either the Master of Arts or Board Certified Behavior Analysis (BCBA) certificate program and registered for the Concepts and Principles of Behavior Analysis course. Participants could be any age and gender. The students previously submitted transcripts and a resume to be accepted into the online program. In addition, students could not have previously taken a graduate-level class in Concepts and Principles of Behavior Analysis.

The average age of participants was 30.5 (range = 26 - 39), with five identifying as female and one as male. Five participants identified their race/ethnicity as white and one as black. Two female participants described themselves as having learning disorders. One reported a diagnosis of dyslexia, while the other disclosed a diagnosis of ADHD and sensory integration disorder. Out of the six participants, five were enrolled in the Master of Arts program, while one was in the BCBA certificate program. All participants had previous experience as practitioners in the field of behavior analysis, averaging 3.5 years (range = 8 months to 9 years). Participants reported working an average of 48 hours per week (range = 30 - 60), which included paid and unpaid labor and excluded time dedicated to educational coursework. See Table 1 for a summary of individual client demographic data.

Jess was a 39-year-old white female enrolled in the BCBA certificate program She reported working in the field of behavior analysis an average of 60 hours per week for the

last four years. She did not report any other paid or unpaid work and she did not disclose having any disabilities.

Sam was a 26-year-old black female enrolled in the Master of Arts program. She reported working in the field of behavior analysis an average of 30 hours per week for the past year. Sam did not report any other paid or unpaid work and she did not disclose having any disabilities.

Cody was a 35-year-old white male enrolled in the Master of Arts program. He reported working in the field of behavior analysis an average of 45 hours per week for the past 9 years. Cody did not report any other paid or unpaid work and he did not disclose having any disabilities.

Taylor was a 27-year-old white female enrolled in the Master of Arts program. She reported working in the field of behavior analysis an average of 55 hours for the past 8 months. Taylor did not report any other paid or unpaid work; however, she did disclose a dyslexia diagnosis.

Haley was a 26-year-old white and Asian female enrolled in the Master of Arts program. She reported working in the field of behavior analysis an average of 42 hours for the past 4 years. Haley did not report any other paid or unpaid work, and she did not disclose any disabilities.

Denise was a 30-year-old white female enrolled in the Master of Arts program. She reported working in the field of behavior analysis an average of 55 hours for the past 2 years. Denise did not report any other paid or unpaid work; however, she did disclose being diagnosed with ADHD and sensory integration disorder.

Course Description

The Concepts and Principles of Behavior Analysis course contained nine instructional units which were administered through the Canvas learning management system. Participants watched prerecorded, interactive lectures with embedded questions about the material before moving on to new video segments. Participants also took weekly fluency quizzes,

had reading assignments with corresponding reading check activities, and weekly unit quizzes. In addition, participants attended a weekly, 1-hr synchronous small-group meeting with a Board Certified Behavior Analyst co-instructor.

Each individual participant was required to attend the same meeting time with the same co-instructor each week (e.g., 7:00pm on Thursdays). The six participants attended different weekly meetings, resulting in each one having a different co-instructor. Despite the variability in co-instructors across participants, each participant had the same co-instructor throughout the entire term, negating any potential variability in within-subject analyses that could result from differences in instructional style among co-instructors.

The unit quizzes (the dependent variable) were offered during a testing window which occurred Friday through Tuesday each week. Two versions of the quiz (form A and form B) were available. Students who completed form A during the testing window were given the opportunity to take form B. Only the highest score would count. If the student did not take form A of the quiz on time, then only form B was available. The highest score was used to calculate the student's overall grade but for the purpose of the study, only the first quiz attempt was evaluated (described below).

Materials

Participants were required to have a computer or tablet, headphones or speakers, a webcam, microphone and high-speed internet connection as part of their enrollment in the online course. Participants were assigned to the Canvas course for Concepts and Principles of Behavior Analysis and received access to all instructional materials that were offered as part of the class (e.g., flashcards, reading comprehension activities, copies of lecture slides). In addition, participants had access to a second, supplemental Canvas course, which was designed specifically for the purpose of the experiment.

The supplemental Canvas course contained a demographic survey, modules corresponding to those in the main course, an assignment to upload a document in each module, guided notes (see Appendix C), learning objectives and a social validity survey (see Appendix D) which became available at the conclusion of the study. Three different versions of the

supplemental Canvas course were created and two participants were randomly assigned to each version. Three different courses were necessary to ensure that participants had access to the guided notes only during predetermined units. The conditions were counterbalanced across participants, thus the three conditions were assigned to different units for each participant. The participants in group 1 only had access to the guided notes in Units 4, 7, and 8, and the learning objectives in Units 2 and 5. (Note that the learning objectives were available for every unit in the main Canvas course, but we included them in the supplemental course to reduce the response effort involved in obtaining them from the main course). The participants in group 2 had access to the guided notes in Units 2, 5, and 8, and the learning objectives in Units 3, 6, and 9. The participants in group 3 had access to the guided notes in Units 3, 6, and 9, and the learning objectives in Units 4 and 7.

The assignment in each module required the participants to upload completed guided notes, learning objectives or personal notes. The purpose of this assignment was two fold. First, it allowed participants to provide a permanent product (completed the guided notes) and second, the completed assignment was used for treatment integrity.

The participants were instructed to use the guided notes (see example in Appendix C) during the videotaped class lecture by filling in the blanks that corresponded to the words or phrases in the PowerPoint presentation. The guided notes were created by the researchers by copying phases and sentences from the PowerPoint slides provided by the professor. Key words and parts of definitions were omitted from the sentences and denoted with an extended underscore to use as fill-in-the-blank spots.

Measures

The dependent variable was the weekly quiz scores during each of the three conditions. Canvas automatically graded and posted the quiz scores. Because the students had two opportunities to take quizzes (form A and form B), the experimenters examined data from the quiz which was completed first. This limited any potential influence of engaging in additional preparation activities (e.g., forming study groups, studying difficult topics seen on the first quiz) during the time between both quiz forms. The quizzes were made up of 20 multiple choice questions with four answer options. Each question was worth 1.5 points

for a total of 30 points per quiz. The data were obtained by phone from the course administrator who communicated with the research team. The data were graphed individually for each participant and were also aggregated across all participants, weekly for each condition.

Participants were instructed to submit notes no matter which condition was assigned in each unit. The completeness of each participant's notes were then examined. For example, although the only requirement for the guided notes was to fill in blanks, some participants added extra notes on the side of the page, or even submitted their personal notes in addition to the guided notes. Additional notes, whether personal notes or answers to reading questions, were not required for the weeks guided notes were assigned, however Sam turned in reading questions along with the guided notes for Unit 5 and Haley turned in personal notes in for Unit 4 and PowerPoint ASR answers in Unit 8 along with their guided notes. On the other hand, for the learning objectives condition, participants turned those in along with screenshots of PowerPoints corresponding to the items on the objectives list (Taylor for Units 4 and 7), or a list of terms and their definitions (Sam and Denise in Unit 9). Finally, for the no notes condition, the students turned in their personal notes, which differed in length, or submitted the lecture's PowerPoint with highlighted key terms or significant findings, or the participants did not turn in any notes at all (Jess for Unit 9).

Experimental Design

A within-subjects adaptive alternating treatment design (Sindelar et al., 1985) counterbalanced across participants was used to evaluate the effects of guided notes on test performance among students enrolled in the online behavior analysis course. Guided notes were provided to participants on alternating units throughout the semester. Unit 1 was baseline, in which no condition was in effect. Participants Jess and Haley received the guided notes in Units 4, 7, and 8. Participants Sam and Denise received them for Units 2, 5, and 8. Participants Cody and Taylor were provided guided notes for Units 3, 6, and 9. In the units following the guided notes weeks, the participants were assigned learning objectives or no notes, with the exception of group 1. Group 1 received the guided notes back to back in Units 7 and 8 to ensure the guided notes were provided three times

throughout the term. Regardless of which condition the participants were assigned to for each unit, the notes were required to be turned in.

A between-subjects analysis was also used in this study. The dyads were compared and assigned to each Canvas course (see Figure 7 for the group graph). Although it was important to show the effects of guided notes for participants individually, the effects were displayed by groups as well to determine whether there were any trends for a particular condition. The group graph gives a clear picture of the data paths of each condition overall, however no statistical analyses were performed because there were too few participants in each group.

Potential Threats to the Internal Validity of the Adapted Alternating Treatments Design

A potential threat to the internal validity of the study would have occurred if participants had shared the guided notes template with other participants. Experimental control could have been threatened if students who were not assigned to guided notes for a particular unit got ahold of the notes for a learning objective or no notes unit. For example, if participant Jess was not assigned guided notes for Unit 3, but a friend who was also a participant gave Jess the notes, that would have been a confound because the control conditions would no longer have functioned as planned. To avoid unwanted sharing, the participants signed an agreement stating materials would not be shared at any time.

Procedure

When meeting with each participant individually during their informed consent meeting, initial instructions were given. These instructions were delivered orally by the researcher - “Hello, thank you for your participation. This study will examine the effects of guided notes. Guided notes are handouts with fill-in-the-blank spots for you to use while watching lecture. You will receive these notes three times throughout the course, with alternating units using learning objectives, or your own personal notes. The course you are assigned to in Canvas will show you which notes you are expected to turn in for each unit. Everything is already uploaded for you. Although you are not graded on any of these notes, I do ask

that you complete the guided notes, and please make sure you pay attention to what needs to be turned in weekly. I will send out a weekly reminder to all participants. Do you have any questions?"

On alternating weeks, participants were given guided notes, learning objectives, or nothing. A weekly email reminder was sent reminding the participants to submit their document in the supplemental Canvas course prior to taking their weekly quiz. For example, for Unit 2 the email read, "Hello, this is your reminder to turn in your Unit 2 notes via Canvas prior to taking your quiz! For those who are not receiving the guided notes this week, it does not matter how much you have written, whether you write on your PowerPoints, highlight, or just circle the ASR answers- please turn in what you have!"

Guided Notes

The participants were provided with handouts at the onset of the term via a Word document (See Appendix C) uploaded to the supplemental Canvas course page. This gave participants the opportunity to print out the guided notes or fill in the blanks on the computer while lectures were watched. The instructions for this condition were delivered orally during the initial informed consent meeting, stating: "It does not matter how you choose to complete these notes, whether they are done electronically or done by hand, as long as they are filled out. Once the notes have been completed while watching the lecture, you will submit them via Canvas but I will accept them via email as well."

Learning Objectives

Learning objectives were already incorporated into every unit in the class. However, during this condition, we gave the students a separate copy of the learning objectives in the supplemental Canvas course. The instructions for this condition were delivered orally during the initial informed consent meeting, stating: "Although these outlines are provided to you by your co-instructor, you will have access to them in your supplemental Canvas course as well. Please fill out on the weeks assigned and turn in prior to your quiz."

No Notes

This was the control condition. Participants were not provided with any guidance as to what notes to take during this condition. It was hypothesized with the use of their own notes that quiz scores would not be significant compared to the scores of the Guided Notes condition. For the No Notes condition, participants were given instructions orally and via email, stating: “It does not matter how much you have written, whether you write on your PowerPoints, highlight, or just circle the ASR answers- please turn in what you have.”

Participant Adherence to Procedures

The participants submitted all notes on the supplemental Canvas course page. The completion of GN, LO, and NN from the participants were reviewed. GN were scored as complete if 95% of the blanks were filled in accurately (i.e., matched the answer key) and partially complete if 85-94% were filled in. If less than 84% of blanks were filled in, the GN were scored as incomplete. The LO notes were scored as accurate and complete if the answers were explained in full while maintaining accuracy, displaying similar answers to the GN when compared. NN were scored as submitted if any free-form notes or highlights to Power Points slides were uploaded, or none if no notes were uploaded. The following data for each participant can be reviewed in Table 2.

Jess adhered to the procedures by turning in fully completed GN in three out of three of her designated GN units. She partially completed two LO notes of her two LO designated units. Of her two assigned NN units, she turned them in once and missed her two other NN opportunities in Units 6 and 9. Her NN turned in were personal notes in the form of an outline that included notes from each subsection of the chapter, definitions, examples, and non-examples on a Word document.

Sam adhered to the procedures by turning in completed GN in all three of her designated GN units as well. For her three assigned LO units, she turned in her own notes without the learning objectives for the first two opportunities for Units 3 and 6, but then turned in both NN and LO for her last LO opportunity in Unit 9. Since this participant did not utilize the LO notes, the quiz scores for this condition should be interpreted as if it belongs to the NN

condition. For the two assigned NN units (Units 4 and 7), she turned in reading questions and lecture notes.

Cody followed some of the procedures by turning in completed GN in three of his designated GN units; however, rather than submitting the notes (from all conditions) via Canvas, he emailed them to the researcher. He missed both opportunities to turn in notes for the LO conditions in Units 4 (turned in own notes containing key terms) and 7 (nothing submitted). But Cody did turn in notes for the three assigned NN units. These notes consisted of reading questions, key terms, and lecture notes.

Taylor adhered to the procedures by turning in completed GN in three of her designated GN units. For her two assigned LO units, she turned in screenshots of the lecture PowerPoint and pasted them onto the LO document. For the three assigned NN units, she submitted written notes along with highlighted PowerPoints slides.

Haley followed the procedures by turning in completed GN in all three of her designated GN units. However, she also turned in own lecture notes along with the GN for one unit and for another GN unit, she turned in her PowerPoint ASR answers. For her two assigned LO units, she turned in them in for Unit 2, but then turned in her own notes for her second LO opportunity in Unit 5. For the three assigned NN units, she submitted her own lecture notes for Units 3 and 6, but then completed a study guide, key terms, and reading questions for Unit 9.

Denise adhered to the procedures by turning in completed GN in all three of her designated GN units. She also completed the LO notes of her three LO designated units. In addition to her learning objectives in Unit 9, she also submitted her own notes. For her two assigned NN units, she submitted both in the form of written key terms and their definitions.

Social Validity

A social validity survey (see Appendix D) was given to participants to complete towards the end of the study. The survey contained a 5-point Likert scale, with 1 being ‘strongly disagree’ and 5 being ‘strongly agree.’ The purpose of the survey was to determine the

extent to which the participants found the procedures useful, used the guided notes as study material for quizzes, would like to use guided notes in future courses, and found it to be an acceptable experiment for those who attend university online or in person. This survey also helped determine whether this note-taking strategy helped participants recall information from lecture or felt less pressure keeping up with lecture when provided with guided notes, and lastly if participants saw a difference in test on weeks provided with guided notes. In addition, the survey asked how the participants used the guided notes. For example, the questionnaire asked participants if the guided notes were filled out synchronously while watching the videotaped lectures or whether the notes were completed by using the PowerPoint slides.

Four of the six participants completed this survey. This social validity survey consisted of nine statements for the participants to score (see Table 5 for summary of social validity ratings). Two participants marked “agree,” one marked “neutral” and the fourth participant marked “strongly agree” for the statement, “I found the procedures useful in this experiment.” For statement two, which read, "I used the guided notes as study material for tests,” three participants scored “agree” and one scored “neutral.” Statement three read, “I would like to use guided notes in future academic courses.” Two students marked “agree,” one student marked “strongly agree,” and one student marked “disagree” for this statement. Statement four read, “I think this study would be acceptable for those who attend university online or in person.” Here, two participants scored “agree” and two scored “strongly agree. The fifth statement read “this study helped improve recalling information from lecture” and two participants scored “neutral,” while the other two scored “agree.” The sixth statement read, “I felt less pressure trying to keep up with the lecture when provided with guided notes.” For this statement, two participants scored “disagree” and two scored “strongly agree.” Statement seven read, “I filled out the guided notes synchronously while watching the videotaped lectures.” There was more variability in responses here. One participant scored “strongly disagree,” one scored “agree,” and the other two participants scored “strongly agree.” The next statement read, “I completed the notes using the PowerPoint slides.” These responses were also variable, with two participants having marked “strongly disagree,” one “agree,” and the other participant marked “strongly agree.” Finally, the ninth statement read, “I saw an increase in test scores

on the weeks provided with guided notes." One participant marked "disagree" for this statement, while two participants marked "neutral," and the other marked "agree." The participants were also given an opportunity to write additional comments at the end of the survey, leaving a comment box. One participant stated that it helped him keep up with the lecture content, however he shared that he "benefitted most from writing out key words and their full definitions." Another participant stated, "I had pretty consistent test scores throughout the course, but believed the guided notes, as a person with diagnosed ADHD, helped them stay focused on the videos." The last additional comment stated, "I used my online meeting PowerPoints and notes as the primary study tool for the unit quizzes."

Chapter 4 : Results

Jess

Figure 1 displays the quiz results for each condition from Jess. Jess' mean quiz score was 85% (range = 80-90%) in the GN condition, 82.5% (range = 70-95%) in the LO condition, and 90% (range = 85-95%) in the NN condition. Jess is the only participant who took Form B of the quiz first in Unit 2 when the LO condition was assigned.

Sam

Figure 2 displays the results for Sam. Sam's mean quiz score was 83.3% (range = 65-100%) in the GN condition, 70% (range = 60-70%) in the LO condition, and 92.5% (range = 90-95%) in the NN condition.

Cody

Figure 3 displays the quiz scores for Cody. Cody's mean quiz score was 95% (received a 95% for all three GN opportunities) in the GN condition, 97.5% (range = 95-100%) in the LO condition, and 98.3% (range = 95-100%) in the NN condition.

Taylor

Figure 4 presents the results for Taylor. Taylor's mean quiz score was 81.7% (range = 75-90%) in the GN condition, 90% (received a 90% for both LO opportunities) in the LO condition, and 80% (received an 80% for all three NN opportunities) in the NN condition.

Haley

Figure 5 displays the data for Haley. Haley's mean quiz score was 85% (range = 80-90%) in the GN condition, 90% (range = 85-95%) in the LO condition, and 81.7% (range = 70-95%) in the NN condition.

Denise

Figure 6 shows the results for Denise. Denise's mean quiz score was 88.3% (range = 80-100%) in the GN condition, 90% (range = 80-100%) in the LO condition, and 92.5% (range = 90-95%) in the NN condition.

Average Scores Across Participants

Figure 7 shows the average quiz scores for all participants across all nine units in each of the three conditions: Guided Notes (GN), Learning Objectives (LO), and No Notes (NN). When visually analyzing each condition, the data showed variability throughout the term. For the GN condition, the highest average score occurred in Unit 4 with a score of 93%. The scores for GN during the term ranged from 80% to 93.3%, with the score of 92.5% recurring most often in Units 2, 5, and 9. A trend was not found during this condition; however, when comparing averages across participants, the GN data points were higher (or equal to) for five of the eight unit tests (2, 3, 4, 5 and 9). So, despite GN not being highest for any one participant, the GN performed better for the group compared to LO and NN.

In the LO condition, the lowest score was a 75% in Unit 9. After a decrease in scores from Units 2 to 3, there was an increase again with the highest quiz score of 95% occurring in Unit 7. Last is the NN condition. This condition was utilized as a baseline for Unit 1 across all participants but used during the term like the other conditions studied as well. Again, there was some variability across all nine units, and although when visually analyzing the data the NN condition had the highest level and quiz scores in comparison to the GN and LO conditions, all conditions had an average score that ranged between 87.03% and 89.7%.

Average Scores Across All Students vs Participants

Figure 8 depicts the average scores across of all students belonging to the Concepts and Principles of Behavior Analysis course compared to the average scores of the participants in all three conditions. Unit 1 could only be compared to the NN condition as that was baseline. The six participants of the study scored equal to or higher than the class average

across all 8 units in the GN condition, with the biggest range occurring in Unit 3 with a difference of 13 percentage points. However, when compared to the other conditions, GN remained equal to or higher in Units 2, 3, 4, 5 and 9.

Chapter 5 : Discussion

The analysis of quiz scores across experimental conditions suggests GN did not provide a big impact on increasing quiz scores when reviewing individual participant graphs. There was variability across all conditions, thus it was difficult to detect whether GN had any effect. After further analysis of the data and graphs, it was determined by comparing averages across participants, the GN data points were higher (or equal to) for five of the eight unit tests (2, 3, 4, 5 and 9). Therefore, GN did not impact scores for any one participant (apart from Sam) but improved performance amongst the group compared to LO and NN. However, when looking at the bar graph in Figure 8, the participants scored equal to or higher than the class average in the GN condition across Units 2-8.

Regarding individual graphs, GN did seem to have some effect based on quiz scores for Sam. Although a higher quiz score was not seen in Unit 8, this unit was overlooked because multiple participants performed poorly when compared to scores of other units. Before sharing Sam's results, it should be noted that the course administrator claimed class content is more difficult in some units versus others based off scores from prior students of the same course (Table 4 shows the mean quiz score per unit for all students enrolled in the course in which the experiment took place).

Sam's highest score was a 30 (or 100%) in Unit 5 (same score as baseline) during the GN condition while other participants averaged an 89% for this same unit. Although Sam's quiz score was highest in the GN condition, the highest quiz score average (93%) still occurred in the NN condition. The highest quiz score average occurred in the NN condition for three other participants as well – Jess, Cody, and Denise (refer to Table 4). These results could suggest that the note-taking strategies of participants produced optimal responding. Given that the course already had several features known to facilitate high scores (e.g., reading questions, complete lecture notes, PowerPoint slides, learning objectives, and key terms) it is likely a ceiling effect occurred for any additional benefits provided by the GN. For example, Cody's data most clearly show the ceiling effect given

his test score average was a 95% in the GN condition, 98% in the LO condition, and 98% in the NN condition. His results suggest there was not a lot of room for improvement.

While current research differs from previous studies due to the online class aspect, similar studies have included GN as one of their conditions to test the effectiveness on quiz scores and note-taking. For example, Austin et al. (2002) compared the use of overhead (lecture material presented in the form of overhead transparencies) only and overhead with GN to test the effects of the fill-in-the-blank handouts on quiz scores, student responding, and recall of lecture material. During the GN condition, students were not given instructions on how to take notes, potential benefits of this strategy were not shared, and students were not required to use the GN. The findings showed that participants had a slightly higher mean quiz score (4.14) in the GN condition compared to the overhead only condition (3.85). The participants did not report learning more from the use of GN but rather preferred them to their personal methods of taking notes because GN allotted students more time to comprehend the materials shared in class, ask questions and participate. When analyzing these finding to that of the current research, GN in comparison to the other conditions did not provide a big impact.

Like the current research, Neef et al. (2006) and Williams et al. (2012) also compared conditions and gave students GN on alternating weeks across two classes. Neef et al. (2006) tested two conditions: GN and completed notes (all notes provided). The results showed a positive impact for guided notes in one class with a mean score of 3.5 while the completed notes condition had a mean score of 3.1. However, it was concluded that GN produced more correct responses for analytic questions; therefore, this note-taking method should be considered for more complex material.

Williams et al. (2012) studied GN in comparison to a traditional lecture across two classes. The results showed increased quiz scores in the weeks students were provided with GN; however, it was a slight increase (2.13 points overall) for Class 1 and 2.04 points overall for Class 2.

Although past and current research compared GN to at least one other condition, there was one notable difference. Prior studies had a larger group of participants that may have

contained a diverse population. However, the data show that whether there are over 50 participants or only six, the use of GN have little impact on quiz scores in undergraduate and graduate courses. Afterall, these six participants in the current study represent a diverse group (see Table 1 for participant characteristics). The participants were asked to fill out a demographic survey. The results varied across participants in age (range = 26 – 39), years of experience in the field of behavior analysis (range = 8 mos – 9 yrs), as well as various disabilities. Due to a wide range of ages, it was hypothesized that some participants were out of school for some time prior to starting the course which may have impacted study strategies. However, a few participants had prior experience in the field of behavior analysis. This possibly gave those participants an advantage in this introductory course. For example, it was likely that after nine years of working in ABA (e.g., participant Cody), one had exposure, through training and practice, to many terms taught throughout the Concepts and Principles in Behavior Analysis course. Therefore, with only six participants in this study, the impact of the GN was consistent with previous research.

Although the purpose of this research was to determine the impact of GN on quiz scores, it was also important the experiment sought the opinions of participants on this note-taking method. Austin et al. (2002) found that students preferred GN, were able to pay more attention when these notes were provided and about 90% of students recommended using these in future courses. While only 44% of participants saw an increase on test scores, 96% reported liking the GN. In the current study, the participants did not agree or disagree that guided notes were filled out synchronously while watching the videotaped lectures. With these responses, it was concluded that many GN were taken inappropriately. Therefore, the lack of treatment integrity effected the results of the test condition, which is a factor that future researchers will want to account for in order to achieve the most reliable and desired results. Although these were not the responses hoped for, the socially validity survey served its purpose and provided feedback for future research related to the use of GN in graduate level courses.

The survey findings also corresponded with the data for the NN condition. With the results being similar across conditions for four participants (Jess, Sam, Cody, and Denise), it was concluded that individual notes were as useful as GN and other forms of study material.

This may be due to learning histories which allowed participants to determine which note-taking methods worked best. Therefore, while one person possibly benefitted from notes provided by the researcher or course instructor, another participant benefitted from reading the textbook and writing their own outline, or even more simple – writing terms and definitions. For this reason, NN may be the preferred condition in future studies, but experiments can focus on preferred note-taking methods and their effects.

There were some limitations found throughout the analysis of the current experiment. One participant was dropped due to not submitting any GN. The participant signed the informed consent and attended the meeting that reviewed the purpose and expected behaviors of the experiment. However, the participant recorded on the social validity survey under 'additional comments' that the purpose and expectations of the study were unclear. Therefore, instead of turning in the assigned condition notes each week, the participant turned in personal notes for each unit. For these reasons, the data from this participant were not included in the analysis.

Participants also turned in notes for a different condition than assigned. This took place four times (Sam in Units 3 and 6, Cody in Unit 4, and Haley in Unit 5) - when participants were assigned LO, NN were submitted instead. It appears all participants had great adherence in the GN condition as each submission was scored as completed. This suggests treatment integrity was greater in the GN condition. Adherence for the LO condition, on the other hand, did not reveal the same data. It is likely that the LO condition expectations were not as clear or detailed as the GN condition. Another possibility for the lack of adherence in the LO condition could be that the participants needed to be provided with a model of expectations, such as a completed LO document. Therefore, providing participants with thorough written instructions for all conditions is suggested. Written instructions provide participants with a document that can be repeatedly referenced if needed.

Another limitation was potential misuse of the GN (filling-in-the-blanks while watching lecture synchronously). Social validity survey results are inconclusive regarding the correct usage of the GN. Although three out of the four participants agreed that GN were

completed while simultaneously watching lecture videos, one participant disagreed and two did not respond to the survey at all. While this information was useful, there was no way of knowing the validity of the survey responses because the participants were not observed while taking notes. Therefore, future research should include a method by which note-taking behavior can be accurately observed or measured.

Based on the previous limitations, it is important to note there was no quiz administered after giving participants a debrief and gaining consent. The purpose of this would be to ensure an understanding of participation requirements prior to the start of research. If this procedure was implemented for the current study, it is possible that more variability would be observed in quiz scores across conditions, producing higher scores in the GN condition. Therefore, a suggestion for future research is to quiz the participants on expectations prior to running the experiment to prevent eliminating participants and data.

Lastly, for the purpose of future research, the experimenters suggest rather than providing GN on alternating weeks, to have a control group that does not receive any notes and one group who receives GN for each unit. For this data collection, participants would still need to be recruited, but consent and collection of scores for the control group could be completed at the end of the course (e.g., Austin et al. (2002)). If the suggested procedure is completed, future researchers may see greater results in the GN group because the notes will be administered for every unit rather than alternating units. In addition, future researchers can determine the blanks for the GN by examining the weekly quizzes and aligning the GN fill-in-the-blanks with test questions. This design would allow for GN to be provided for all complex material as well, showing more variability between conditions.

In conclusion, the use of guided notes in an online graduate course did not improve quiz scores for individual participants but it is important to note that data showed some effectiveness in average scores across participants. Overall, four of the highest quiz averages occurred in the No Notes condition while the other two high quiz averages occurred in the Learning Objectives condition. Therefore, participants achieved higher quiz scores using preferred note-taking methods or what was already provided by the course (e.g., completed lecture notes, reading questions, and key terms). It is possible that if all

participants had utilized the guided notes by filling-in-the-blanks while watching lecture synchronously and used as study material for the quiz, greater results would be seen in the Guided Notes condition. However, it was determined by the ratings on the social validity survey that notes were not always completed as instructed. Although participants agreed that the procedures of the experiment were useful and would like to use guided notes again in future courses, guided notes did not provide differentiated data.

References

Austin, J. L., Lee, M., & Carr, J. P. (2004). The effects of guided notes on undergraduate students' recording of lecture content. *Journal of Instructional Psychology*, *31*(4), 314-320.

Austin, J. L., Lee, M. G., Thibeault, M. D., Carr, J. E., & Bailey, J. S. (2002). Effects of guided notes on university students' responding and recall of information. *Journal of Behavioral Education*, *11*(4), 243-254.

https://doi.org/10.1023/A:1021110922552

Barbetta, P. M., & Skaruppa, C. L. (1995). Looking for a way to improve your behavior analysis lectures? Try guided notes. *The Behavior Analyst*, *18*(1), 155-160. https://doi.org/10.1007/bf03392701

Biggers, B., & Luo, T. (2020). Guiding students to success: A systematic review of research on guided notes as an instructional strategy from 2009-2019. J*ournal of University Teaching & Learning Practice*, *17*(3) 1-12. https://doi.org/10.53761/1.17.3.12

Chen, P. H., Teo, T., & Zhou, M. (2017). Effects of guided notes on enhancing college students' lecture note-taking quality and learning performance. *Current Psychology*, *36*(4), 719-732. https://doi.org/10.1007/s12144-016-9459-6

Fedynich, L., Bradley, K. S., & Bradley, J. (2015). Graduate students' perceptions of online learning. *Research in Higher Education Journal*, *27,* 1-13.

https://files.eric.ed.gov/fulltext/EJ1056187.pdf

Haydon, T., Mancil, G. R., Kroeger, S. D., McLeskey, J., & Lin, W. Y. J. (2011). A review of the effectiveness of guided notes for students who struggle learning academic content. *Preventing School Failure: Alternative Education for Children and Youth*, *55*(4), 226-231. https://doi.org/10.1080/1045988x.2010.548415

Heward, W. L. (2004). Want to improve the effectiveness of your lectures? Try guided notes. Talking about teaching. *The Academy of Teaching*, 34-46.

Holzweiss, P. C., Joyner, S. A., Fuller, M. B., Henderson, S., & Young, R. (2014). Online graduate students' perceptions of best learning experiences. *Distance Education*, *35*(3), 311-323. https://doi.org/10.1080/01587919.2015.955262

Kauffman, D. F., Zhao, R., & Yang, Y. S. (2011). Effects of online note taking formats and self-monitoring prompts on learning from online text: Using technology to enhance self-regulated learning. *Contemporary Educational Psychology*, *36*(4), 313-322. https://doi.org/10.1016/j.cedpsych.2011.04.001

Larwin, K. H., & Larwin, D. A. (2013). The impact of guided notes on post-secondary student achievement: A meta-analysis. *International Journal of Teaching and Learning in Higher Education*, *25*(1), 47-58. https://files.eric.ed.gov/fulltext/EJ1016535.pdf

Musti-Rao, S., Kroeger, S. D., & Schumacher-Dyke, K. (2008). Using guided notes and response cards at the postsecondary level. *Teacher Education and Special Education*, *31*(3), 149-163. https://doi.org/10.1177/0888406408330630

National Center for Education Statistics (NCES) *U.S. Department of Education*. (n.d.). https://nces.ed.gov/fastfacts/display.asp?id=80.

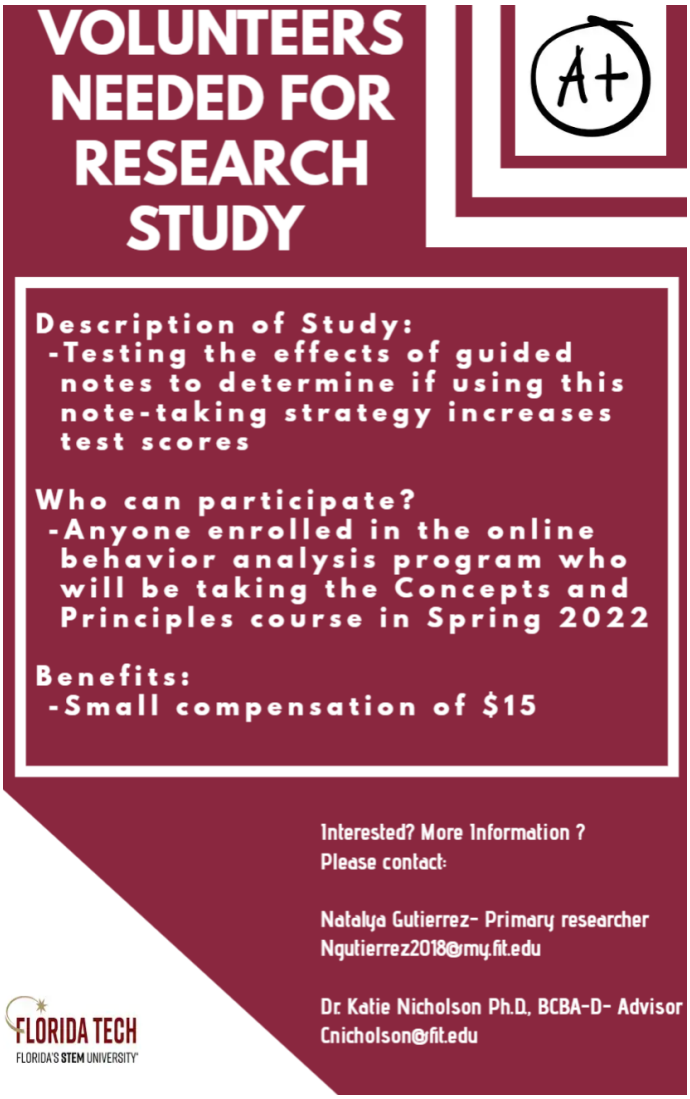
Neef, N. A., McCord, B. E., & Ferreri, S. J. (2006). Effects of guided notes versus completed notes during lectures on college students' quiz performance. *Journal of Applied Behavior Analysis*, *39*(1), 123-130. https://doi.org/10.1901/jaba.2006.94-04

Sindelar, P. T., Rosenberg, M. S., & Wilson, R. J. (1985). An adapted alternating treatments design for instructional research. *Education and Treatment of Children*, 67-76. https://www.jstor.org/stable/42898888

Williams, W. L., Weil, T. M., & Porter, J. C. (2012). The relative effects of traditional lectures and guided notes lectures on university student test scores. *The Behavior Analyst Today*, *13*(1), 12-16. https://doi.org/10.1037/h010

Appendix

Recruitment Flier



Informed Consent

Please read this consent document carefully before you decide to participate in this study. The researcher will answer any questions before you sign this form.

Study Title: The Effects of Guided Notes in an Online Behavior Analysis Graduate Course

Purpose of the Study:

The purpose of this study is to test the impact of various note-taking strategies on quiz scores in an online course, predicting that the use of this note-taking strategy will improve the understanding of the content.

Procedures:

Participants will take part in 3 different conditions throughout the semester, where weekly units will alternate the conditions. These conditions are 1) guided notes: Fill in the blank handouts are provided, 2) learning objectives: Essential topics and terms used for that particular learning unit are provided, 3) no notes: No handouts or notes provided. Participants may take notes independently if they wish. In other words, participants will receive some form of guided notes in some weeks but not in other weeks.

Potential Risks of Participating:

There is no risk to participating in this study in terms of everyday life. However, participants' course data will be reviewed, and their identity will be known by researchers. Code names will be used for each participant in order to verify a match between test score and notes submitted, but the key containing the code names will be stored in a secure web storage secured by the university.

Potential Benefits of Participating:

Participants may see an increase in test scores when notes are taken while watching the video lectures.

No Sharing of Notes:

Participants must agree not to share the guided notes provided to them with any other students. Doing so will risk the integrity of the data being collected. Additionally, quizzes are closed book/closed notes. Thus, no notes, including the guided notes, can be referred to/accessed while completing quizzes or exams.

Initial for agreement: _____

Compensation:

If you choose to assist and complete the study, you will have the opportunity to earn $15 in the form of a gift card.

Confidentiality:

Data and other documents will refer to participants using a code name. Data and references will include no personally-identifying information. De-identified data may be shared and discussed within a university lab group for student learning. The researchers ensue your identity will be kept confidential. Scanned data and documents will also be stored on university-owned secure cloud storage that is password protected and HIPAA compliant. These materials will be destroyed after three years. Only the investigators involved in the study will have access to these materials.

Voluntary participation:

Participation in this study is entirely voluntary. It is possible that participating may improve performance in the course, but you will not be penalized in any way for not participating.

Right to withdraw from the study:

You have the right to withdraw from the study at any time without penalty.

Whom to contact if you have questions about the study:

Dr. Katie Nicholson

Email: cnicholson@fit.edu

Phone: (321) 674-8330

Whom to contact about your rights as a research participant in the study:

Dr. Jignya Patel, IRB Chairperson

150 West University Blvd.

Melbourne, FL 32901

Email: Fit_irb@fit.edu

Phone: (321) 674-8104

Agreement:

I have read the procedure described above. I voluntarily agree to participate in the procedure, and I have received a copy of this description.

<If research participants do not receive a copy of their informed consent form, they should then receive an informational sheet including at least the title of your study, along with your name and contact information, along with the contact information for the IRB.>

Participant: _____ _____

Date

Signature of Participant: _____ _____

Date

Principal Investigator: _____ _____

Date

Guided Notes

5041 Unit 1 Guided Notes

A. Introduction to Science

1. Science
    a. Define
    b. List goals

"Science is a willingness to accept facts even when they are _____ to wishes." (Skinner, 1953, p. 12)

Definition of Science

"Science is a _____ approach to understanding natural phenomena [emphasis added]—as evidenced by description, prediction, and control— that relies on _____ as its fundamental assumption, empiricism as its prime directive, _____ as its basic strategy, replication as its necessary requirement for believability, _____ as its conservative value, and philosophic doubt as its guiding conscience." (Cooper, Heron, & Heward, 2020, p. 7)

The Scientific Method

"The definition of _____ lies not in test tubes, spectrometers, or electron accelerators, but in the behavior of scientists." (Cooper et al., 2020, p. 4)

Scientists' Behavior

- ☐ _____: Observe and record the phenomenon of interest
- ☐ _____: The basic strategy; manipulate something and see its effect on the phenomenon of interest
- ☐ _____: Repeat the experiment; ensure the results

Basic Assumptions of Science

- ☐ Parsimony
- ☐ _____
- ☐ Determinism

Social Validity Survey

Questionnaire

Name: _____

Please rate the statements below based on the following scale:

1 - strongly disagree

2 - disagree

3 - neutral

4 - agree

5 - strongly agree

I found the procedures useful in this experiment

1 2 3 4 5

I used the guided notes as study material for tests

1 2 3 4 5

I would like to use guided notes in future academic courses

1 2 3 4 5

I think this study would be acceptable for those who attend university online or in person

1 2 3 4 5

This study helped improve recalling information from lecture

1 2 3 4 5

I felt less pressure trying to keep up with the lecture when provided with guided notes

1 2 3 4 5

I filled out the guided notes synchronously while watching the videotaped lectures

1 2 3 4 5

I completed the notes using the PowerPoint slides

1 2 3 4 5

I saw an increase in test scores on the weeks provided with guided notes

1 2 3 4 5

Additional Comments

Figure 1: Results for Participant Jess

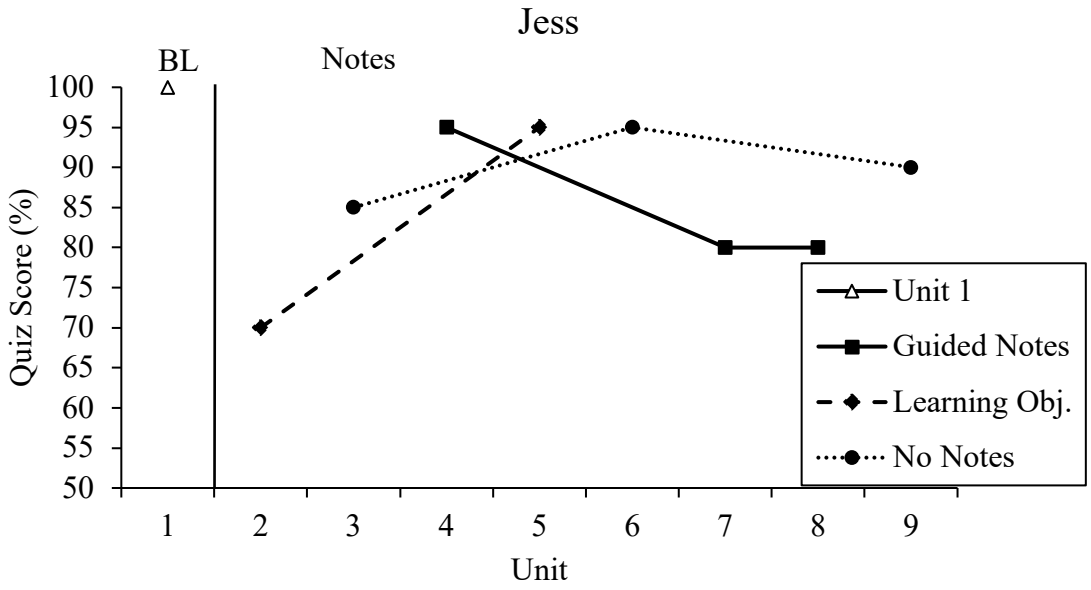


Figure 2: Results for Participant Sam

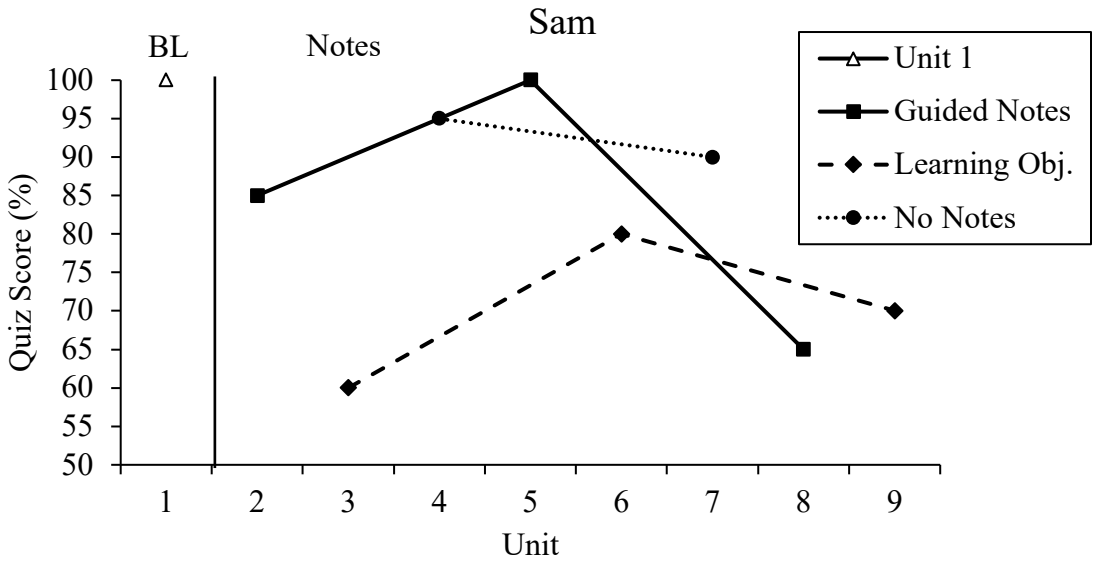


Figure 3: Results for Participant Cody

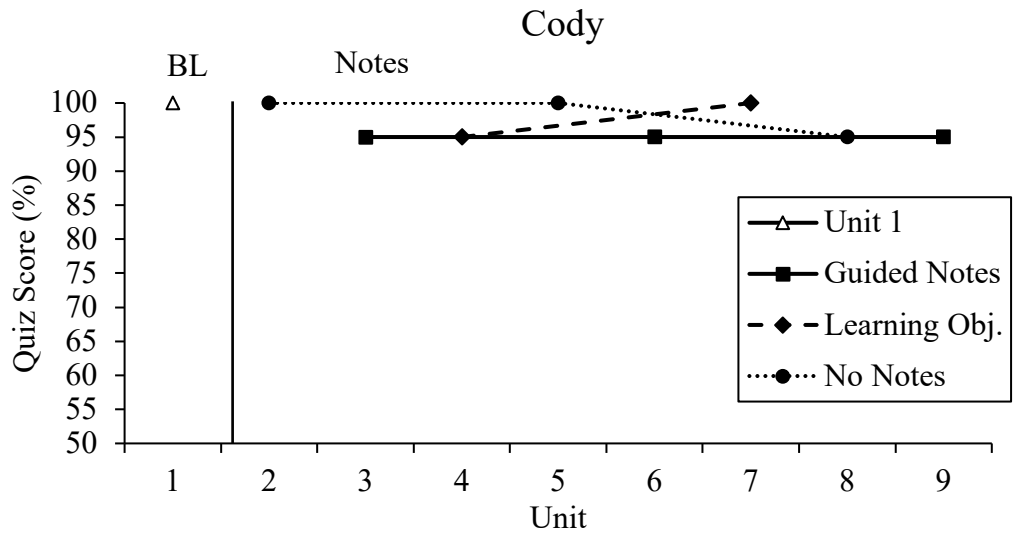


Figure 4: Results for Participant Taylor

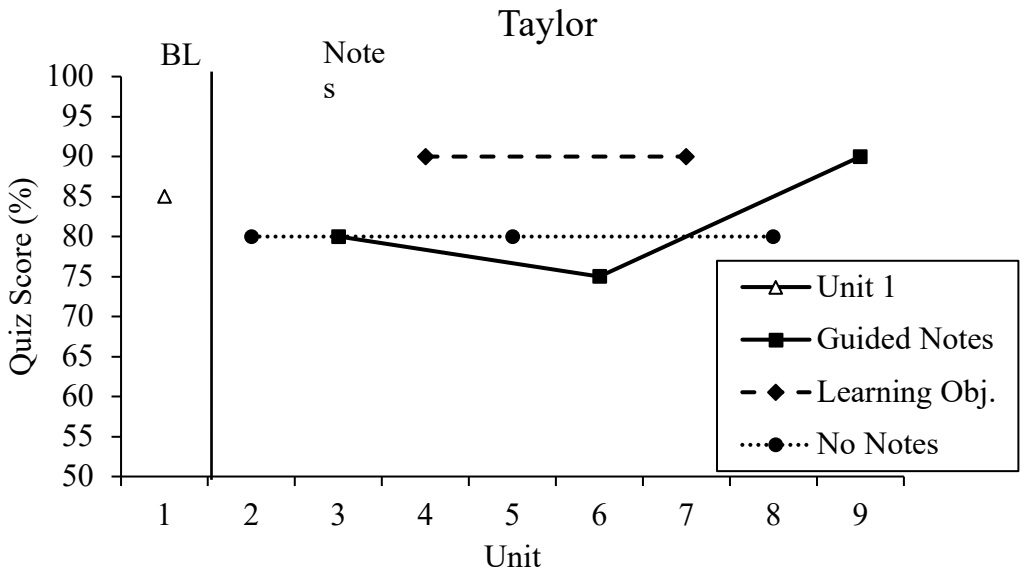


Figure 5: Results for Participant Haley

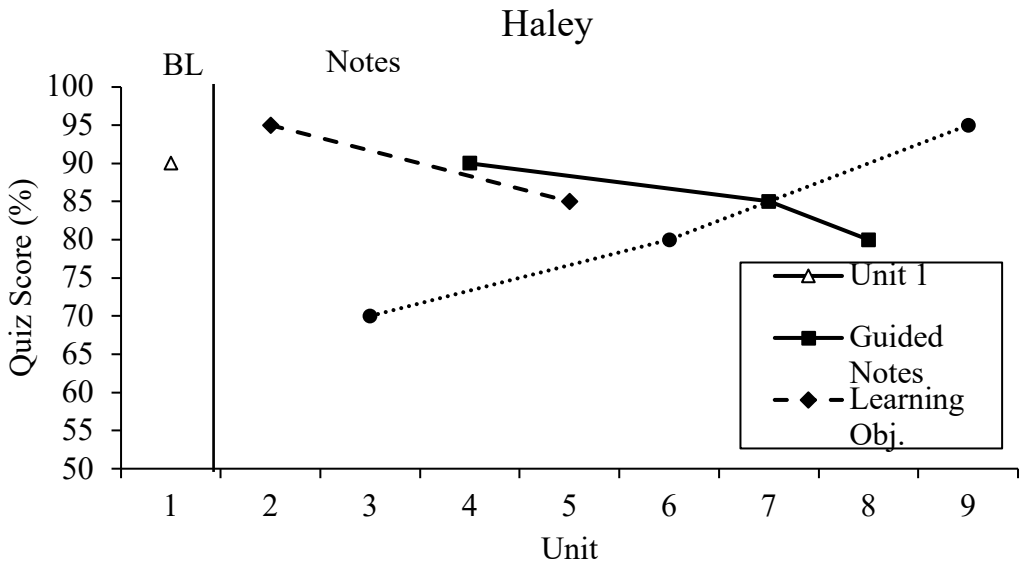


Figure 6: Results for Participant Denise

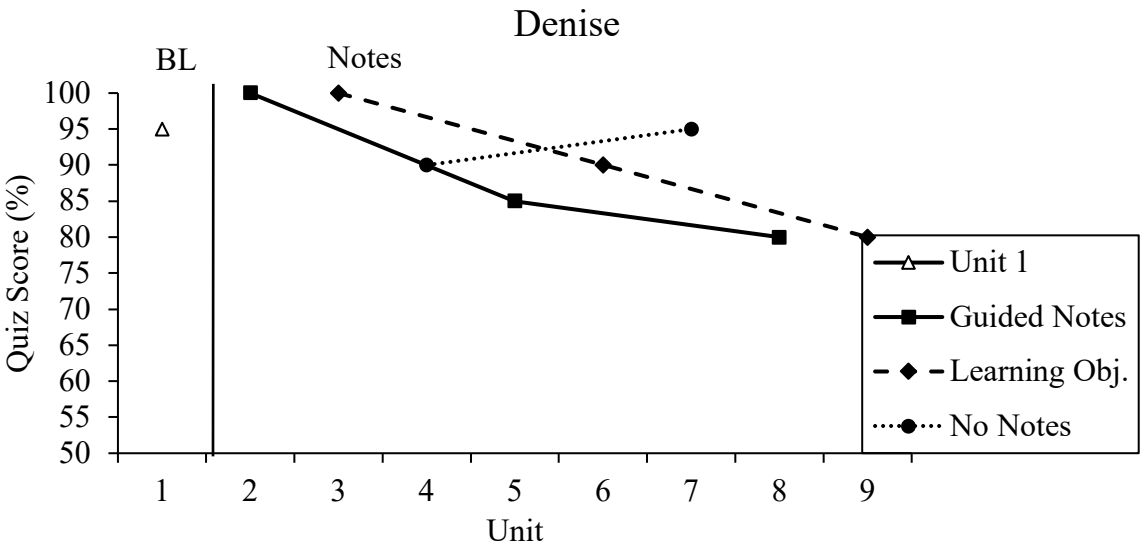


Figure 7: Average Scores Across Conditions in All 9 Units

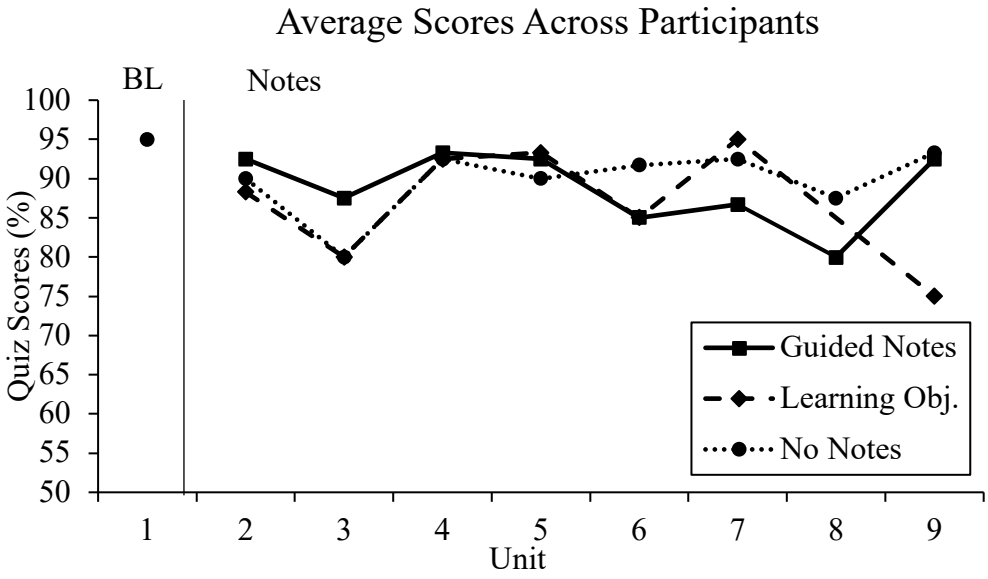


Figure 8: Scores of Online Students vs Participants

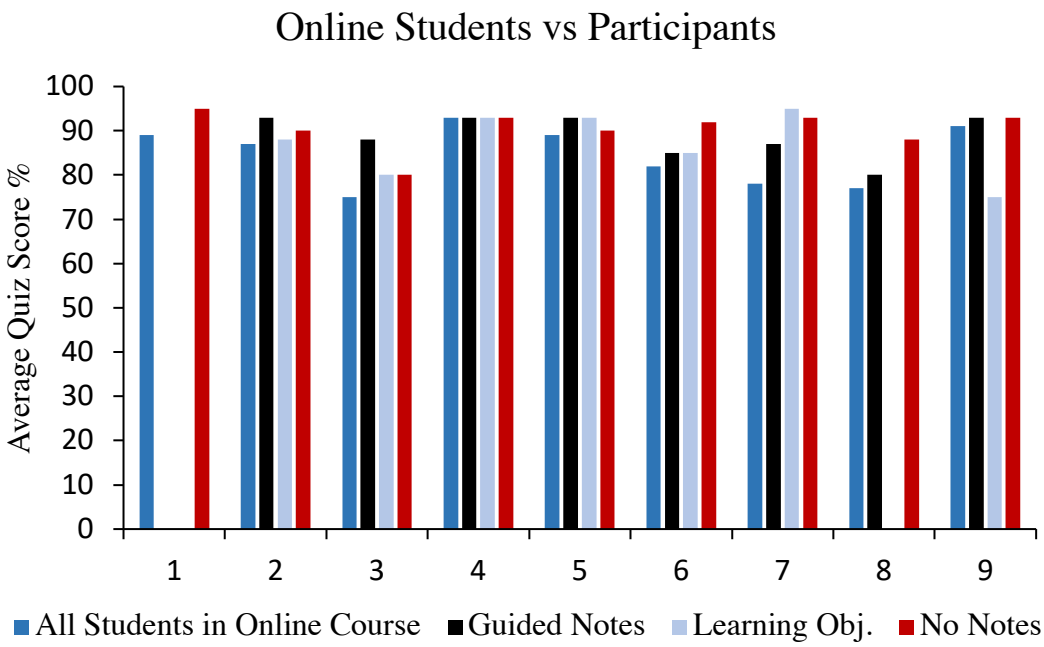


Table 1: Participant Characteristics

Participant	Race/ Ethnicity	Disabilities	Age	Time in ABA	Program of enrollment	Avg # of hours worked/week	Gender
Jess	White	N/A	39	4 yrs	Certificate program for ABA	60	female
Sam	Black	N/A	26	1 yr	MA in ABA	30	female
Cody	White	N/A	35	9 yrs	MA in ABA	45	male
Taylor	White	Dyslexia	27	8 mos	MA in ABA	50-60	female
Haley	White & Asian	N/A	26	4 yrs	MA in ABA	42	female
Denise	White	ADHD & Sensory Integration Disorder	30	2 yrs	MA in ABA	50-60	female

Table 2: Participant Adherence to Procedures Across Conditions

	GUIDED NOTES								
	1st Exposure			2nd Exposure			3rd Exposure		
	Unit #	Submitted	Adherence	Unit #	Submitted	Adherence	Unit #	Submitted	Adherence
Jess	4	Complete GN	yes	7	Complete GN	yes	8	Complete GN	yes
Sam	2	Complete GN	yes	5	Complete GN	yes	8	Complete GN	yes
Cody	3	Complete GN	yes	6	Complete GN	yes	9	Complete GN	yes
Taylor	3	Complete GN	yes	6	Complete GN	yes	9	Complete GN	yes
Haley	4	Complete GN	yes	7	Complete GN + Personal notes	yes	8	Complete GN + Personal notes	yes
Denise	2	Complete GN	yes	5	Complete GN	yes	8	Complete GN	yes

	LEARNING OBJECTIVES								
Jess	2	Partial LO	somewhat	5	Partial LO	somewhat			
Sam	3	Personal notes	no	6	Personal notes	no	9	Complete LO + Personal notes	somewhat
Cody	4	Personal notes	no	7	none	no			
Taylor		Complete LO	yes		Complete LO	yes			
Haley	2	Complete LO	yes	5	Personal notes	no	N/A	N/A	N/A
Denise	3	Complete LO	yes	6	Complete LO	yes	9	Complete LO + Personal notes	no

	NO NOTES								
Jess	3	Personal notes	yes	6	none	No			
Sam	4	Personal notes	yes	7	Personal notes	yes			
Cody	2	Personal notes	yes	5	Personal notes	yes	8	Personal notes	yes
Taylor	2	Personal notes	yes	5	Personal notes	yes	8	Personal notes	yes
Haley	3	Personal notes	yes	6	Personal notes	yes	9	Personal notes	yes
Denise	4	Personal notes	yes	7	Personal notes	yes			

Table 3: Summary of Quiz Scores for All Students Enrolled in Course

	Number of Students Taking Form A Quiz	Average Quiz Score	Range of Scores on Quiz
Unit 1	589	89%	55-100%
Unit 2	561	87%	5-100%
Unit 3	563	75%	5-100%
Unit 4	547	93%	0-100%
Unit 5	540	89%	40-100%
Unit 6	541	82%	20-100%
Unit 7	539	78%	0-100%
Unit 8	536	77%	20-100%
Unit 9	541	91%	20-100%

Table 4: Summary of Average Quiz Scores Across Conditions for Each Participant

	Baseline	Guided Notes	Learning Objectives	No Notes
Jess	100%	85%	83%	90%*
Sam	100%	83%	70%	92%*
Cody	100%	95%	98%	98%*
Taylor	85%	81%	90%*	80%
Haley	90%	85%	90%*	82%
Denise	95%	88%	90%	93%*
All Participants	95%	87%	87%	89%

Table 5: Summary of Social Validity Ratings

Survey Statements and Ratings	Cody	Taylor	Haley	Denise
I found the procedures useful in this experiment	4	3	5	4
I used the guided notes as study material for tests	4	4	4	3
I would like to use guided notes in future academic courses	4	2	4	5
I think this study would be acceptable for those who attend university online or in person	5	4	5	5
This study helped improve recalling information from lecture	3	3	4	4
I felt less pressure trying to keep up with the lecture when provided with guided notes	5	2	5	2
I filled out the guided notes synchronously while watching the videotaped lectures	5	4	1	5
I completed the notes using the PowerPoint slides	1	4	5	1
I saw an increase in test scores on the weeks provided with guided notes	3	3	4	2