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TEACHING STUDY SKILLS TO COLLEGE STUDENTS USING CHECKLIST TRAINING

By

Sarah T. Kong

A Thesis Submitted to the

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In Partial Fulfillment of the

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Stockton, California

2021

TEACHING STUDY SKILLS TO COLLEGE STUDENTS USING CHECKLIST TRAINING

By

Sarah T. Kong

APPROVED BY:

Thesis Advisor: Corey Stocco, Ph.D.

Committee Member: Matthew Normand, Ph.D.

Committee Member: Carolynn Kohn, Ph.D.

Department Chair: Matthew Normand, Ph.D.

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By

Sarah T. Kong

DEDICATION

This thesis is dedicated to my parents for their unconditional support.

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TEACHING STUDY SKILLS TO COLLEGE STUDENTS USING CHECKLIST TRAINING

Abstract

By Sarah T. Kong

University of the Pacific
2021

Deficits in the study skills of college students can lead to lower academic performance and disqualification. Although behavior analytic research has evaluated methods for teaching, structuring in-class notes, increasing attendance, and improving participation, no studies have evaluated methods for improving independent studying outside of the classroom using a single-case design. We evaluated the effects of a study skills training package using a multiple probe design across skills with college students. Sessions took place in a room arranged to emulate the typical study space found in a dorm or library. During sessions, participants were given a 3–6 page reading from a textbook on research methods and statistics. We modified the readings to equate the number of headings, subheadings, paragraphs, and bolded terms. Using a combination of a checklist with picture models and performance feedback, we taught college students how to set up their study space, take notes, and study their notes by writing answers to study questions. Some participants received instructions to check items off the checklist as they completed them. As a supplemental measure, we probed quiz performance during baseline and after a participant mastered each skill. Checklist training improved targeted study skills for all four participants. Explicit instructions to check items off the checklist improved performance for one participant when consistent performance did not maintain after training and produced high levels of performance when implemented at the beginning of training for another participant.

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LIST OF ABBREVIATIONS

BL	Baseline
cm	centimeters
CT	Checklist Training
GPA	Grade Point Average
in	inches
IOA	Interobserver Agreement

CHAPTER 1: INTRODUCTION

Deficits in study skills can be a barrier for students to stay in and graduate from college. Retention rates at four-year universities are as low as 62%, and only 62% of students graduate with a bachelor's degree within a 6-year time frame (National Center for Education Statistics [NCES], 2020). Research has shown positive correlations between grade point average (GPA), retention rates (Kern et al., 1998; Williams et al., 2018), and student study skills, such as reading, identifying main ideas, and self-testing on study material (Beattie et al., 2019; Crede & Kuncel, 2008; Hartwig & Dunlosky, 2012; Kern et al., 1998; Purdie & Hattie, 1999). Although instructors reportedly recommend study skills in classes (Hunter & Lloyd, 2018; Morehead et al., 2016), they have also indicated that students do not follow their advice (Morehead et al., 2016). Moreover, despite reporting intentions to engage in study skills, students have admitted that they rarely took notes or self-tested across an academic semester (Blasiman et al., 2017).

Due to the link between study skills, academic achievement, and retention, much of the behavior analytic research in higher education has focused on strategies for improving student performance that can be implemented by instructors during class. Researchers have reported pedagogical techniques or course policies that targeted increases in attendance (Bicard et al., 2012), class participation (Cavanaugh et al., 1996; Heward, 1994; Marmolejo et al., 2004; Twyman & Heward, 2018), or in-class notes (Austin et al. 2002; Konrad et al., 2009; Neef et al., 2006). These techniques have produced improvements in student performance, but the effects have been understudied or unreliable at the individual level. For example, Neef et al. (2006) compared the effects of completed notes and guided notes on quiz performance in two sections of an introductory research methods course. The class met weekly, and students obtained notes

from the instructor's website. Whereas completed notes were identical to lecture slides, guided notes included blank spaces for key words and phrases. The effects of completed and guided notes were assessed by comparing scores on 5-point quizzes administered before and after each lecture. Postlecture quizzes were administered at the beginning of class during the following week. The results were inconsistent across the two sections of the course. In one section, students performed better on quizzes after lecture when they were given guided notes. In contrast, students in another section performed similarly on quizzes when given guided or completed notes to use during lecture. The inconsistent results could have been due to differences in students' study skills across sections of the class. Students in one section of the class may have engaged in more active responding (see Heward, 1994, for a discussion of active responding) when given guided notes compared to completed notes. Students in the other section may have taken additional notes or self-tested using materials in their lecture notes between classes, resulting in more consistent improvements in quiz performance. Although faculty may implement techniques in the classroom to improve academic performance, some students may require explicit instruction on taking notes and self-testing with course material at home.

Self-testing could be interpreted as part of a behavior chain of studying because it depends on stimuli produced when setting up a study space (e.g., reading material, writing utensils) and taking notes on main points (e.g., self-generated questions). Researchers have reported establishing behavior chains with task analyses for creating single-case design graphs (Tyner & Fienup, 2015; Tyner & Fienup, 2016), implementing stimulus preference assessments (Graff & Karsten, 2012), performing Olympic-style weightlifting exercises (Moore & Quintero, 2019), hitting a baseball (Simek & O'Brein, 1988), assembling furniture (Martin et al., 1992),

and preparing meals (Agran et al., 1992; Mechling et al., 2010). For example, Tyner and Fienup (2016) compared the effects of two types of task analyses on teaching college students to create a reversal design graph in Microsoft Excel. One task analysis consisted of a description of the response sequence required to create the graph. The other task analysis was identical but was supplemented with descriptions of relevant antecedent stimuli and performance criteria for each step. Students who received the supplemented task analysis completed steps more accurately than students who received only a description of the response sequence. These results may have implications for chaining a series of study skills to improve active student engagement with course material outside of the classroom. Additional stimuli presented with a task analysis can produce more accurate responding without instruction from another individual, which is ideal when teaching students to study independently.

Research outside of behavior analysis has indicated that combinations of instructions, modeling, practice, and performance feedback may improve the study skills of college students (Gettinger & Seibert, 2002; Kartika, 2007; Renzulli, 2015). However, there are limitations related to the replicability of teaching procedures and the measurement of study skills. For example, Renzulli (2015) evaluated the effects of a learning skills course on the study skills of nine college students on academic probation. The class met twice a week for 3 weeks and focused on self-monitoring, self-testing, note taking, and developing study plans. During the first meeting of the week, the instructor provided vocal instructions and rationale for using the targeted study skills. During the second meeting, students practiced the skills during class. However, the details about the procedures used during practice sessions were unclear. The researcher reportedly facilitated the development of study skills during class sessions but did not report a description of antecedents and consequences for engaging in targeted skills. Therefore,

it is difficult to replicate the procedures to conduct further research on the efficacy of the protocol or to implement in practice. Additionally, despite reporting increases in note taking, self-testing, and GPA, the researcher evaluated the intervention by comparing indirect measures of study skills. Students self-reported their study skills and researchers reported students' GPAs from the semester before and after completing the course. Students indicated that they were more likely to engage in study skills and spend more time studying, and students' GPAs improved by an average of 0.42 grade points (1.38 to 1.80) in the semester after taking the course. However, it is possible that self-reported study habits were inaccurate and changes in GPA could be attributed to other factors. For example, semester GPAs represent an average of student grades across multiple courses and could be influenced by changes in course difficulty, rather than student engagement in study skills.

Although the literature suggests that classroom-based interventions may be effective, a checklist training procedure may be a viable alternative that specifies programmed antecedents and consequences and directly measures target skills. Checklist training includes instructions, practice, and performance feedback that includes a written task analysis including a sequence of responses to perform a task. Rantz et al. (2009) used a multiple baseline design across participants with withdrawal of treatment to assess the effects of checklist training to improve the use of flight checklists for eight undergraduate students enrolled in an aviation flight science program. Researchers used a 40-item checklist describing critical aviation tasks and collected data on the number of items completed on the checklist during each flight. During training, the experimenters provided vocal and visual feedback on the correct completion of checklist items and the number of errors made for each flight. Following training, the experimenters withdrew feedback for checklist performance. All participants completed higher levels of checklist items

and made fewer errors during training sessions that maintained when researchers no longer provided feedback for use of the checklist. Checklist training has also produced improvements in restaurant cleaning tasks (Austin et al., 2005), blood glucose testing (Wong et al., 2000), and home accident prevention (O'Reilly et al., 1990). However, research is needed to evaluate the effects of this procedure on the study skills of college students.

Behavior analytic studies addressing academic performance have focused on interventions implemented in the classroom, but no studies have evaluated methods for teaching independent study skills. Studies outside of behavior analysis suggest that instructions, modeling, practice, and performance feedback can improve study skills. Despite reporting improved outcomes, these studies lacked procedural details and relied on indirect measures to assess the effects of interventions. Checklist training procedures include the same components that appear effective in the study skills literature with the addition of written task analyses. These procedures have produced improvements in a variety of skills that maintain in the absence of immediate feedback. Task analyses used in checklist training provide a description of steps to complete and allow for direct measurement of a complex skill, such as studying. No studies to date have used checklist training to teach study skills. The purpose of this study was to develop and evaluate the effectiveness, practicality, and social validity of a checklist training procedure to teach study skills to college students.

CHAPTER 2: METHOD

Participants and Setting

Participants were four undergraduate college students at the University of the Pacific who self-reported academic struggles and a desire to improve their study skills. Participant demographics are listed in Table 1. Sessions were conducted in a room on a university campus designed to emulate a study space found in a dorm or library. The room was equipped with a chair and desk that faced a wall. Participants were provided with a backpack that included 3 in. (7.62 cm) x 5 in. (12.7 cm) notecards, 8 in. (20.32 cm) x 10.5 in. (26.67 cm) notebook paper, and two writing utensils (i.e., two pens, or one pen and one mechanical pencil). The experimenter video recorded each session with participants.

Table 1

Participant Demographics

	Participants			
	Alyssa	Sandy	David	Mickey
Age	20	28	26	33
Race/Ethnicity	Filipino American	African American	Latino American	White
Traditional/Transfer Student	Traditional	Transfer	Transfer	Transfer
Semester at University	3rd	1st	3rd	1st
Major	Pre-pharmacy	Psychology	Business	Psychology
GPA	2.1	2.94	2.69	3.2
Time Spent Studying	1–10 hours per week	2–6 hours per week	2.5–5 hours per week	7–11 hours per week
Methods of Studying	Review PowerPoint slides, rewrite notes taken in class	Review class notes and handouts	Pomodoro Technique facilitated by a mobile phone app, highlight important points	Skim readings, self-quiz with study guides, Chegg study app
Concerns About Studying	Cramming, inefficient studying	Organization, time management, consistency	Effective and efficient studying, practical application	Comprehen-sion of materials, effective studying
Reported Barriers to Studying	Test anxiety, procrastin-ation	Organization, time management	Procrastina-tion, time manage-ment	Stress, anxiety, distractions
Study Assistance	Tutoring from university academic support center	None	None	Prior assistance received from tutor center at community college

Measurement

During sessions, observers scored the percentage of steps implemented correctly on task analyses for three skill sets related to studying: environment set up, note taking, and self-testing (Table 2). Environment set up included obtaining materials needed for completing study tasks and removing potential distractors from the study space. Note taking involved writing vocabulary terms and definitions on notecards and taking notes in the margins of a reading packet. To simulate assigned readings from a class, the experimenter created reading packets from a textbook on research methods and statistics (Adams & Lawrence, 2018). Each reading consisted of 3 to 6 pages, 3 to 8 headings/subheadings, 9 to 19 paragraphs, and 4 to 6 bolded terms. The number of pages, headings/subheadings, paragraphs, and bolded terms are listed in Table 3. Self-testing consisted of reciting vocabulary terms and definitions out loud, comparing recited definitions to notecard definitions, rewriting questions generated while taking notes, answering questions without looking at notes, and checking answers using notes. These task analyses were developed from a book on studying in college (Pauk & Owens, 2010) and from consultation provided by a staff member at the academic support center of a university.

Table 2
Checklist of Study Skills

- Preparing Study Environment
  - Electronic devices are turned off or silenced (e.g., phone, iPads, radio, TV, smart watch, computer).
  - Place all electronic devices out of reach from study area.
  - Place readings on the table.
  - Place notebook or loose-leaf paper on the table.
  - Place two writing utensils (e.g., pen, pencil) on the table.
  - Place notecards on the table.
  - No other items (e.g., planner, water bottle, etc.) on the table.
- Note Taking
  - Notes On Readings
    - Reword headings and subheadings into question format in the margins of text (it is recommended that you do this before reading).
    - While reading, write at least one question or comment per paragraph next to the paragraph.
    - Read the paragraph or section and answer the questions generated from the headings and subheadings by summarizing the main points in the margins of the text.
  - Definitions
    - Write the bolded word on one side of an index card.
    - On the other side of the index card, define the word using the text provided in the reading.
    - Write the page number in the bottom corner of the notecard on the same side as definition.
- Practice
  - Review Notes
    - Write the question for each heading on a separate sheet of paper.
    - Flip over reading and notes, concealing all written text.
    - Write down the answer to the questions without flipping over the notes.
    - Using reading, notes, and summary statements, mark the questions with a star for each correct answer.
    - Using reading, notes, and summary statements, circle each question answered incorrectly.
    - Rewrite questions answered incorrectly on a separate sheet of paper.
    - Repeat steps 2 through 6 once.
  - Review Notecards
    - Look at the word on the front of the notecard and read the word out loud.
    - Without looking at the definition, say the definition out loud.
    - Turn the card over and read the definition out loud.
    - Create a pile of cards with words that you defined correctly, and a separate pile of cards with words that you defined incorrectly.
    - Review the pile with the incorrectly defined words using steps 1 through 4 once.

Table 3
Reading Packet and Quiz Characteristics

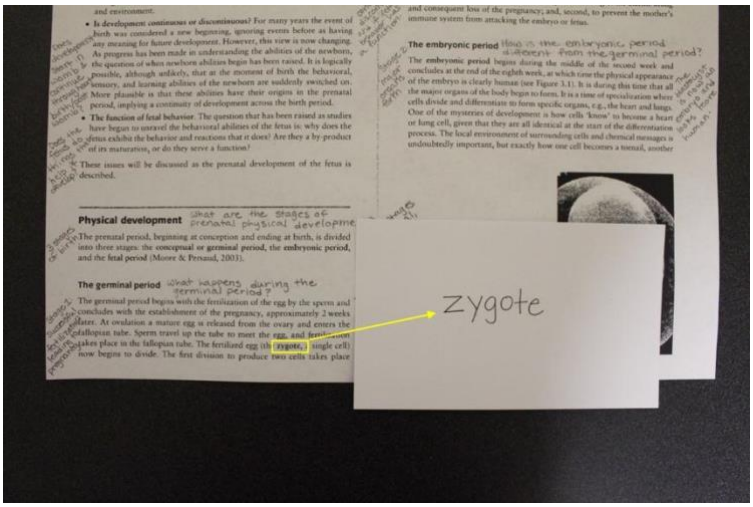
Reading Number	Pages	Headings/ Subheadings	Paragraphs	Vocabulary Terms	Generated Quiz Questions
1	5	6	15	6	0
2	4	5	10	9	2
3	4	3	9	6	3
4	5	8	11	9	2
5	5	8	12	8	1
6	5	5	16	5	0
7	5	5	14	7	2
9	3	4	11	7	2
13	4	5	9	6	4
14	4	4	13	6	4
15	5	4	12	6	3
17	6	7	12	4	5
18	4	4	15	8	5
19	5	5	16	7	3
20	4	4	9	7	2
22	6	3	10	5	2
24	5	4	19	5	1
Average	5 (3–6)	4 (3–8)	12 (9–19)	6 (4–9)	2.4 (0–5)

Note. Ranges for each characteristic are presented in parentheses. Readings 8, 10, 11, 12, 16, 21, and 23 are not listed in this table because they included inconsistent opportunities to complete steps on the task analysis. These readings were not provided to participants.

During training sessions, participants were given a checklist that included items identical to those on the task analysis with a picture model for each step (see Table 4). The experimenter used the smartphone application, Countee, to score the duration of a participant observing the checklist by reviewing session videos. The experimenter began scoring checklist observation when the participant oriented their face toward the checklist and stopped scoring when the participant oriented their face away from the checklist. Observing the checklist was scored for durations in which participants had access to sections of the checklist for targeted skills. These

data were depicted as percentages of opportunities to observe the checklist because the total duration in which the checklist was available varied across sessions. For example, the opportunity for Sandy to observe the checklist was 4 m 30 s in session 3 and 27 m 44 s in session 12.

Table 4
Example of a Picture Model Checklist Item

Checklist Item	Picture Model
Write the bolded word on one side of an index card.	

As a supplemental measure of learning, participants completed a reading quiz that consisted of 5 multiple-choice questions during sessions in which all skills were probed. Quizzes consisted of five types of questions: vocabulary, true/false, recognition of information, comprehension and application, and problem-solving questions (see Appendix G for an example of a quiz). Quizzes included one question of each type. The experimenter randomized the sequence of readings and quizzes to minimize the influence of the presentation of readings in sequential order on quiz performance. The quizzes were generated from a test bank available in

the coursepack for instructors on the publisher's webpage (Sage Publishing, n.d.). If the test bank included less than 5 questions on the content for a given reading, the experimenter generated additional questions that were formatted similar to those in the test bank (see Table 3).

A second observer scored completion of items on the task analysis by reviewing videos, reading packets, notecards, and paper used by participants during 100% (Alyssa), 69% (Sandy), 100% (David), and 69% (Mickey) of sessions. Trial-by-trial interobserver agreement (IOA) on completion of task analysis items for all three skill sets was calculated by dividing the number of items that observers scored the same by the total number of items. A second observer collected data on the duration of observing the checklist for 100% (Alyssa), 100% (Sandy), 88% (David), and 78% (Mickey) of sessions. Mean Count-per-Interval IOA on observing the checklist was calculated by dividing the lower score by the higher score within each 10-second interval for each session. Scores from each interval were then averaged for the entire session. Agreement scores for completion of task analysis items and observing the checklist are shown in Table 5. Agreement data were not collected for quiz scores as quizzes were scored by comparing participant answers to an answer key.

Table 5
Interobserver Agreement

	Alyssa	Sandy	David	Mickey
Task Analysis Items				
Skill Sets				
Environment Set Up	98%	77%	88%	98%
Note Taking	98%	100%	92%	100%
Self-Testing	100%	100%	97%	100%
Average	99%	92%	92%	99%
Observing Checklist				
Average	79%	89%	86%	85%

Procedures and Experimental Design

Sessions were conducted 1 or 2 days a week and lasted between 30 min and 90 min. Before conducting experimental sessions, participants were interviewed about study habits (frequency, methods, concerns, barriers) and history with academic-support services (see Appendix F). The effects of training were evaluated using a concurrent multiple probe design across skills. Training was conducted to teach participants to complete steps for one skill set at a time. Participants were taught to set up their study space, to take notes, and to self-test. For two participants, a self-monitoring component was added to (David) or included in (Mickey) training.

Baseline Probe

The purpose of this session was to observe the participant's study skills with their typical academic materials and to assess the extent to which their performance during this observation corresponded with their actions during baseline using the readings selected for this study. Prior to the session, an experimenter instructed participants to bring reading and study materials (e.g.,

textbooks, articles, writing utensils, paper) from a class they were taking at the time of participation. The experimenter observed participants while studying their own academic materials and recorded the number of items completed on the task analysis. During observations, participants were informed that they may use materials (i.e., notebook paper, pens, and index cards) available to them in a backpack provided by the experimenter. The experimenter provided materials in a backpack to ensure participants had access to materials needed to complete steps on the task analysis during probe sessions. The experimenter instructed the participants to study about 5 pages of reading material for class. No differential consequences were provided for participants' study behaviors. If the participant asked feedback, the experimenter explained the purpose of the observation was to assess current study habits and that suggestions for improvement would be provided during training sessions.

Baseline

The purpose of these sessions was to assess participant performance under conditions of this study using selected readings. We selected readings for this study to ensure opportunities to complete task analysis steps remained constant across sessions. Prior to the start of baseline sessions, the experimenter requested permission from the participant to move their personal items around and arranged the study space to match conditions observed in the baseline probe. For example, if the participant had a cell phone on the table during the baseline probe, the experimenter placed the participant's cell phone on the table. Materials in the backpack were made available near the study area. At the start of the session, the experimenter gave the participant a reading packet, instructed them to read and study the packet, and informed them that they would take a quiz once they finished studying. Once the participant stated that they

finished studying, the experimenter collected the reading packet and notes and administered a quiz.

Checklist Training

Checklist training was included instructions, a written checklist with picture models, an opportunity to perform target skills, and vocal feedback. During checklist training, the experimenter provided participants with a picture checklist that outlined steps for a particular skill set (i.e., environment set up, note taking, or self-testing). The experimenter read each item on the checklist with the participant while referring to each picture model and provided a reading packet and the instructions to complete the steps on the checklist. Materials were made available in a backpack near the study area. After providing an opportunity to complete all targeted skills, the experimenter reviewed the checklist items with the participant and described each step the participant completed correctly, did not complete, or completed incorrectly.

Post mastery probes. After the participant met a mastery criterion of 100% of task analysis items completed for one training trial, the experimenter conducted probes of mastered and untargeted skill sets. Probe sessions were identical to baseline sessions with the addition of vocal praise or corrective feedback for performance on mastered skill sets. After reviewing targeted steps with the participant, the experimenter instructed them to complete steps for unmastered skill sets. For example, during probes following mastery of environment set up, we reviewed steps for setting up the study space, then instructed participants to read and study the reading packet.

Checklist Training and Self-Monitoring

The checklist training and self-monitoring phase was identical to checklist training with the addition of explicit instruction on self-monitoring. The experimenter instructed the

participant to check off items from the checklist as they completed them and described the correspondence between items checked off by the participant and the experimenter. For example, if the participant scored an item as complete and the experimenter marked the same item as incomplete, the experimenter described the discrepancy and explained to the participant why the item was marked as incomplete. If the participant appeared to complete steps without checking off items, the experimenter prompted the participants to check off items from the checklist.

Debrief and Social Validity

After final sessions, the researcher debriefed participants by providing a handout outlining advice and rationale for engaging in targeted skills while studying, reviewed graphs of participants' performance on task analysis steps and quizzes, and asked participants to complete a social validity questionnaire. A 7-point Likert-type scale was used on the questionnaire to assess acceptability of the experimental procedures, likelihood of engaging in study skills learned through participation, participant satisfaction with improvements in study skills, and usefulness of skills targeted in this study.

Follow Up

Follow up data were obtained from one participant (Mickey) to assess the generality of training outcomes across study environments. Two weeks after debriefing Mickey on his participation in the study, the researcher asked Mickey to take a video of one of his study sessions at home using the checklist. To obtain permanent products for note taking and self-testing skills, the researcher instructed Mickey to take pictures of each page he wrote on during the session and asked him to share the videos and pictures from the study session. Videos and pictures were reviewed by the researcher, and data were collected on the completion of checklist

items. Follow up data were not obtained from Alyssa because she discontinued participation before mastering all skill sets. Alyssa discontinued participation due to conflicting familial responsibilities. Sandy and David declined further participation after they were debriefed.

Procedural Integrity

The experimenter trained three research assistants to conduct sessions with participants. The experimenter read the session protocol (see Appendix I) with research assistants. The session protocol outlined steps for conducting skills assessments (e.g., baseline probes, baseline, post mastery probes), and checklist training sessions. The experimenter and research assistants role-played each type of session. During role play, the experimenter acted as a participant and the research assistant conducted mock sessions. The experimenter reviewed missed protocol steps with the research assistant and the research assistant conducted the session until all steps were completed once. The experimenter conducted all sessions with Alyssa and most sessions with David. A research assistant conducted David's baseline sessions and the initial training session with the experimenter present. Two research assistants were present and conducted all sessions with Sandy. One research assistant was present and conducted all sessions with Mickey. Research assistants reported data to the experimenter following each session.

The experimenter or a research assistant scored procedural integrity by checking off items completed on one of two session protocols (Appendix I). One protocol listed steps for implementing checklist training. The other protocol listed steps for checklist training and self-monitoring. Procedural integrity scores were calculated by dividing the number of steps completed correctly by the total number of steps for each session. Procedural integrity was scored for 100% of sessions for Alyssa, 100% of sessions for Sandy, 85% of sessions for David, and 75% of sessions for Mickey. Procedural integrity scores are depicted in Table 6.

Table 6
Procedural Integrity

Percent of Opportunities for Procedural Steps Completed Across Scored Sessions				
	Alyssa	Sandy	David	Mickey
Skills Assessments				
Arrange room with distractors and remove study materials	50%	83%	100%	67%
Place study materials in backpack	80%	100%	100%	100%
Give participant the reading packet	100%	100%	100%	100%
Instruct participant to engage in study skills (i.e., set up study space, read and study the reading packet)	100%	100%	100%	100%
Prompt to check off items (CT + self-monitoring only; post mastery probes)	–	–	–	100%
Review performance for mastered skills (post mastery probes)	75%	100%	100%	100%
Review correspondence between checked items (CT + self-monitoring only; post mastery probes)	–	–	–	50%
Instruct participants to engage in unmastered skills (post mastery probes)	100%	100%	100%	100%
Remove textual stimuli when participant finishes studying	100%	100%	88%	67%
Provide participant with quiz	100%	100%	100%	100%
Remove quiz when participant completes quiz	100%	100%	100%	100%
No comments regarding performance for unmastered skills	100%	100%	100%	100%
Training				
Arrange room with distractors and remove study materials (environment set up training only)	–	–	–	0%
Set up environment with study materials and remove distractors	–	–	–	100%
Give participant checklist and read each item with them	100%	100%	100%	100%
Discuss checklist and clarify questions (if any)	100%	100%	100%	100%
Perform each step or refer to picture models when reading through checklist	100%	100%	100%	100%
Provide participant with reading packet and checklist	100%	100%	100%	100%
Instruct participant to complete targeted steps	100%	100%	100%	100%

(Table 6 Continued)

Prompt to check off items (CT + self-monitoring only)	–	–	–	67%
Review each step performed correctly and incorrectly, referring to the checklist	100%	100%	86%	100%
Review correspondence between checked items (CT + self-monitoring only)	–	–	–	33%
Average	94%	99%	98%	86%

Note. This table depicts the percent of opportunities the experimenter completed each step of the experimental procedures across sessions. Procedural integrity for baseline and post-mastery probes are included under Skills Assessments. Procedural integrity for training sessions across all skill sets (environment set up, note taking, and self-testing) are included under Training. Dashes indicate steps that were not included on the data sheet. As a result, no data were collected for those steps. Percentages lower than 100% indicate steps that were missed during at least one opportunity.

Data were omitted for session 4 for Alyssa, sessions 4 and 5 for David, and session 2 for Mickey due to procedural errors that resulted in inconsistent opportunities to complete steps on the task analysis. That is, during these sessions the experimenter did not replace distractor items and remove study materials from the study space prior to starting the session, resulting in no opportunities to complete environment set up. Data from session 16 for David were omitted because the reading packet used during the session included headings formatted as questions, resulting in no opportunities for the participant to generate questions while taking notes. Data from Session 7 for Sandy were omitted because the session was cut short, resulting in missed opportunities to complete steps on the task analysis. Procedural integrity data were not collected for omitted sessions.

CHAPTER 3: RESULTS

Results are shown in Figures 1–3. Overall, performance was higher during checklist training compared to baseline for all participants. In baseline, participants completed an average of 12% (range, 0% to 71%) of task analysis steps. When checklist training was implemented, participants completed an average of 95% (range, 41% to 100%) of steps. However, checklist training produced varying levels of performance with one participant, David. David's performance stabilized at high levels when instructions to self-monitor were delivered. For one participant, Mickey, performance immediately improved when checklist training was implemented with instructions to self-monitor.

The percent of task analysis steps completed by Alyssa and Sandy are depicted in Figure 1. During baseline probes and baseline sessions, Alyssa completed an average of 19% (range, 14% to 29%) of steps for environment set up (top panel). Sandy completed an average of 62% (range, 43% to 71%) of steps for environment set up (top panel). Neither participant completed steps for note taking (middle panel) or self-testing (bottom panel). During checklist training, Alyssa completed 95% (range, 83% to 100%) of steps and Sandy completed 97% (range, 71% to 100%) of steps for all skill sets. Alyssa terminated her participation in the study after session 10. Therefore, a full probe was not conducted after implementing checklist training for self-testing skills.

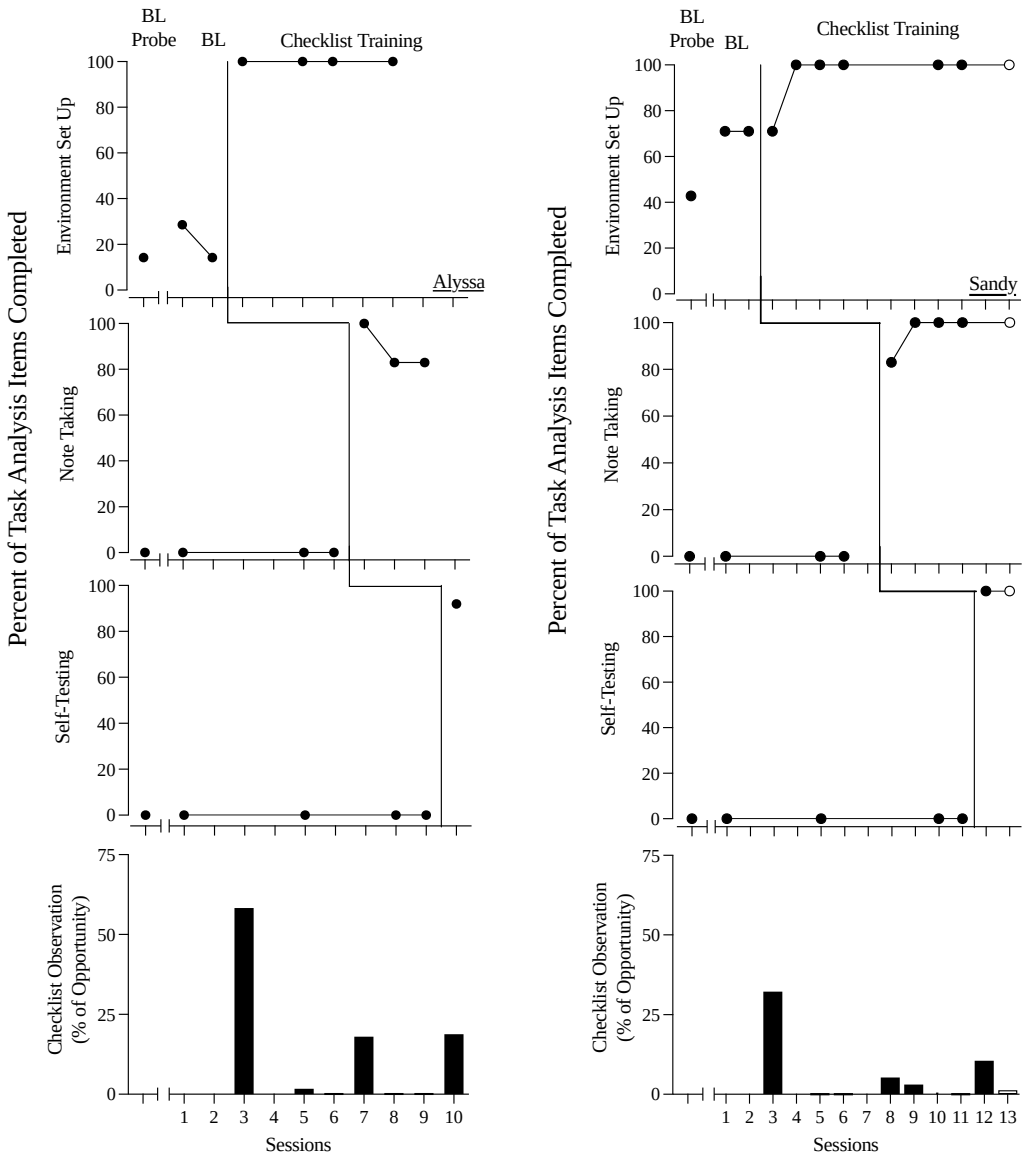


Figure 1. Percent of task analysis steps completed during baseline probes, baseline, post mastery probes, and checklist training sessions for environment set up (top panel), note taking (top middle panel), and self-testing skills (bottom middle panel) for Alyssa (left panel) and Sandy (right panel). The bottom panel depicts checklist observation during each session. The open circles and bars depict Sandy's performance during the final post mastery probe session.

David's results are depicted in Figure 2. David completed 43% of task analysis steps for environment set up, an average of 11% (range, 0% to 33%) steps for note taking, and no self-testing steps during the baseline probe and baseline sessions. During checklist training, David

completed 87% (range, 42% to 100%) of steps. Although there were improvements during checklist training, David's performance varied across sessions. When checklist training was supplemented with instructions to check off items from the checklist as they were completed, David's performance stabilized at high levels (*M* = 98%; range, 86% to 100%).

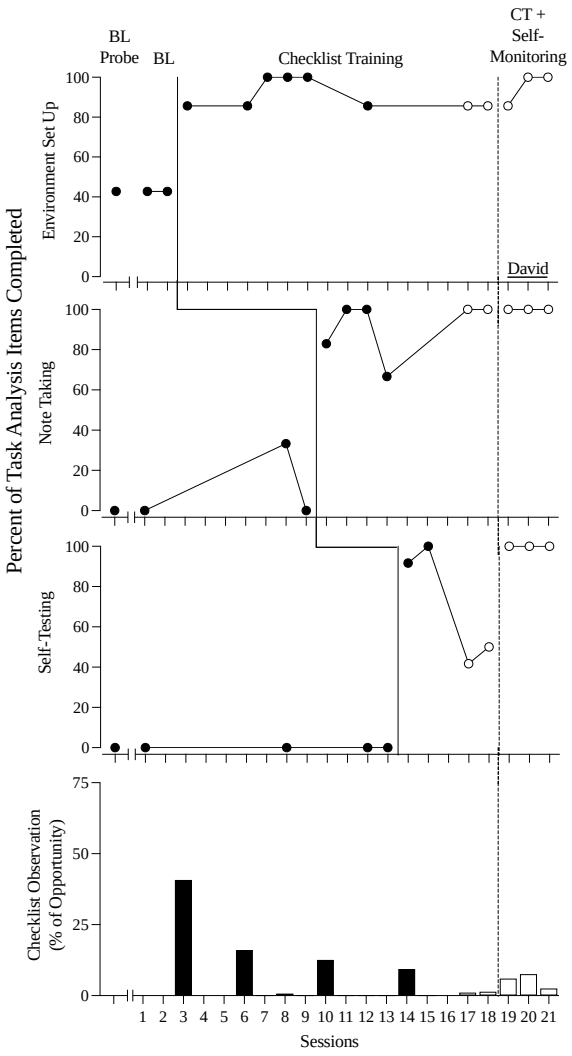


Figure 2. Percent of task analysis steps completed during baseline probes, baseline, post mastery probes, and checklist training sessions for environment set up (top panel), note taking (top middle panel), and self-testing skills (bottom middle panel) for David. The bottom panel depicts checklist observation during each session. The open circles and bars depict David's performance during probes after mastering self-testing.

The percent of task analysis steps completed by Mickey are depicted in Figure 3. During the baseline probe and baseline sessions, Mickey completed 57% (range, 43% to 71%) of steps for environment set up and no items for note taking and self-testing. During checklist training and self-monitoring, Mickey's performance increased to 97% (range, 75% to 100%) and stabilized at high levels. In follow-up observations, Mickey's performance maintained at 100% of items for environment set up, but performance on note taking and self-testing decreased to 67% and 8% of steps, respectively.

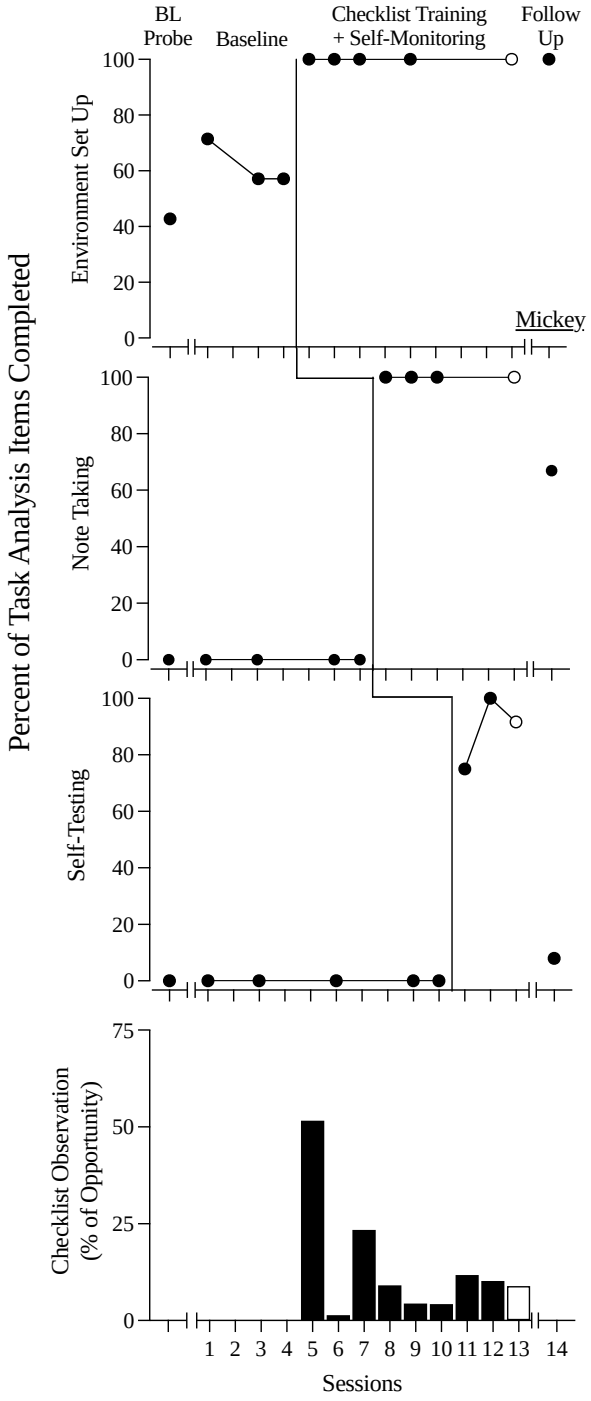


Figure 3. Percent of task analysis steps completed during baseline probes, baseline, post mastery probes, and checklist training sessions for environment set up (top panel), note taking (top middle panel), and self-testing skills (bottom middle panel) for Mickey. The bottom panel depicts checklist observation during each session. The open circles and bars depict Mickey's performance during the final post mastery probe session.

Table 7 depicts the sessions to mastery for each skill set across participants. It took an range of 1 to 3 sessions to master environment set up, 1 to 2 sessions to master note taking, and 1 to 2 sessions to master self-testing.

Table 7
Sessions to Mastery Criterion

Skills	Participants				
	Alyssa	Sandy	David	Mickey	Average
Environment Set Up	1	2	3	1	1.75
Note Taking	1	2	2	1	1.5
Self-Testing	–	1	2	2	1.25

Note. Mastery criterion was one session at 100% for each skill.

The time it took to complete assessments and training for each participant is depicted in Table 8. It took an average of 1 hr 38 min (range, 27 min to 2 hr 30 min) to complete training for all skill sets.

Table 8
Time Expenditure

Phases	Participants				
	Alyssa	Sandy	David	Mickey	Average
Training					
Environment Set Up	3 min	7 min	12 min	4 min	7 min
Note Taking	13 min	1 hr 32 min	*1 hr 8 min	23 min	49 min
Self-Testing	11 min	30 min	1 hr 10 min	*59 min	43 min
Total	27 min	2 hr 9 min	2 hr 30 min	1 hr 26 min	1 hr 38 min

Note. Time expended. Asterisks (*) denote phases in which videos for one session were inaccessible due to difficulties with video recordings. Average durations were adjusted to exclude these data.

Percentages of opportunities within sessions for participants to observe the checklist during training and final post mastery probes are depicted in Figure 4. Both Alyssa and Mickey

observed the checklist during 14% of opportunities within training sessions. Both Sandy and David observed the checklist at 6% of opportunities within training sessions. During checklist training, both Sandy and David observed the checklist during 1% of opportunities during final post mastery probes. David and Mickey observed the checklist during 5% and 9% of opportunities during final post mastery probes after receiving checklist training with instructions to self-monitor their completion of checklist items. These data are unavailable for Alyssa because she terminated her participation in our study prior to conducting a final probe of all skill sets.

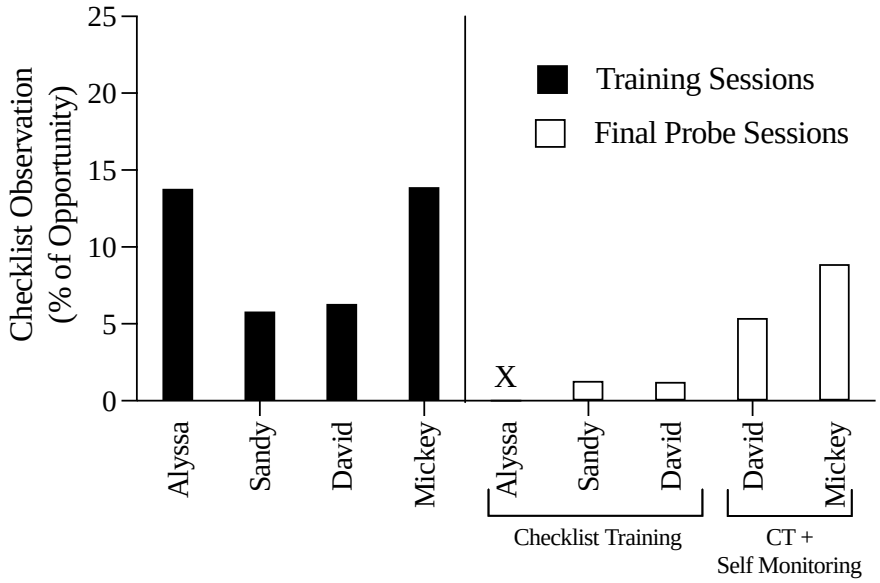


Figure 4. Percent of observing during training and final post mastery probe sessions when the checklist was available. These data are averaged for training sessions until the participant met the mastery criterion and David's post mastery probes during checklist training with and without self-monitoring.

Quiz scores for all participants are depicted in Figure 5. Alyssa scored 60% on the baseline quiz. Her scores decreased to 20% after checklist training on environment set up and

increased to 100% after training on note taking. Sandy scored 40% on the quiz during baseline that increased to 100% following checklist training on environment set up and maintained on quizzes taken after training note taking and self-testing. David scored 40% on the quizzes administered during baseline and after mastering environment set up. His quiz scores increased to 80-100% after completing checklist training on note taking. Mickey scored 60% on the baseline quiz. His quiz scores decreased to 40% after training on environment set up but increased and maintained at 80% after training on note taking and self-testing.

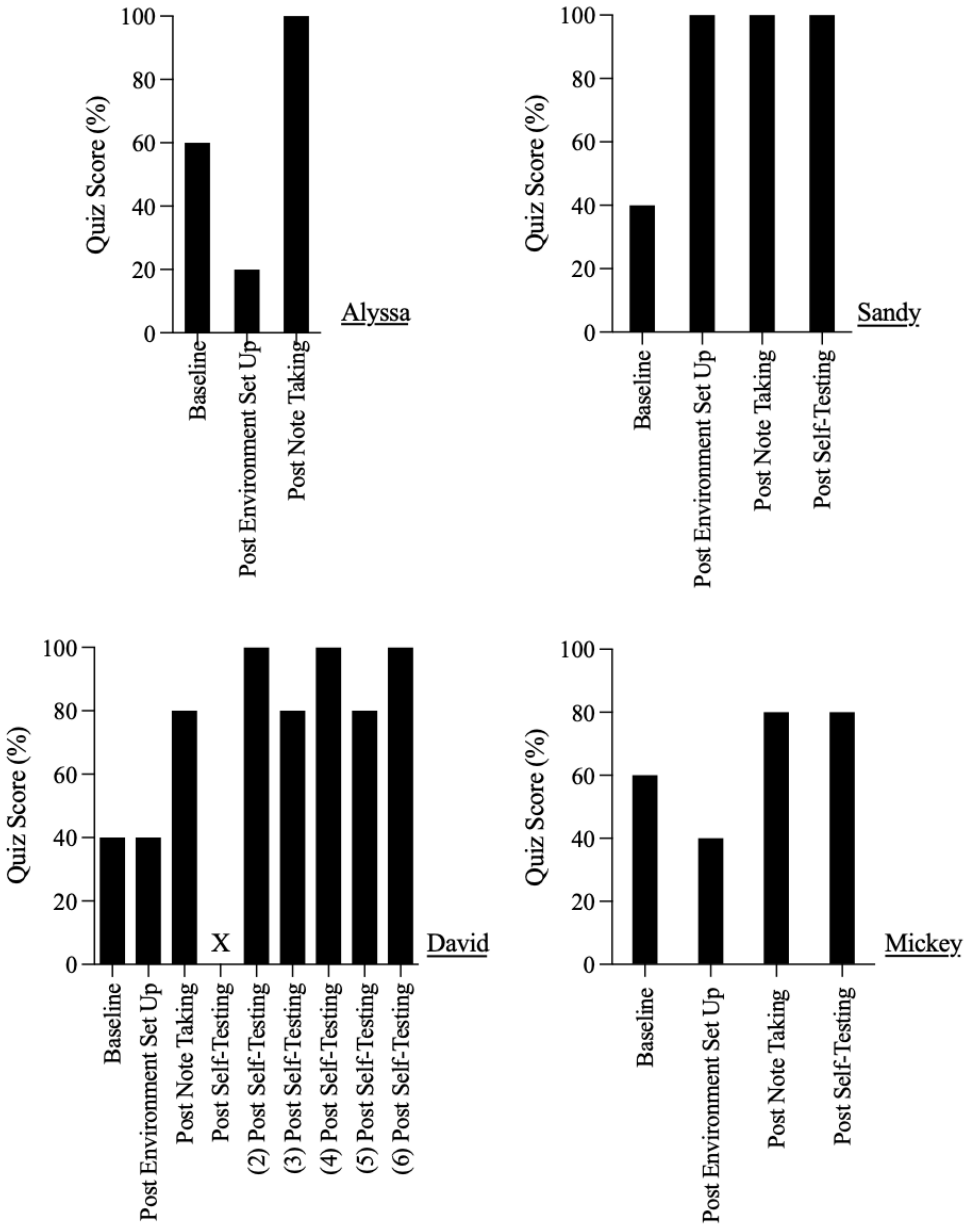


Figure 5. Participant quiz scores during probes of all skills in baseline and following training.

Social validity scores are depicted in Table 9. Participants rated their agreement with statements on a social validity questionnaire on a 7-point Likert-type scale (1 = strongly disagree, 7 = strongly agree). The mean rating for agreement with the statement, "I think it is acceptable to use these procedures to teach study skills," was 7. The mean rating for agreement

with the statement, “I plan to use these skills in the future,” was 7. The mean rating for agreement with the statement, “I am satisfied with the amount of improvement in my study skills,” was 5.7. Participants also rated the usefulness of skills taught in our study (1 = not useful, 7 = very useful). Ratings for the usefulness of skills related to preparing the study environment, note taking, and self-testing were an average of 6.8, 6.9, and 7, respectively.

Table 9
Participant Social Validity Ratings

	Sandy	David	Mickey
Questionnaire Items		Rating	
“I think it is acceptable to use these procedures (e.g., vocal instructions, checklist, example pictures, practicing skills, and vocal feedback) to teach study skills.”	7	7	7
“I plan to use these skills in future classes.”	7	7	7
“I am satisfied with the amount of improvement in my study skills.”	5	7	5
		Mean Rating	
Preparing Study Environment	6.7	7	6.7
Note Taking	6.8	7	7
Self-Testing	7	7	7

Note. 1 = Strongly Disagree/Not Useful, 7 = Strongly Agree/Very Useful

CHAPTER 4: DISCUSSION

Although previous research has indicated that combinations of instructions, modeling, and performance feedback were associated with reported improvements in studying (Gettinger & Seibert, 2002; Kartika, 2007; Renzulli, 2015), this was the first evaluation of checklist training that included these components and direct measures of study skills. Our results suggest that checklist training may be an effective, acceptable, and practical method of teaching study skills to college students. All participants exhibited immediate improvements in targeted study skills during training. Three of four participants mastered all skills within two training sessions per skill set. One participant required three sessions to master one skill set (environment set up). Moreover, participants found the goals and procedures acceptable and the outcomes satisfactory. However, additional research is needed on the reliability, generality, and social validity of procedures and outcomes.

Previous research on checklist training has shown improvements in airplane safety and navigation (Rantz et al., 2009), restaurant cleaning tasks (Austin et al., 2005), blood glucose testing (Wong et al., 2000), and home accident prevention (O'Reilly et al., 1990). These studies have shown that checklist training is effective at increasing the number of steps completed on task analyses for targeted skills. For example, Rantz et al., (2009) reported participants completed 56% of aviation checklist items in baseline that increased to 98% by the end of training. Our findings add to the existing research by demonstrating the effectiveness of checklist training on improving the study skills of college students. During training, targeted study skills improved from an average of 18% (range, 0% to 71%) in baseline to 91% (range, 42% to 100%) during training across all four participants. However, one participant's

performance (David) did not maintain after meeting the mastery criterion for note taking and self-testing. The variability in note taking and self-testing for David could be due to the lack of instructions and feedback on using the checklist. David did not observe the checklist (6% of opportunity) as much as Alyssa (14%) and Mickey (14%). David also observed the checklist at lower levels during probe sessions until he was explicitly taught to self-monitor using the checklist (1% vs. 5%). Although David looked at the checklist at levels similar to Sandy (6%), our measures of observing do not capture collateral responses. For example, although David oriented toward the checklist, he may not have read the text on the checklist. Including instructions and feedback on self-monitoring may have increased the likelihood that the text and images on the checklist function as discriminative stimuli for collateral behavior, resulting in quicker mastery of target skills. When we included instructions and feedback on using the checklist at the start of training for one of four participants (Mickey), we observed immediate mastery and maintenance of environment set up and note taking. Some researchers have shown improvements in target skills without explicitly teaching participants to use the checklist (Austin et al., 2005; Rantz et al., 2009), whereas others have included vocal instructions (Wong et al., 2000) or instructions and feedback (O'Reilly et al., 1990) on using checklists as a component of training. Future researchers could evaluate the effects of explicitly teaching individuals to self-monitor using checklists and the effects of collateral responses on the acquisition and maintenance of targeted skills by requiring participants to read checklist items aloud during training.

Because the checklist training package in the current study included vocal instructions, a written checklist with picture models, and vocal feedback, it is unclear if improvements in study skills were due to one or more of these components. Our results showed variability in the

immediacy of mastery across skill sets and participants. Alyssa mastered environment set up and note taking before receiving feedback during the first training session. Although Alyssa's self-testing increased to high levels during her first session of training, she discontinued participation in the study before mastering self-testing. As a result, we were unable to assess changes in self-testing for Alyssa after receiving feedback. These findings suggest that vocal instructions, a written checklist, or picture models may be sufficient to produce immediate mastery of skills for some students. However, it is unknown whether performance would have maintained without feedback. Additional research is needed to assess the additive effects of feedback on the maintenance of targeted skills (see Ward-Horner & Sturmey, 2010, for a discussion of additive effects). In contrast, Sandy did not meet the mastery criterion for environment set up and note taking until the second training session after she received feedback. This suggests that performance feedback may produce additive effects that could be necessary for some students to master targeted skills. Previous research found that the addition of feedback increased the effectiveness of training when researchers taught teachers to implement written behavior plans (DiGennaro-Reed et al., 2010) or new volunteers to handle dogs during walks at an animal shelter (Howard & DiGennaro-Reed, 2015). However, researchers have not evaluated the effects of feedback as a component of training packages for study skills. Researchers should consider component analyses of checklist training to assess the additive effects of feedback to produce mastery-level performance with college students learning study skills.

These results have implications for how faculty and staff at academic support centers could teach study skills to college students. Our data on time expenditure suggest that the training package could be practical to implement (M = 1 hr 18 min; range 27 min to 2 hr 30 min). Checklist training for study skills could take one or two class periods for the typical college

course or a one-to-two-hour session with a tutor. University staff could incorporate these procedures in first-year courses to help address deficits in study skills. For example, faculty members could provide all students with a written checklist and opportunities to practice the skills with feedback during class. Staff or peer tutors at academic support centers could also implement the training package with students who seek assistance with studying. Although participants indicated that the training procedures were acceptable and the targeted skills were useful, we did not assess the social validity of procedures with other relevant consumers. Schwartz and Baer (1991) emphasized the importance of also assessing social validity of behavioral programs with indirect consumers (e.g., faculty who teach first-year courses, staff who work at academic support centers) and members of the extended community (e.g., university administrators who oversee academic affairs). Researchers could assess the adoptability of using written checklists to teach study skills by administering questionnaires to faculty, staff, and university administrators. To obtain more objective measures, researchers could teach faculty and staff to implement checklist training procedures, provide opportunities to teach study skills to students using teaching methods of their choice, and collect data on the implementation of targeted training steps.

Before faculty or staff adopt these procedures, additional research is needed on the external validity of outcomes. No studies have directly measured the maintenance of trained skills under naturalistic contexts. Responses to our social validity questionnaire suggested that participants might engage in targeted skills during typical study sessions. However, when we observed one participant (Mickey) studying at home two weeks after training, two of the three previously mastered skill sets decreased to 67% (note taking) and 8% (self-testing). There are two notable points illustrated by these data. First, these data highlight that self-report may not be

a reliable measure of the reported behavior. Mickey did not implement some targeted study skills at home despite self-reported plans to do so. Second, these outcomes emphasize the importance of conducting ecologically valid assessments. Although Mickey mastered all skill sets during sessions, he completed low levels of note taking and self-testing while studying at home. Future research should assess the variables that influence outcomes across experimental and naturalistic settings. For Mickey, aspects of the experimental arrangement might have functioned as establishing operations for engaging in the targeted skills. For example, Mickey's engagement in targeted skills could have been maintained by escape from the session. During sessions, the experimenter provided corrective feedback and conducted repeated training sessions if participants did not meet the mastery criterion. At home, the experimenter was not present and did not provide corrective feedback for errors. Moreover, Mickey's home session was conducted during the week of final exams. The difference in responding across skill sets may have been due to the immediacy of escape from studying and competing contingencies associated with completing final assignments or studying for exams. Based on time-expenditure data, Mickey spent less time setting up his study environment (4 min) than taking notes (23 min) and self-testing (59 min) during experimental sessions. While studying at home, he spent 10 min completing steps from all three skill sets. Mickey's performance decreased for note taking and self-testing while studying at home, producing more immediate escape from the study session. Although follow-up data from one participant suggests that the generality of study skills to the natural environment is limited, we were unable to obtain these data for three of four participants. Additional data are needed to assess the reliability of our findings in naturalistic settings.

Additional research is also needed on the impact of teaching these study skills on GPAs and retention rates. Previous research has indicated that academic achievement is positively

associated with taking notes and self-testing on study material (Beattie et al., 2019; Crede & Kuncel, 2008; Hartwig & Dunlosky, 2012; Kern et al., 1998; Purdie & Hattie, 1999). Similarly, our data indicate that note taking and self-testing may improve quiz performance. We administered reading quizzes during probes of all skills in baseline and after meeting the mastery criterion for environment set up, note taking, and self-testing. Baseline quiz scores ranged from 40% to 60% and improved to 80% or above after training on only note taking for three of four participants. Quiz scores maintained at 80% or above after training on self-testing. One participant's (Sandy) quiz performance improved after she was taught to set up her study environment. However, the changes in Sandy's quiz scores may be attributed to potential overlap in the quiz materials used in this study and the content covered in a research methods course that she took while participating. Because study skills are correlated with GPAs and retention rates (Kern et al., 1998; Williams et al., 2018), the outcomes produced by study skills training could have implications for improving academic performance and retention. However, little is known about whether these procedures produce meaningful changes in the academic performance of a broader student population. Participants in the current study had GPAs that ranged from 2.1 to 3.2. Although we observed improvements in quiz performance, our participants might not represent a more important target population. One qualitative study indicated that students with GPAs below 2.0 reportedly do not know how to study or take notes on course material (Balduf, 2009). To assess the social significance of these outcomes with students whose GPAs fall below 2.0, researchers should consider recruiting students who have been mandated to complete coursework due to their academic standing and assessing the impact of study skills training on reading quizzes, GPA, and retention across semesters.

Although research suggests that study skills may improve academic performance, behavior analytic research in higher education has focused on strategies implemented in the classroom. This study was the first to evaluate a checklist training package to teach study skills to college students. We found that checklist training may be an effective, acceptable, and practical method for improving study skills. Additionally, the effectiveness of checklist training may be enhanced by explicitly teaching students to self-monitor. These findings add to the reliability of previous research on checklist training to teach targeted skills. However, future research should evaluate individual and combined components of the training package. Further research is also needed to assess the external validity and social significance of outcomes produced by checklist training.

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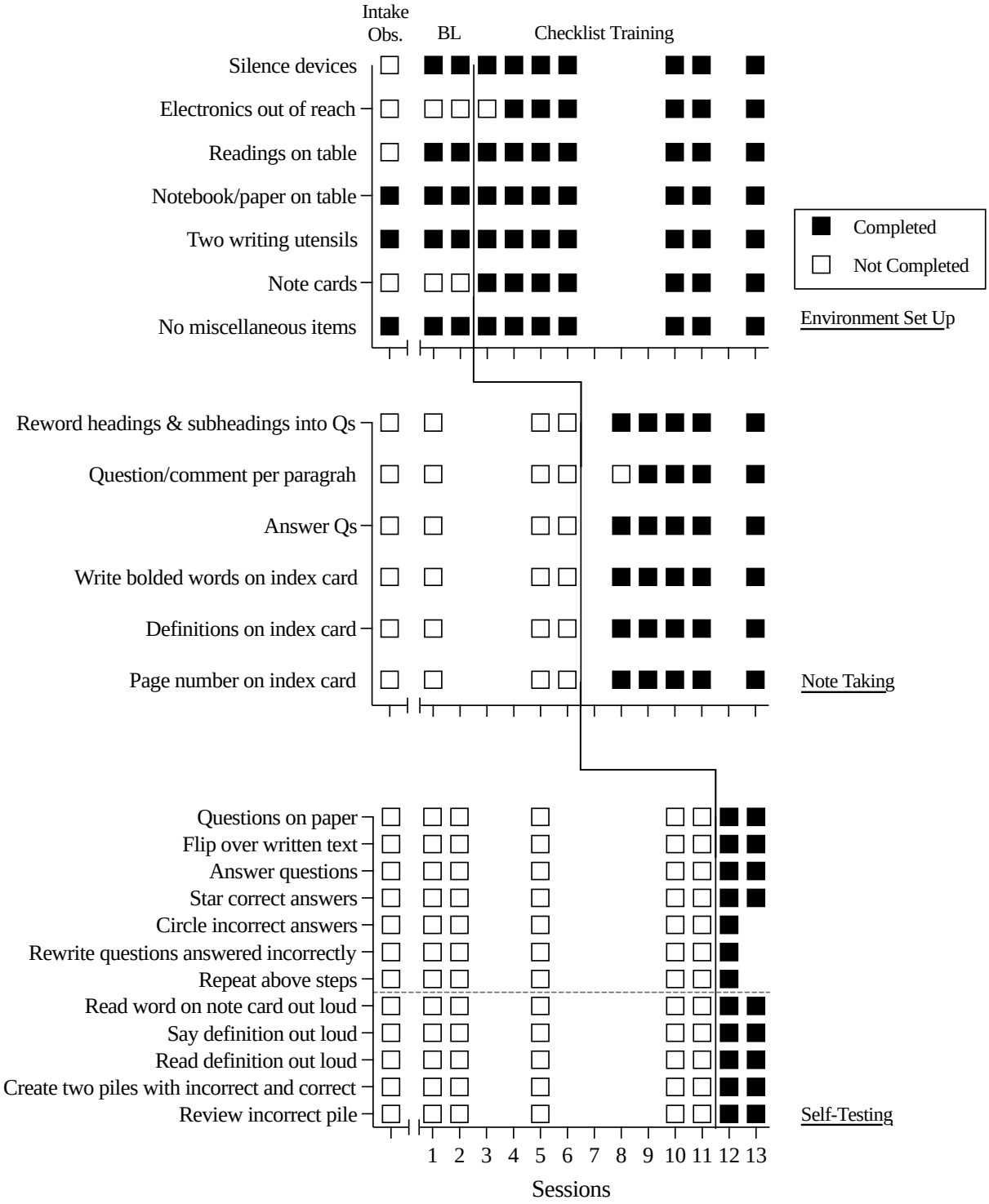
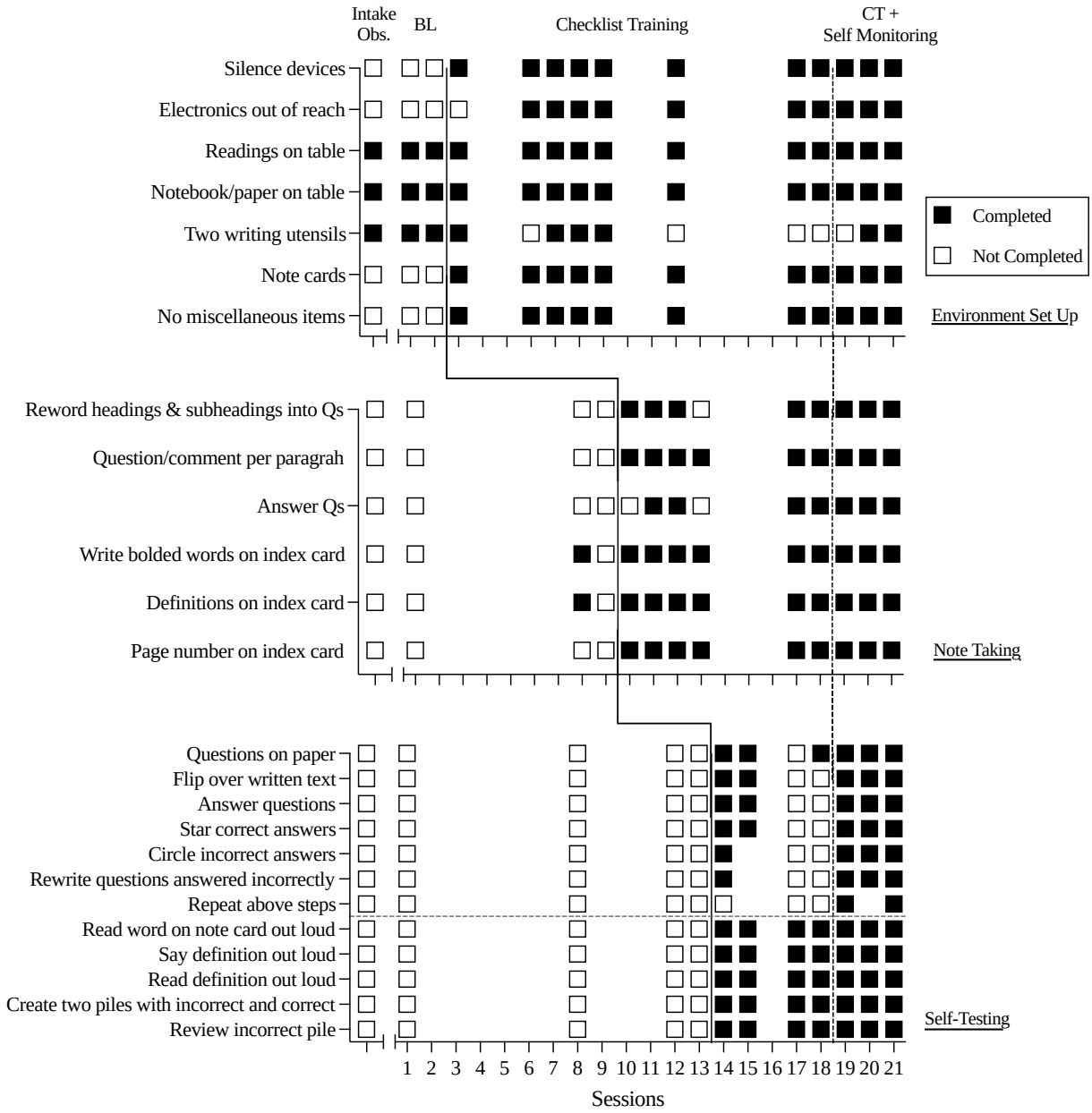
APPENDIX A: INDIVIDUAL TASK ANALYSIS ITEMS COMPLETED BY ALYSSA

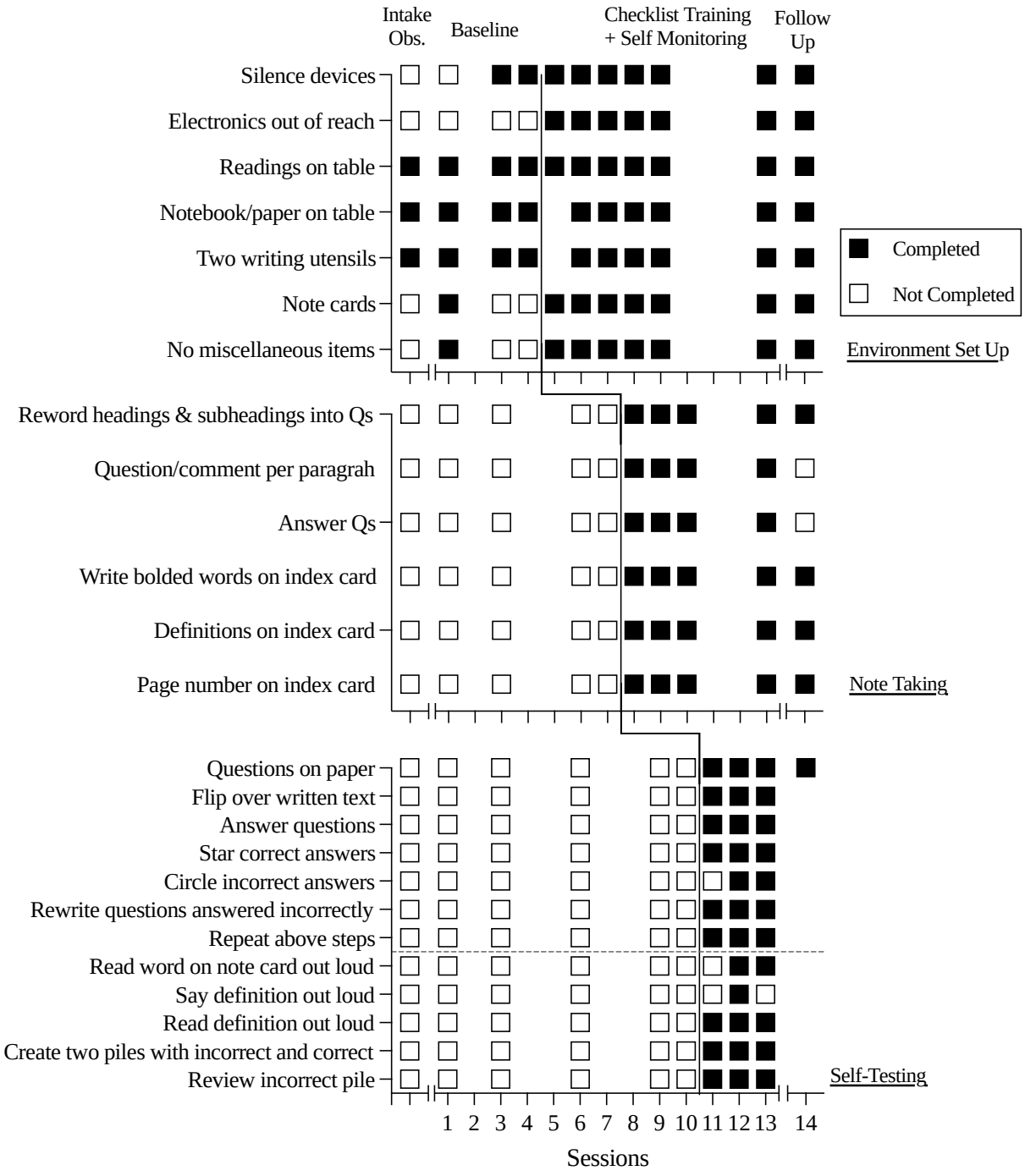
APPENDIX B: INDIVIDUAL TASK ANALYSIS ITEMS COMPLETED BY SANDY



APPENDIX C: INDIVIDUAL TASK ANALYSIS ITEMS COMPLETED BY DAVID



APPENDIX D: INDIVIDUAL TASK ANALYSIS ITEMS COMPLETED BY MICKEY



APPENDIX E: DATA SHEET

Checklist:

Preparing Study Environment:

□ Electronic devices are turned off or silenced (e.g., phone, iPads, radio, TV, smart watch, computer).
□ Place all electronic devices out of reach from study area.
□ Place readings on the table.
□ Place notebook or loose-leaf paper on the table.
□ Place two writing utensils (e.g., pen, pencil) on the table.
□ Place notecards on the table.
□ No other items (e.g., planner, water bottle, etc.) on the table.

Note Taking:

A. Notes On Readings

□ Reword headings and subheadings into question format in the margins of text (It is recommended that you do this before reading).
□ While reading, write at least one question or comment per paragraph next to the paragraph.
□ Read the paragraph or section and answer the questions generated from the headings and subheadings by summarizing the main points in the margins of the text.

B. Definitions

□ Write the bolded word on one side of an index card.
□ On the other side of the index card, define the word using the text provided in the reading.
□ Write the page number in the bottom corner of the notecard on the same side as the definition.

Self-Testing:

A. Review Notes

□ (1) Write the question for each heading on a separate sheet of paper.
□ (2) Flip over reading and notes, concealing all written text.
□ (3) Write down the answer to the questions without flipping over the notes.
□ (4) Using reading, notes, and summary statements, mark the questions with a star for each correct answer.
□ (5) Using reading, notes, and summary statements, circle each question answered incorrectly.
□ (6) Rewrite questions answered incorrectly on a separate sheet of paper.
□ (7) Repeat steps 2 through 6 once.

B. Review Notecards

□ (1) Look at the word on the front of the notecard and read the word out loud.
□ (2) Without looking at the definition, say the definition out loud.
□ (3) Turn the card over and read the definition out loud.
□ (4) Create a pile of cards with words that you defined correctly, and a separate pile of cards with words that you defined incorrectly.
□ (5) Review the pile with the incorrectly defined words using steps 1 through 4 once.

APPENDIX F: INTERVIEW FORM

Intake Interview Date of Interview: _____

Student: _____ Interviewer: _____

RELEVANT BACKGROUND INFORMATION

1. **Date of birth ____-_____-_____**
2. **Current Age yrs ____ mos_____**
3. **Male/Female**
4. **Year in School _____**
5. **Major _____**
6. **GPA _____**
7. **Current Classes:**

8. **Have you been diagnosed with a disability (this will not prevent you from participating)?**
   _____

QUESTIONS RELEVENT TO STUDY BEHAVIOR

To develop objective definitions of observable study behaviors:

9. **What does your typical studying look like?**
   a. **In what type of environment do you typically study?**
   b. **Do you take notes? If so by what means (e.g., hand written, electronic)? What do these notes look like?**
   c. **How do you study your notes?**

To develop objective definitions of observable time management behaviors:

10. **What does your typical organization and time management look like?**
    a. **When (time of day/week) do you sit down to study?**
    b. **How often do you study?**
    c. **How much time do you spend studying?**
    d. **How do you keep your courses organized?**

To determine behavior(s) which will be targeted in the study:

11. **What are your top three concerns regarding studying?**
12. **What skills would you like to learn? (e.g. note taking, test taking, homework completion, etc.)**
13. **Where would you like to see your grade or GPA overall?**

To assist in developing a hunch as to why these behaviors are occurring and to assist in determining the test condition(s) to be conducted:

14. **What are some factors you feel prevent you from conducting good study skills?**
15. **What do you feel is the largest factor preventing good study skills from occurring?**

To assist in understanding study and time-management history:

13. **Are there any other services you may be receiving for study assistance currently (e.g. peer tutors, etc.)?**
14. **Are there any other services you have received prior for study assistance (e.g. workshops, peer tutors, etc.)?**

APPENDIX G: EXAMPLE QUIZ

Reading Quiz

1. The four attributes that determine the preciseness of a scale of measurement are:
a. rating, ranking, ratio, equal intervals
b. equal intervals, categories, ranking, uniqueness
c. true zero, identity, order, equal intervals
d. sequencing, rating, true zero, identity

2. The time it takes to run a 5K race represents the _____ scale of measurement.
a. interval
b. ordinal
c. ratio
d. nominal

3. Temperature is a good example of a(n) _____ variable because it lacks a true zero.
a. interval
b. ordinal
c. ratio
d. nominal

4. _____ means that each number has a unique meaning
a. Identity
b. Order
c. Equal interval
d. True zero

5. Demographic data, such as gender, ethnicity, and marital status, each represent variables that can be measured on an ordinal scale
a. True
b. False

APPENDIX H: SOCIAL VALIDITY QUESTIONNAIRE

Name: _____ Date of completion: _____

1. **The procedures used by researchers to teach study skills included vocal instructions, checklist, example pictures, practicing skills, and vocal feedback. Please rate the extent to which you agree with the following statement.**

   "I think it is acceptable to use these procedures to teach study skills."

   1 2 3 4 5 6 7
   Strongly Disagree Strongly Agree

   Comments:

   "I plan to use these skills in future classes."

   1 2 3 4 5 6 7
   Strongly Disagree Strongly Agree

   Comments:

   "I am satisfied with the amount of improvement in my study skills."

   1 2 3 4 5 6 7
   Strongly Disagree Strongly Agree

   Comments:

2. Please rate the usefulness of the study skills included on the checklist:

1 2 3 4 5 6 7
Not Useful Very Useful

Preparing Study Environment:

____Electronic devices are turned off or silenced (e.g., phone, iPads, radio, TV, smart watch, computer).
____Place all electronic devices out of reach from study area.
____Place readings on the table.
____Place notebook or loose-leaf paper on the table.
____Place two writing utensils (e.g., pen, pencil) on the table.
____Place notecards on the table.
____No other items (e.g., planner, water bottle, etc.) on the table.

Note Taking:

C. Notes On Readings

____Reword headings and subheadings into question format in the margins of text (It is recommended that you do this before reading).
____While reading, write at least one question or comment per paragraph next to the paragraph.
____Read the paragraph or section and answer the questions generated from the headings and subheadings by summarizing the main points in the margins of the text.

D. Definitions

____Write the bolded word on one side of an index card.
____On the other side of the index card, define the word using the text provided in the reading.
____Write the page number in the bottom corner of the notecard on the same side as the definition.

Self-Testing:

C. Review Notes

____ (1) Write the question for each heading on a separate sheet of paper.
____ (2) Flip over reading and notes, concealing all written text.
____ (3) Write down the answer to the questions without flipping over the notes.
____ (4) Using reading, notes, and summary statements, mark the questions with a star for each correct answer.
____ (5) Using reading, notes, and summary statements, circle each question answered incorrectly.
____ (6) Rewrite questions answered incorrectly on a separate sheet of paper.
____ (7) Repeat steps 2 through 6 once.

D. Review Notecards

____ (1) Look at the word on the front of the notecard and read the word out loud.
____ (2) Without looking at the definition, say the definition out loud.
____ (3) Turn the card over and read the definition out loud.
____ (4) Create a pile of cards with words that you defined correctly, and a separate pile of cards with words that you defined incorrectly.
____ (5) Review the pile with the incorrectly defined words using steps 1 through 4 once.

Comments:

3. Please provide any additional comments for our team.

APPENDIX I: PROCEDURAL INTEGRITY DATA SHEETS

Study Skills of College Students
Session Protocol Checklist

- **Observation** (Conduct during initial meeting)
  - ☐ Prior to session, inform participant to bring study materials from a class they are currently taking
  - ☐ Prepare a backpack containing all materials required for sessions (i.e., lined paper, writing utensils, notebook, index cards, etc.)
  - ☐ Tell participant to study their own materials: "*I want you to do what you would normally do when you study. Once you get through about 5 pages, let me know.*"
  - ☐ Inform the participant "*If you forgot anything, you may use the materials provided in the backpack.*"
    - ☐ Have notebook or paper, pens, and index cards available to participant
  - ☐ Once participant identifies completion of task, experimenter takes data using checklist or makes note of participant's relevant studying behaviors.

- **Baseline Sessions**
  - ☐ Environmental Set-up
    - ☐ Based on participant pre-assessment, arrange the room with distractors
    - ☐ Place materials (lined paper, writing utensils, notebook, index cards etc.) in a backpack near the study area
  - ☐ Participant enters room
    - ☐ Hand participant reading packet
    - ☐ Instruct participant: "*Imagine this is the room you typically study in and this is a reading from a class you are taking. Do what you would normally do to study.*
    - ☐ *Let me know once you are finished with the reading packet. I will have you take a quiz once you finish studying it.*"
    - ☐ *Inform the participant that materials will be provided for sessions*
    - ☐ When participant identifies completion, remove all textual stimuli
    - ☐ Provide participant with quiz
    - ☐ Upon participant identification of completion, remove the quiz
    - ☐ Provide no feedback or comments regarding performance

- **Untrained Environment Probe Session**
  - ☐ Based on participant pre-assessment, arrange the room with distractors
  - ☐ Place materials (lined paper, writing utensils, notebook, index cards, etc.) in a backpack near the study area
  - ☐ Instruct the participant "*This time, I am only asking you to set up your study space. I will not be asking you to read or study the reading, and I will not be*

giving you a quiz. Do what you would normally do to set up your study space. Let me know when you are finished."
- Provide no feedback or comments regarding performance.
- Repeat if upward trend from Baseline

- **Checklist Training: Environment**
  - Instruction & Model
    - Give participant the corresponding section of the checklist and read each item with them
    - Discuss section of checklist and clarify questions participant may have
    - Perform each step or refer to picture models when reading through the checklist
  - Rehearsal & Feedback
    - Provide participant with the reading packet
    - Instruct participant: "*Now I want you to show me how you would complete these steps.*"
    - Have notebook or paper, pens, and index cards available to participant in backpack
    - Record data on checklist items as participant performs each step
    - Provide praise for each step that participant performed correctly and corrective feedback for each step that participant performed incorrectly, referring to the checklist
    - Repeat for each section until 100% on all checklist items for 1 trial

- **Run Full Probe Session**
  - Reset the environment to include distractors (ask participant if you can move their stuff around to get repeated practice using the skills)
  - Provide the typical instructions for environment training: "*I want you to show me how you would complete the steps I just taught you. After you are done setting up your study area, let me know."*
  - Provide feedback on the environment setup.
  - After providing feedback, instruct the participant: *I want you to do what you would normally do to read and study this reading. Let me know once you are finished with the reading packet. I will have you take a quiz once you finish studying it.*"
  - When participant identifies that they have completed studying, remove all textual stimuli and provide participant with the quiz.
  - Upon participant identification of completion, remove the quiz
  - Provide no feedback or comments regarding performance

- **Untrained Note Taking + Trained Environment Probe Session**
  - Reset the environment to include distractors
  - Place materials (lined paper, writing utensils, notebook, index cards, etc.) in a backpack near the study area
  - Provide participant with reading packet

- Instruct the participant: "*I want you to show me how you would complete the steps I just taught you. After you are done setting up your study area, let me know."*
- When participant completes environment tasks, provide feedback, then provide instructions: *"I want you to do what you would normally do to read this reading; you will not need to study it and I will not be giving you a quiz this time.*"
- Provide no feedback or comments regarding performance on note taking tasks.
- Repeat if upward trend from Baseline

- **Checklist Training: Note Taking**
  - Instruction & Model
    - Give participant the corresponding section of the checklist and read each item with them
    - Discuss section of checklist and clarify questions participant may have
    - Performs each step or refer to picture models when reading through the checklist
  - Rehearsal & Feedback
    - Provide participant with the reading packet
    - Instruct participant: "*Now I want you to show me how you would complete these steps.*"
    - Have notebook or paper, pens, and index cards available to participant in backpack
    - Record data on checklist items as participant performs each step (data may also be collected retrospectively using permanent products in this phase)
    - Provide praise for each step that participant performed correctly and corrective feedback for each step that participant performed incorrectly, referring to the checklist
    - Repeat for each section until 100% on all checklist items for 1 trial

- **Run Full Probe Session**
  - Reset the environment to include distractors
  - Provide participant with reading packet
  - Provide the typical instructions for training: "*I want you to show me how you would complete the steps I just taught you. After you are done setting up your study area and taking notes, let me know."*
  - Provide feedback on the environment setup and note taking.
  - After providing feedback, instruct the participant: *I want you to do what you would normally do to study this reading. Let me know once you are finished with the reading packet. I will have you take a quiz once you finish studying it.*"
  - When participant identifies that they have completed studying, remove all textual stimuli and provide participant with the quiz.
  - Upon participant identification of completion, remove the quiz
  - Provide no feedback or comments regarding performance

- **Untrained Self-Testing + Trained Note Taking Probe Session**
  - Set up the environment for the participant with correct materials

- Place materials (lined paper, writing utensils, notebook, index cards, etc.) in a backpack near the study area
- Provide participant with reading packet
- Instruct the participant: "*I want you to show me how you would complete the steps I just taught you. After you are done taking notes, let me know."*
- Provide feedback on the participant's note taking, then provide the instructions: *"I want you to do what you would normally do to study it; I will not be giving you a quiz this time.*"
- Provide no feedback or comments regarding performance on written practice tasks.
- Repeat if upward trend from Baseline

- **Checklist Training: Self-Testing**
  - Instruction & Model
    - Give participant the corresponding section of the checklist and read each item with them
    - Discuss section of checklist and clarify questions participant may have
    - Performs each step or refer to picture models when reading through the checklist
  - Rehearsal & Feedback
    - Provide participant with the reading packet
    - Instruct participant: "*Now I want you to show me how you would complete these steps.*"
    - Have notebook or paper, pens, and index cards available to participant in backpack
    - Record data on checklist items as participant performs each step (data may also be collected retrospectively using permanent products in this phase)
    - Provide praise for each step that participant performed correctly and corrective feedback for each step that participant performed incorrectly, referring to the checklist
    - Repeat for each section until 100% on all checklist items for 1 trial
- **Run Full Probe Session**
  - Reset the environment to include distractors
  - Provide the typical instructions for training: "*I want you to show me how you would complete the steps I have taught you to study. Let me know once you are finished with the reading packet. I will have you take a quiz once you finish studying it.*"
  - When participant identifies that they have completed studying, remove all textual stimuli and provide participant with the quiz.
  - Upon participant identification of completion, remove the quiz
  - Provide feedback on performance on the three areas.

Study Skills of College Students
Session Protocol Checklist (CT + Self-Monitoring)

- **Observation** (Conduct during initial meeting)
  - ☐ Prior to session, inform participant to bring study materials from a class they are currently taking
  - ☐ Prepare a backpack containing all materials required for sessions (i.e., lined paper, writing utensils, notebook, index cards, etc.)
  - ☐ Tell participant to study their own materials: "*I want you to do what you would normally do when you study. Once you get through about 5 pages, let me know.*"
  - ☐ Inform the participant "*If you forgot anything, you may use the materials provided in the backpack.*"
    - ☐ Have notebook or paper, pens, and index cards available to participant
  - ☐ Once participant identifies completion of task, experimenter takes data using checklist or makes note of participant's relevant studying behaviors.

- **Baseline Sessions**
  - ☐ Environmental Set-up
    - ☐ Based on participant pre-assessment, arrange the room with distractors and remove study materials
    - ☐ Place materials (lined paper, writing utensils, notebook, index cards etc.) in a backpack near the study area
  - ☐ Participant enters room
    - ☐ Hand participant reading packet
    - ☐ Instruct participant: "*Imagine this is the room you typically study in and this is a reading from a class you are taking. Do what you would normally do to study.*
    - ☐ *Let me know once you are finished with the reading packet. I will have you take a quiz once you finish studying it.*"
    - ☐ *Inform the participant that materials will be provided for sessions*
    - ☐ When participant identifies completion, remove all textual stimuli
    - ☐ Provide participant with quiz
    - ☐ Upon participant identification of completion, remove the quiz
    - ☐ Provide no feedback or comments regarding performance

- **Untrained Environment Probe Session**
  - ☐ Based on participant pre-assessment, arrange the room with distractors and remove study materials
  - ☐ Place materials (lined paper, writing utensils, notebook, index cards, etc.) in a backpack near the study area
  - ☐ Instruct the participant "*This time, I am only asking you to set up your study space. I will not be asking you to read or study the reading, and I will not be giving you a quiz. Do what you would normally do to set up your study space. Let me know when you are finished.*"
  - ☐ Provide no feedback or comments regarding performance.
  - ☐ Repeat if upward trend from Baseline

- **Checklist Training: Environment**
  - ☐ Based on participant pre-assessment, arrange the room with distractors and remove study materials.

- Instruction & Model
  - Give participant the corresponding section of the checklist and read each item with them
  - Discuss section of checklist and clarify questions participant may have
  - Perform each step or refer to picture models when reading through the checklist
- Rehearsal & Feedback
  - Provide participant with the reading packet and ***environment*** checklist
  - Have notebook or paper, pens, and index cards available to participant in backpack
  - Instruct participant: "*Now I want you to show me how you would complete these steps. Use the checklist to check off items as you go. Let me know once you are finished.*"
  - If participant does not appear to be checking off items on the checklist, provide a prompt to do so (e.g., "Please make sure you are following the checklist," Did you check that off the list?")
  - Record data on checklist items as participant performs each step
  - Provide praise for each step that participant performed correctly and corrective feedback for each step that participant performed incorrectly, referring to the checklist
  - Provide feedback on self-monitoring data by comparing to data collected by the experimenter ***only for the environment section***.
  - Repeat for each section until 100% on all checklist items for 1 trial

- **Run Full Probe Session**
  - Reset the environment to include distractors and remove study materials (ask participant if you can move their stuff around to get repeated practice using the skills)
  - Provide participant with the reading packet and ***environment*** checklist
  - Provide the typical instructions for environment training: "*I want you to show me how you would complete the steps I just taught you. Use the checklist to check off items as you go. After you are done setting up your study area, let me know."*
  - If participant does not appear to be checking off items on the checklist, provide a prompt to do so (e.g., "Please make sure you are following the checklist," Did you check that off the list?")
  - Provide feedback on the environment setup.
  - Provide feedback on self-monitoring data by comparing to data collected by the experimenter ***only for the environment section***.
  - After providing feedback, instruct the participant: *I want you to do what you would normally do to read and study this reading. Let me know once you are finished with the reading packet. I will have you take a quiz once you finish studying it.*"
  - When participant identifies that they have completed studying, remove all textual stimuli and provide participant with the quiz.
  - Upon participant identification of completion, remove the quiz
  - Provide no feedback or comments regarding performance

- **Untrained Note Taking + Trained Environment Probe Session**
  - Reset the environment to include distractors
  - Place materials (lined paper, writing utensils, notebook, index cards, etc.) in a backpack near the study area
  - Provide participant with reading packet and ***environment*** checklist

- Instruct the participant: "*I want you to show me how you would complete the steps I just taught you. Use the checklist to check off items as you go. After you are done setting up your study area, let me know."*
- If participant does not appear to be checking off items on the checklist, provide a prompt to do so (e.g., "Please make sure you are following the checklist," Did you check that off the list?")
- When participant completes environment tasks, provide feedback on skills.
- Provide feedback on self-monitoring data by comparing to data collected by the experimenter ***only for the environment section***.
- Provide instructions: *"I want you to do what you would normally do to read this reading; you will not need to study it and I will not be giving you a quiz this time.*"
- Provide no feedback or comments regarding performance on note taking tasks.
- Repeat if upward trend from Baseline

- **Checklist Training: Note Taking**
  - Instruction & Model
    - Give participant the corresponding section of the checklist and read each item with them
    - Discuss section of checklist and clarify questions participant may have
    - Performs each step or refer to picture models when reading through the checklist
  - Rehearsal & Feedback
    - Set up the environment for participant to include necessary materials and remove distractors.
    - Provide participant with the reading packet and ***note taking*** checklist
    - Have notebook or paper, pens, and index cards available to participant in backpack
    - Instruct participant: "*Now I want you to show me how you would complete these steps. Use the checklist to check off items as you go. Let me know when you are done.*"
    - If participant does not appear to be checking off items on the checklist, provide a prompt to do so (e.g., "Please make sure you are following the checklist," Did you check that off the list?")
    - Record data on checklist items as participant performs each step (data may also be collected retrospectively using permanent products in this phase)
    - Provide praise for each step that participant performed correctly and corrective feedback for each step that participant performed incorrectly, referring to the checklist
    - Provide feedback on self-monitoring data by comparing to data collected by the experimenter ***only for the note taking section***.
    - Repeat for each section until 100% on all checklist items for 1 session.

- **Run Full Probe Session**
  - Reset the environment to include distractors and remove necessary study materials
  - Provide participant with reading packet and ***note taking*** checklist
  - Have notebook or paper, pens, and index cards available to participant in backpack
  - Provide the typical instructions for training: "*I want you to show me how you would complete the steps I just taught you. Use the checklist to check off items as you go. After you are done setting up your study area and taking notes, let me know."*

- If participant does not appear to be checking off items on the checklist, provide a prompt to do so (e.g., "Please make sure you are following the checklist," Did you check that off the list?")
- Provide feedback on the environment setup and note taking.
- Provide feedback on self-monitoring data by comparing to data collected by the experimenter ***only for the environment and note taking section***.
- After providing feedback, instruct the participant: *I want you to do what you would normally do to study this reading. Let me know once you are finished with the reading packet. I will have you take a quiz once you finish studying it.*"
- When participant identifies that they have completed studying, remove all textual stimuli and provide participant with the quiz.
- Upon participant identification of completion, remove the quiz
- Provide no feedback or comments regarding performance

- **Untrained Self-Testing + Trained Note Taking Probe Session**
  - Set up the environment for the participant with correct materials and remove distractors.
  - Place materials (lined paper, writing utensils, notebook, index cards, etc.) in a backpack near the study area
  - Provide participant with reading packet and ***note taking*** checklist.
  - Instruct the participant: "*I want you to show me how you would complete the steps I just taught you. Use the checklist to check off items as you go. After you are done taking notes, let me know."*
  - If participant does not appear to be checking off items on the checklist, provide a prompt to do so (e.g., "Please make sure you are following the checklist," Did you check that off the list?")
  - Provide feedback on the participant's note taking
  - Provide feedback on self-monitoring data by comparing to data collected by the experimenter ***only for the note taking section***.
  - Provide the instructions: *"I want you to do what you would normally do to study it; I will not be giving you a quiz this time*."
  - Provide no feedback or comments regarding performance on written practice tasks.
  - Repeat if upward trend from Baseline

- **Checklist Training: Self-Testing**
  - Instruction & Model
    - Give participant the corresponding section of the checklist and read each item with them
    - Discuss section of checklist and clarify questions participant may have
    - Performs each step or refer to picture models when reading through the checklist
  - Rehearsal & Feedback
    - Set up the environment for the participant with correct materials and remove distractors.
    - Have notebook or paper, pens, and index cards available to participant in backpack
    - Provide participant with the reading packet and ***full*** checklist.
    - Instruct participant: "*Now I want you to show me how you would complete these steps. Use the checklist to check off items as you go. Let me know when you are done*."

- If participant does not appear to be checking off items on the checklist, provide a prompt to do so (e.g., “Please make sure you are following the checklist,” Did you check that off the list?”)
- Record data on checklist items as participant performs each step (data may also be collected retrospectively using permanent products in this phase)
- Provide praise for each step that participant performed correctly and corrective feedback for each step that participant performed incorrectly, referring to the checklist
- Provide feedback on self-monitoring data by comparing to data collected by the experimenter ***only for the self testing section***.
- Repeat for each section until 100% on all checklist items for 1 trial

- **Run Full Probe Session**
  - Reset the environment to include distractors and remove necessary study materials
  - Have notebook or paper, pens, and index cards available to participant in backpack
  - Provide participant with the reading packet and ***full*** checklist.
  - Provide instructions: “*I want you to show me how you would complete the steps I have taught you to study. Use the checklist to check off items as you go. Let me know once you are finished with the reading packet. I will have you take a quiz once you finish studying it.*”
  - If participant does not appear to be checking off items on the checklist, provide a prompt to do so (e.g., “Please make sure you are following the checklist,” Did you check that off the list?”)
  - When participant identifies that they have completed studying, remove all textual stimuli and provide participant with the quiz.
  - Upon participant identification of completion, remove the quiz
  - Provide feedback on performance on ***all three*** areas.
  - Provide feedback on self-monitoring data by comparing to data collected by the experimenter for ***all three areas***.