The Effects of a Rule Governed Algorithm on Line Technicians' Analysis of Instructional Problems and Clients' Learn Units to Criterion

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Abstract

We tested the effects of a rule governed algorithm on line technicians' analysis of instructional problems and clients' learn units to criterion. We used a delayed multiple baseline design across six participants who worked at a private center and provided 1:1 instruction for clients diagnosed with autism. The participants were selected because they showed interest in verbal behavior about the science and the scientific vocabulary used at the center. The independent variable was the Rule Governed Algorithm which included a Verbal Behavior about the Science Protocol package. The dependent variables were total and correct learn units delivered by the line technicians, pre- and post-probe data for the protocol, and learn units to criterion for the clients taught. The study included a pre-probe, two phases of questions, post-probes for each phase and a maintenance probe for dyad 1 due to a time lapse between interventions. Probes were also conducted with a control group of participants who were not receiving the additional training as outlined in the Protocol package above. Results for the intervention showed an increase in the participants' analysis of instructional tasks and scientific tacts as well as increases in correct responses, and decreases in learn units to criterion for the clients taught.

Literature Review

Ross, Singer-Dudek & Greer (2005)

- TPRA (Teacher Performance and Rate Accuracy)
- An evaluative measure, a diagnostic tool, and a method of direct teacher observation used across CABAS® programs

Greer & McDonough (1999)

Ingham & Greer (1992)

- TPRA used to evaluate teachers' instructional effectiveness and student learning
- The learn unit
  - Complex predictor of student outcomes
  - A measure of accuracy of teacher presentations and productivity

Literature Review

Nuzzolo-Gomez, R. (2002)

- Tested the effects of direct and observed supervisor learn units on teachers' scientific tacts and student learning (instructional effects of teachers)
- Results replicated the pilot study and included additional generalization data for observing teachers
- Results = Both those directly receiving & observing supervisor learn units resulted in increased correct scientific tacts which generalized into the classroom setting and students' percentage of correct responses increased as a function of teachers' increased scientific tacts

Literature Review

Singer-Dudek, Speckman & Nuzzolo (2010)

- Study reflected an evolution of the CABAS® model
- Increased teacher expertise
- Accurate and valid measurement and analyses of relevant data
- Effective assessment and teaching strategies
- Results = Improved student outcomes

Selinske, Greer & Lodhi (1991)

- Tested effects of a CABAS® model on total trials taught, correct student trials, and objectives achieved
- Results = Educationally significant increases in total trials taught, correct trials, and student objectives achieved

Literature Review

Greer, Keohane, & Healy (2002)

- 3 broad repertoires of teachers as strategic scientists:
  - The vocabulary of the science or *verbal behavior about the science*
  - Classroom and supervisory practice in-situ or *contingency-shaped repertoires of in-class practice*
  - *Verbally mediated repertoires* (rule-governed, verbally governed, and verbally governing)

Keohane & Greer (2005)

- Tested the effects of a verbally governed algorithm training package for teachers on students' learn units to criterion and correct teachers' decisions
- Results = Teachers' scientific verbally governed behavior increased, teachers' decision errors decreased, students achieved significantly more objectives

Participants

Participant A	**26-year-old female with a high school diploma and some college courses in psychology at a local community college (was working on pre-teacher rank)**
Participant B	**27-year-old female with a high school diploma (was working on Teacher I rank)**
Participant C	**22-year-old female enrolled in a Bachelor of Science program and a Registered Behavior Technician (RBT) (was working on pre-teacher rank)**
Participant D	**26-year-old female in her first semester of an ABA graduate program at a local state university (was working on Teacher I rank)**
Participant E	**22-year-old female; enrolled in a Bachelor of Science program (was working on pre-teacher rank)**
Participant F	**25-year-old female with a high school diploma (was working on pre-teacher rank)**

Mentors' ranks

Senior mentor:

- Dolleen-Day Keohane, PhD, Senior Behavior Analyst, AssocRS, BCBA-D, LBA

Junior mentor:

- Kelly King, B.S. Psych, M.Ed./ABA, CABAS® Teacher II, RBT
  - Completed 5 components of the CABAS ® Master Teacher Rank

Setting

- Private center for clients diagnosed with autism
  - Early C-PIRK classroom
- 1 Lead Curricula Tech (Supervised by BCBA)
  - 1:1 setting (1 technician : 1 client)
- Some small group sessions (1 technician : 3 clients)

Dependent variables

- Total and correct learn units delivered by the mentees, pre- and post-probe data for the protocol, and learn units to criterion for clients taught

Independent variable

- A rule-governed algorithm including learn units delivered by the mentor (Site Lead RBT) to the mentees (RLTs), consisting of a series of questions asked throughout the day with and without a TPRA observation

Procedure

- A delayed multiple baseline design across participants
- Data were collected through direct observation of mentees
- Learn units to criterion of clients taught recorded weekly
- Pre-probes, 2 phases of scientific questions, post-probes for each phase, and a maintenance phase for participants of Experiment 1
- Event frequency data: TPRAs with and without error, Level 1, Step 1 (1) decisions with and without error, number of questions asked on tactics and scientific tacts used in programming, and the use of scientific tacts by line technicians

CABAS® In Situ Verbal-Behavior-About-the-Science Protocol	
	+/-
1. What is the name of the program being run and where is it on one of the inventories?	
2. What is the target SD?	
3. What is/are the tactic(s) being used?	
4. Is there correspondence between what is said and what is done for number 2? Yes/No	
5. What is the schedule for praise and what is the schedule for mands or tokens? (e.g. FR1 Praise, FR5 mand opportunities for edibles or tokens)	
6. Is there correspondence for 5? Yes/No	
7. What is the long-term goal for this program?	
8. What are the short term goals for this program?	
9. (While observing the graph) What is the current trend in student responses for this program?	
10. Are the student responses stable or variable?	

1. Is a decision needed yet?	
2. What are your learn units to criterion for this student and what is your goal?	
3. Define a tact.	
4. Define a mand.	
5. What is an establishing operation?	
6. What is the establishing operation for this program?	
7. What level of verbal behavior is this student?	
8. What are the existing reinforcers for this student?	
9. Explain the purpose of the TPRA?	
10. Describe the program and the components of the program using accurate verbal behavior about the science	

DATE:	MENTEE:	MENTOR:	% CORRECT:

(Keohane, D. D., 2016, slides 27-28).

- Data sheet used for implementation of Phase I of the Rule Governed Algorithm
- Learn units were delivered by the mentor to the mentee throughout the day or during a session with a TPRA.
- Criterion was set at 90% x 2 or 100% x 1.

CABAS® In Situ Verbal-Behavior-About-the-Science Protocol	
Criterion: 90% x 2 or 100% x 2	**+/-**
1. What is reactivity?	
2. What tactic should be implemented when reactivity occurs?	
3. What are the components of a good behavioral definition?	
4. Measurement must be _____, _____, and _____.	
5. List 3 possible factors which contribute to measurement error.	
6. What is interobserver agreement?	
7. What is the verbal behavior about the science?	
8. Extinction results in what?	
9. Define dependent variable.	
10. Defined independent variable.	
11. What is parsimony?	
12. Once we induce missing capabilities, what happens?	
13. When a capability is present, a _____ can be built and expanded.	
14. The concept of behavioral cusps describes changes in person-environment interactions that enable _____ ___ _____.	
15. Define autoclitics and provide an example.	
16. What is the difference between palilalia and echolalia? Explain.	
17. For students who have echoic problems and who have some textual responding, it is possible to use _____ _____ to shift echolalia to appropriate intraverbal responding.	
18. What other tactics or protocols might be used to correct faulty echoic responding and to replace palilalia?	
19. Define response latency.	
20. The behavior of the learner is always _____.	

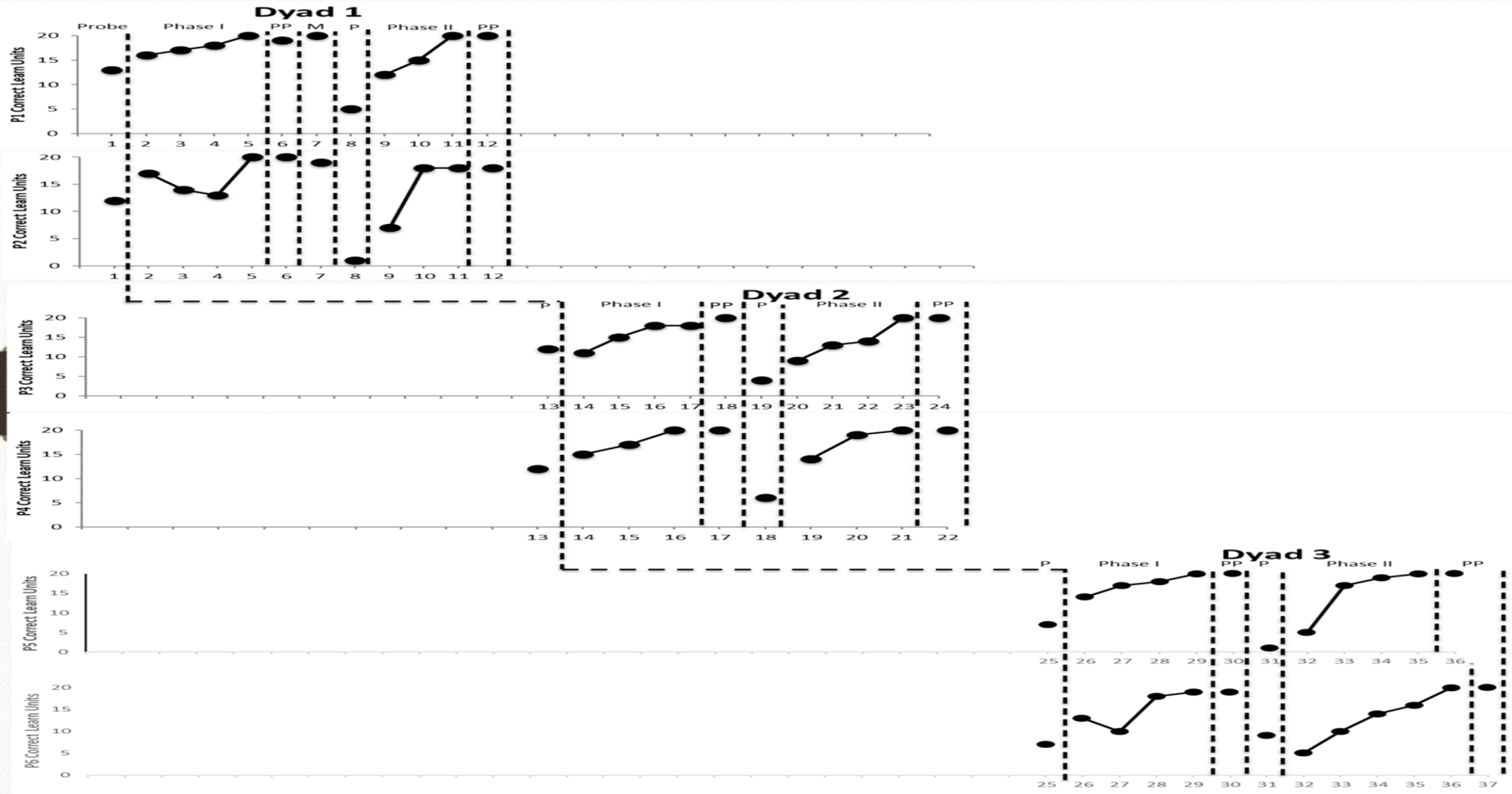
DATE:	MENTEE:	MENTOR:	% CORRECT:

- Data sheet used for implementation of Phase II of the Rule Governed Algorithm

- Learn units were delivered by the mentor to the mentee throughout the day or during a session with a TPRA.

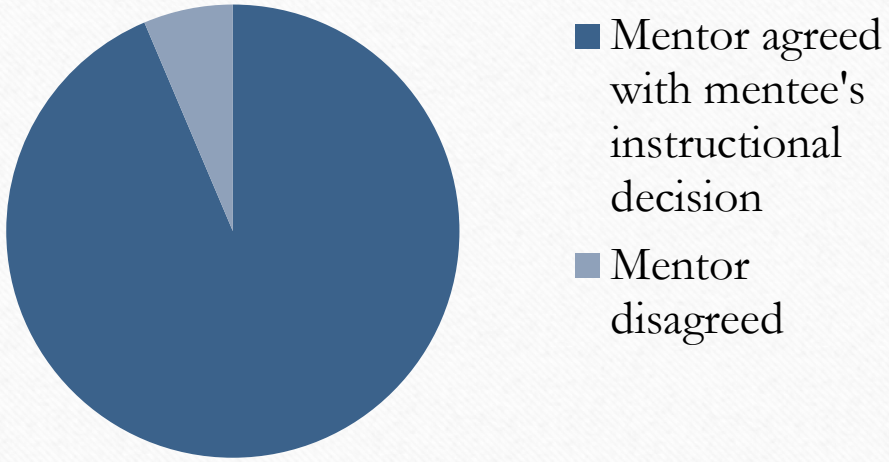
- Criterion was set at 90% x 2 or 100% x 1.

Results

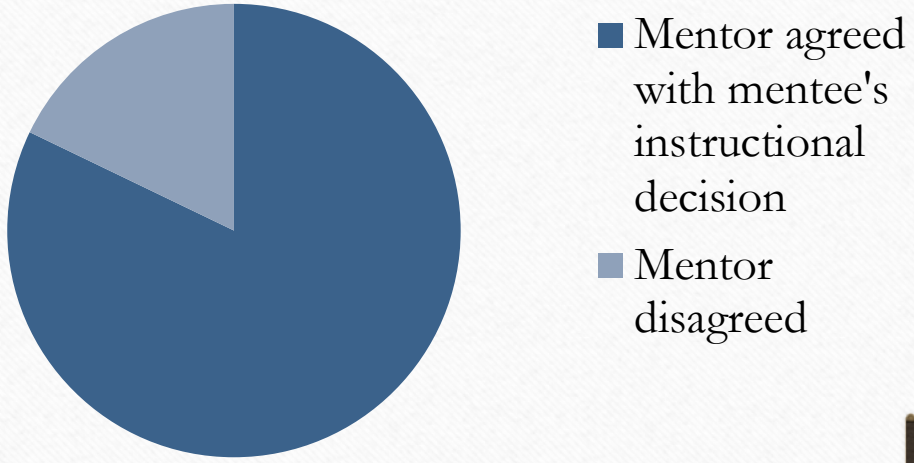

Dyad 1
Probe
Phase I
PP
M
P
Phase II
PP
P1 Correct Learn Units
P2 Correct Learn Units
Dyad 2
P
Phase I
PP
P
Phase II
PP
P3 Correct Learn Units
P4 Correct Learn Units
Dyad 3
P
Phase I
PP
P
Phase II
PP
P5 Correct Learn Units
P6 Correct Learn Units

Level , Step 1 (1) Decision Opportunity Agreement

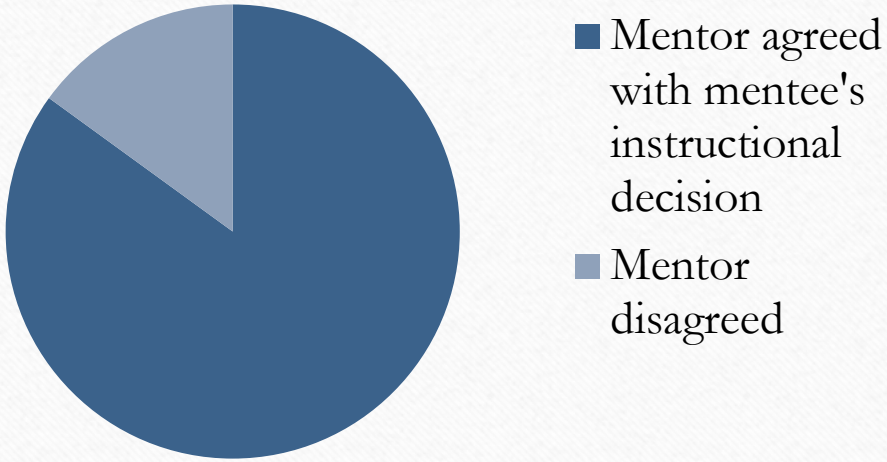
Participant A - 94% agreement



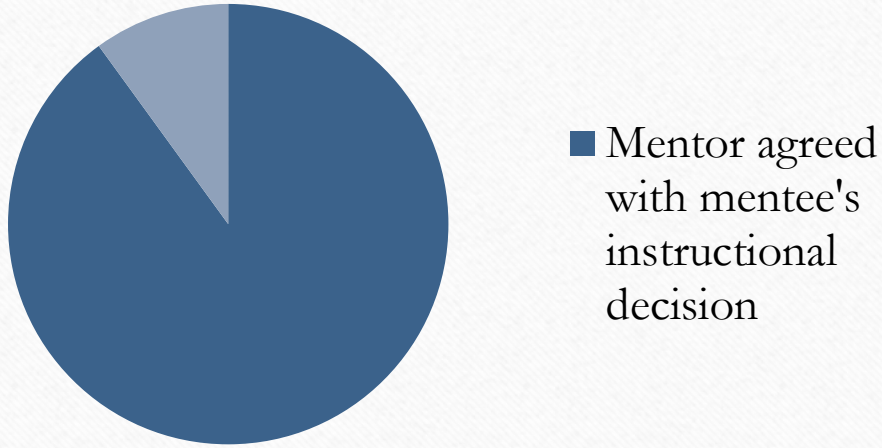
Participant B - 82% agreement



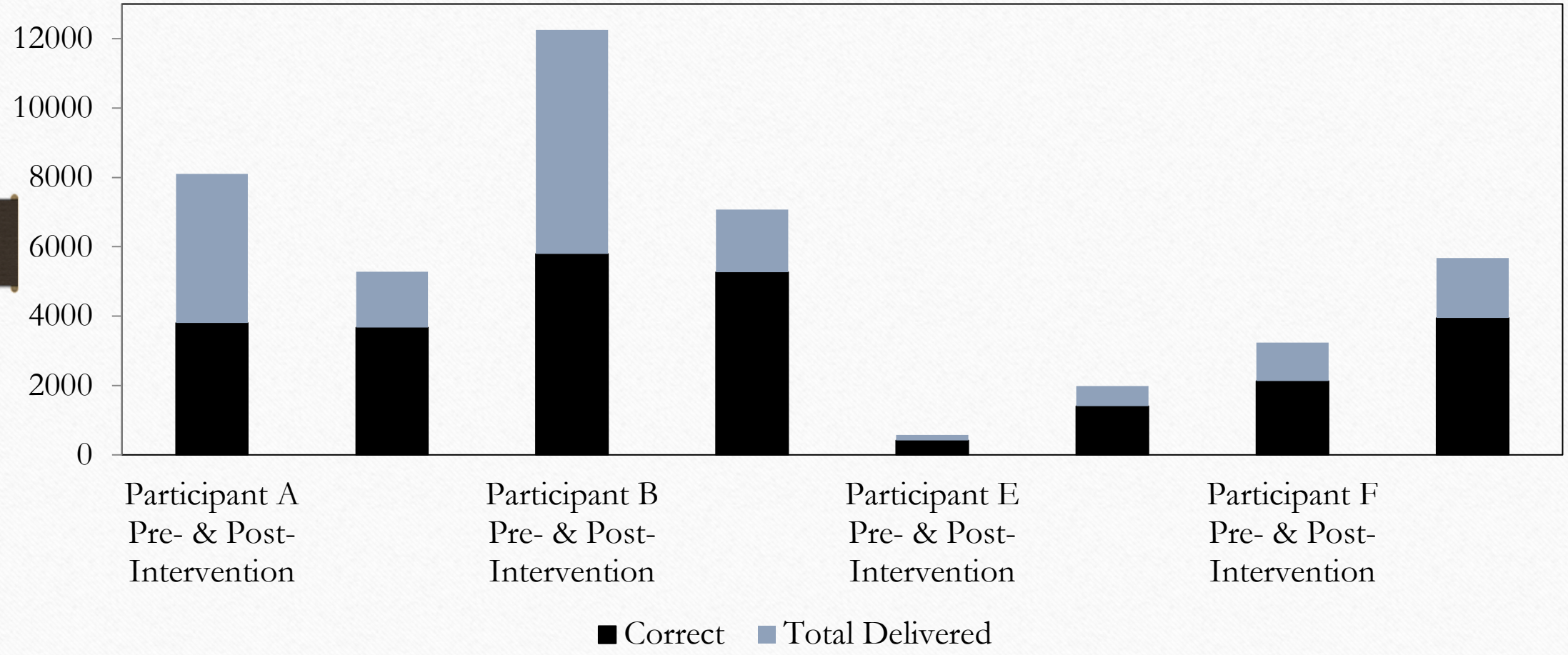
Participant E - 85% agreement

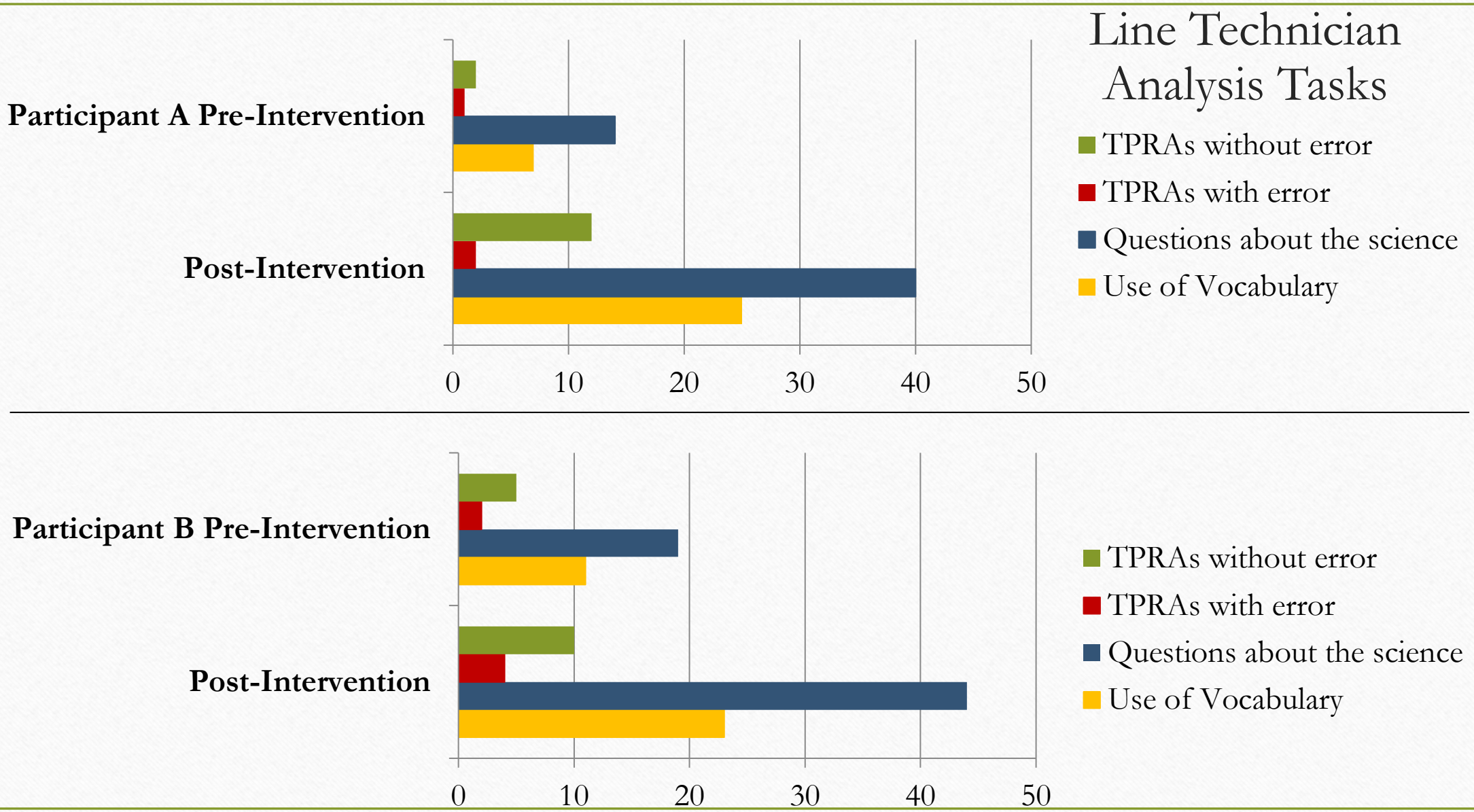


Participant F- 90% agreement

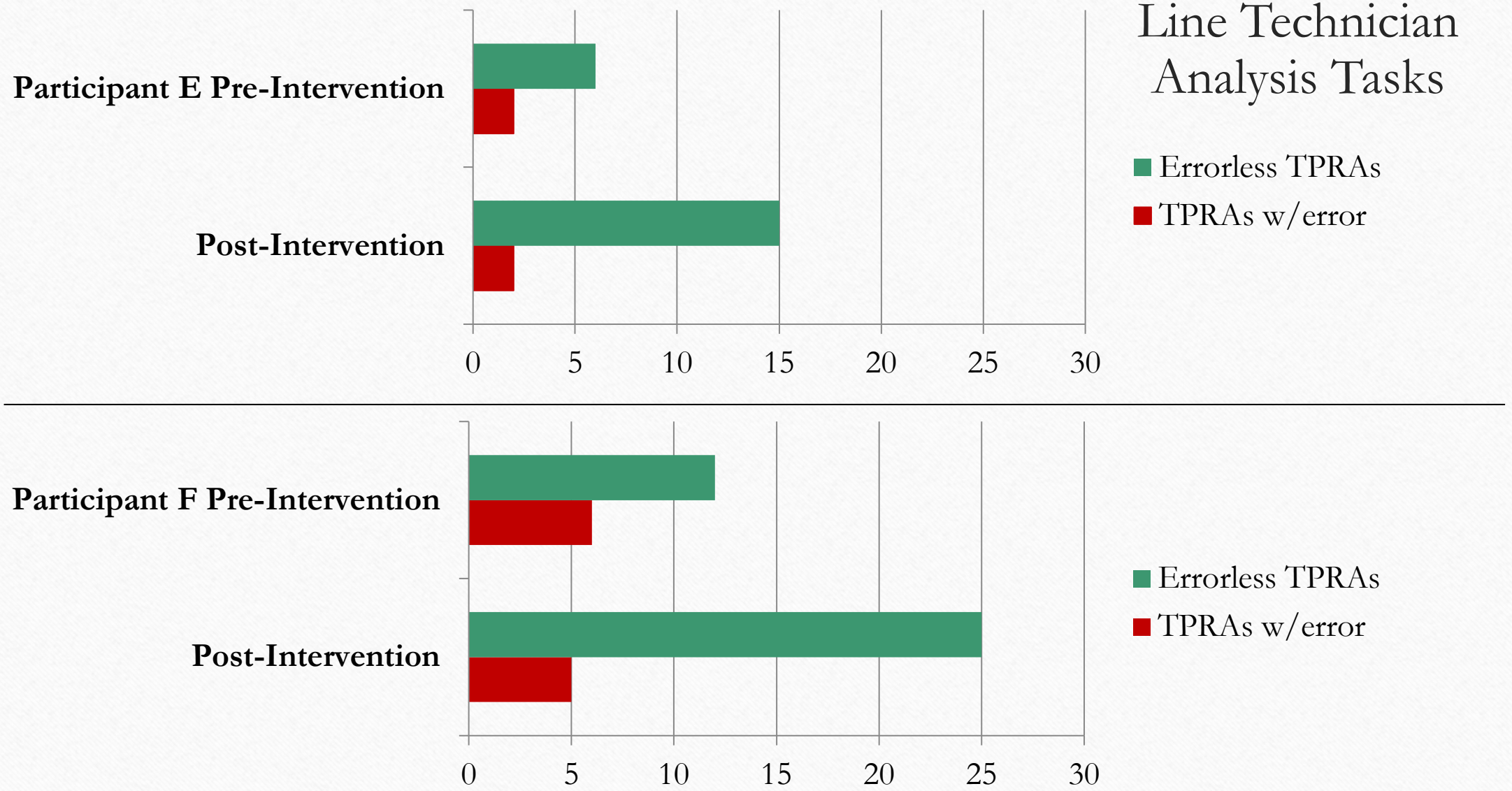


Total learn Units delivered by mentees to clients pre- and post-intervention




Line Technician Analysis Tasks
Participant A Pre-Intervention
Post-Intervention
0
10
20
30
40
50
TPRAs without error
TPRAs with error
Questions about the science
Use of Vocabulary
Participant B Pre-Intervention
Post-Intervention
0
10
20
30
40
50
TPRAs without error
TPRAs with error
Questions about the science
Use of Vocabulary

Line Technician Analysis Tasks



Learn units to criterion (LUC) of clients taught by mentees/line technicians in Dyads 1 & 2

Clients taught by mentees	Pre-Intervention LUC	Post-Intervention 1 LUC	Post-Intervention 2 LUC
Client 1	634	188	140
Client 2	600	234	268

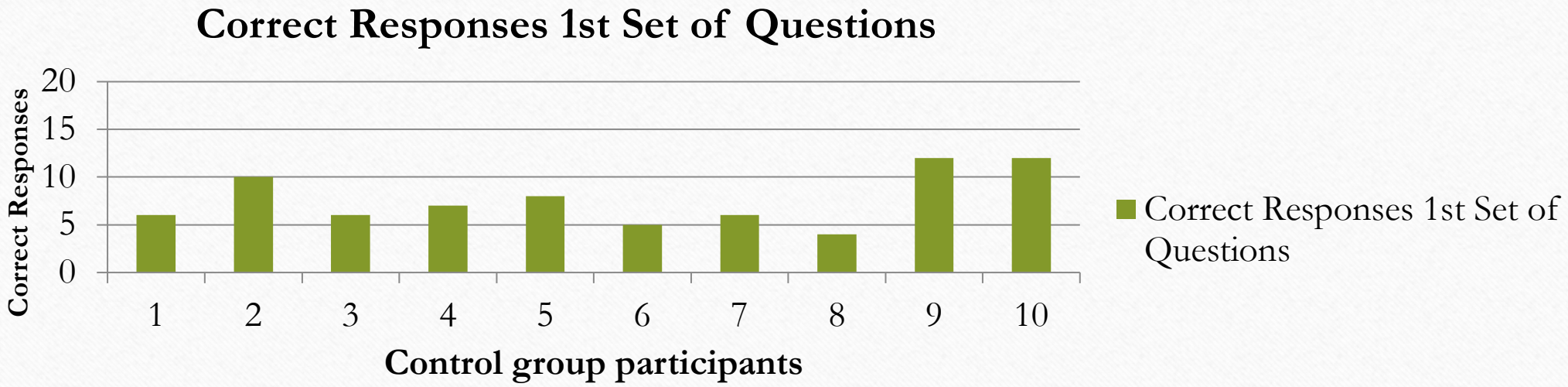
Learn units to criterion (LUC) of clients taught by mentees/line technicians in Dyad 3

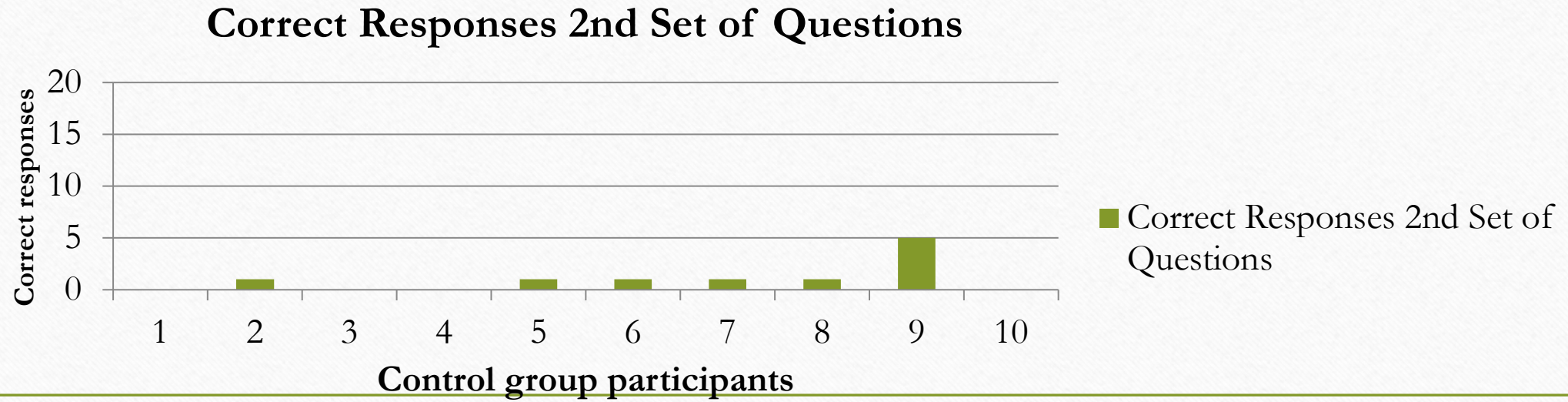
Clients taught by mentees	Pre-Intervention LUC	Post-Intervention LUC
Client 1	1451	188
Client 2	334	177
Client 3	297	175

…A return to LUC of clients taught by mentees/line technicians in Dyads 1& 2

Clients taught by mentees	Post-Intervention LUC (Post-intervention of rule-governed algorithm)	Maintenance check LUC (No intervention and changes occurred)
Client 1	140	912
Client 2	268	612

Control Group





Post-intervention informal meeting with participants

- Did the 'thinking process' change?

All participants noted that they definitely "thought" more about what they were doing in the moment. They also noticed a difference in their delivery of learn units and how they considered short- and long-term goals on a different level after being mentored.

- What would you like to see more of?

Increased use of the verbal behavior about the science across everyone in center and daily "challenge questions" posted

- Would you like to see the 'verbal behavior about the science protocol' implemented across center for all technicians?

Definitely, so that everyone has more direct contact with a mentor at all times and is also mentoring someone else constantly.

Results & Discussion

- Functional relationship demonstrated
- Increased line technicians' analysis of instructional decisions
- Clients' learn units to criterion decreased
- Future study will implement production and selection responses across four topographies

References

Greer, R. D., Keohane, D., Healy, O. (2002). Quality and CABAS®. *The Behavior Analyst Today, 3*(2), retrievable at http://behavior-analyst-online.org.

Greer, R. D., & McDonough, S. H. (1999). Is the learn unit the fundamental measure of pedagogy? *The Behavior Analyst, 20*, 5-16.

Ingham, P., & Greer, R. D. (1992). Changes in student and teacher responses in observed and generalized settings as a function of supervisor observations. *Journal of Applied Behavior Analysis, 25*(1), 153-164. doi:10.1901/jaba.1992.25-153

Keohane, D. D. (2016). Teaching as applied behavior analysis in general education and special education settings [PowerPoint slides]. Retrieved from http://moodle.nicholls.edu/moodle/course/view.php?id=12294.

Keohane, D., & Greer, R. D. (2005). Teachers' use of a verbally governed algorithm and student learning. *International Journal of Behavioral Consultation and Therapy, 1*(3), 249-268. doi:10.1037/h0100749

Nuzzolo-Gomez, R. (2002). *The effects of direct and observed supervisor learn units on the scientific tacts and instructional strategies of teachers.* Unpublished Doctoral Dissertation,, Columbia University, New York, NY.

Ross, D. E., Singer-Dudek, J., & Greer, R. D. (2005). The teacher performance rate and accuracy scale (TPRA): Training as evaluation. *Education and Training in Developmental Disabilities, 40*, 411-423.

Selinske, J. E., Greer, R. D., & Lodhi, S. (1991). A functional analysis of the comprehensive application of behavior analysis to schooling. *Journal of Applied Behavior Analysis, 24*(1), 107-117. doi:10.1901/jaba.1991.24-107

Singer-Dudek, J., Speckman, J., & Nuzzolo, R. (2010). A comparative analysis of the CABAS® model of education at the Fred S. Keller School: A twenty-year review. *The Behavior Analyst Today, 11*(4), 253-265. doi:10.1037/h0100705