Framework for the Evaluation of the ABA Compliance of Technology-Based Intervention Supports

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Background

- Technology-based interventions and supports are being produced and disseminated at a rapid pace.

- Not all technology-based interventions and supports are designed by applied behavior analysts.

- Even technologies designed by applied behavior analysts should be systematically evaluated for their compliance with implementation of core principles of applied behavior analytic teaching.

- BCBAs and others who seek to focus and/or restrict their intervention procedures to those consistent with ABA (scope of practice) have limited time to review the large number of technologies available.

- There is a critical need for frameworks and procedures that can be applied to systematically evaluate compliance of each of the numerous technologies with an applied behavior analytic approach.

Study Aim

The aim of the current study is to develop and apply a systematic evaluation procedure to determine the ability of a particular technology-based intervention program to be implemented within the scope of applied behavior analytic practice.

A critical distinction between the current framework and common practice in the field is that we systematically evaluate each individual lesson for its compliance with applied behavior analysis, as opposed to categorically accepting or rejecting the program as a whole.

Method

Evaluation Targets

Three-Term Contingency

- *Activation/Control of Antecedents (Sd)*
- *Determination and Evaluation of Target Behavior*
- *Implementation of Behaviorally Contingent Responses, Immediately*

Prompting

- *Digitally-Implemented Prompting (automated)*
- *Human Activation of Digitally-Implemented Prompting (button press)*
- *Human-Implemented Prompting (e.g., physical, verbal)*

Error Correction

- *Direct Repeat of Trial*
- *Implementation of Prompting*

Technology-Based Intervention Program

Floreo

- *Immersive Virtual Reality (McCleery et al., 2020)*
- *Supervised by Coach (Teacher, BCBA, Paraprofessional, Parent, etc.; see Figure 2)*
- *150+ Lessons*
- *Sometimes Lessons are single trials, which can be repeated by re-starting the Lesson.*
- *Sometimes Lessons are trial sets which can be repeated within the Lesson, usually with two or more Sd options.*

Procedure

- *Two researchers with training and experience in applied behavior analysis (authors MM, JPM) reviewed each Lesson and provided detailed descriptions of the processes underlying the Evaluation Targets and associated sub-components (see Methods, left)*
- *Table 1 presents the summary data characterizing the findings. Detailed descriptions of researcher codes and coding are available upon request.*

Results

Table 1. Compliance of Floreo Virtual Reality Lesson Cards with Applied Behavior Analysis principles

Skill Category	Lesson Name	Sd Activation			Distinct Sd	Target Behavior	Immediate Consequence			Consequence Quality		Prompting			Error Correction		Summary
		Digital	Human-Digital	Human			Digital	Human-Digital	Human	Descriptive	Natural	Digital	Human-Digital	Human	Prompting	Repeat	
Focusing	Find That Sound		**		**	**	**		*	*	**	**		*	*	*	ABA Compliant With Added Coach Support
	Follow the Animals		**		**	**	**		*	*	**	**		*	*	*	ABA Compliant With Added Coach Support
	Orienting to the Grocery Store		**		*	*			*	*	*	**		*	*	*	ABA Compliant With Added Coach Support
	Quickly Follow a Point		**		**	**	**		*	**				**	*	*	ABA Compliant With Added Coach Support
	Focus on Yoga Instructions		**		**	**		*	*	*	**			*	**	*	ABA Compliant With Added Coach Support
Imitation	Be a copy hero		**		**	**		**	*	**			**		*	*	ABA Compliant With Added Coach Support
	Be an echo hero		**		**	**		**	*	**			**	*	*	*	ABA Compliant With Added Coach Support
	Show 'em what to do			*	**	**		**	*	**	**	**		**	*	*	ABA Compliant With Added Coach Support
	Stop and go with the Giraffes			*	**	**		**	*	**			**	*	**		ABA Non-Compliant
	Move, Giraffe! It's time to swing			*	**	**		**	*	**			**	*	**		ABA Compliant Easily Implementable
	Tell 'em what to say			*	**	**		**	*	**			**	*	*	*	ABA Compliant With Added Coach Support
	Start the gestures game	*			**	**		**	*	**			**	*	*	*	ABA Compliant Easily Implementable
Impulse Control	Raise Your Hand-Kindergarten			*	**	**		*	**	**	*	**	*				ABA Non-Compliant
	Listen and Find, 2 Animals by Feature	*			**	**	**		*	*				*			ABA Non-Compliant
	Unfriendly Greeting	*			**	**		**	*					*			ABA Non-Compliant
Responding to Auditory Information	Listen and Find: 2 Animals by Name, then Feature	*			**	**	**		*	*				*			ABA Non-Compliant
	Listen and Find: 2 Animals by Feature, then Name	*			**	**	**		*	*				*			ABA Non-Compliant
School Social	Join a Conversation-Cafeteria		**		**	**		**	*	**				*			ABA Compliant Easily Implementable
	Invite a peer to sit	*			**	**		**	*	**				*			ABA Compliant Easily Implementable
	Populated greetings in motion: high traffic		**		**	**			*	**	**			*			ABA Compliant Easily Implementable
	Find a seat and get ready for class			*	**	**	**		**	*	**	**	**		*		ABA Compliant Easily Implementable
	Carlos shares his concern	*			**	**		**	*	**				*	*	*	ABA Compliant With Added Coach Support
	Friendly Greeting	*			**	**		**	**	*	*			*			ABA Non-Compliant
	Unfriendly Greeting	*			**	**		**	*	*				*			ABA Non-Compliant
	Neutral Greeting	*			**	**		**	*	*				*			ABA Non-Compliant
	Greetings in Motion		**		**	**		**	*	**				*	*	*	ABA Compliant With Added Coach Support
	Populated Greetings in Motion: Low Traffic		**		**	**			*	**				*	*	*	ABA Compliant With Added Coach Support
	May shares personal info	*			**	**		*	*	**	**			*	*	*	ABA Compliant With Added Coach Support
Descriptive Language	Spatial Concepts: Up & Down	*			**	**	**		*	**		**		*	**		ABA Non-Compliant
	Spatial Concepts: In & Out	*			**	**	**		*	**		**		*	**		ABA Non-Compliant
Infrequent Events	Trick-or-Treat	*			**	**		**	*	**		**		*			ABA Non-Compliant
	Airport security check	*			*	*		*	*	**	**	*		*			ABA Non-Compliant
Communicative Eye Gaze	Safari survey		**		**	**		**	*	*	**			*	**		ABA Non-Compliant
	Look & find 180	**			**	**		**	*	*			**	*	**		ABA Non-Compliant
	Look & find 360	**			**	**		**	*	*			**	*	**		ABA Non-Compliant
	Winter look & find 180	**			**	**		**	*	*			**	*	**		ABA Non-Compliant
	Meet the Animals	**			**	**	**		*	*				*	*		ABA Non-Compliant
	Who Made That Sound?	**			**	**	**		*	*			*	*	*		ABA Non-Compliant
	Watch It Go	**			**	**	**		*	*				*	*		ABA Non-Compliant
	Emma is Pointing		**		**	**	**		*	*				*	**		ABA Non-Compliant

CRITERIA

ABA Compliant, Easily Implementable - Each primary domain has at least 2 stars & at least 2 stars in both Error Correction subdomains

ABA Compliant, With Added Coach Support - Each primary domain has at least 1 star & at least 1 star in both Error Correction subdomains

ABA Non-Compliant - One or more primary domains has 0 stars & less than 1 star in each Error Correction subdomains
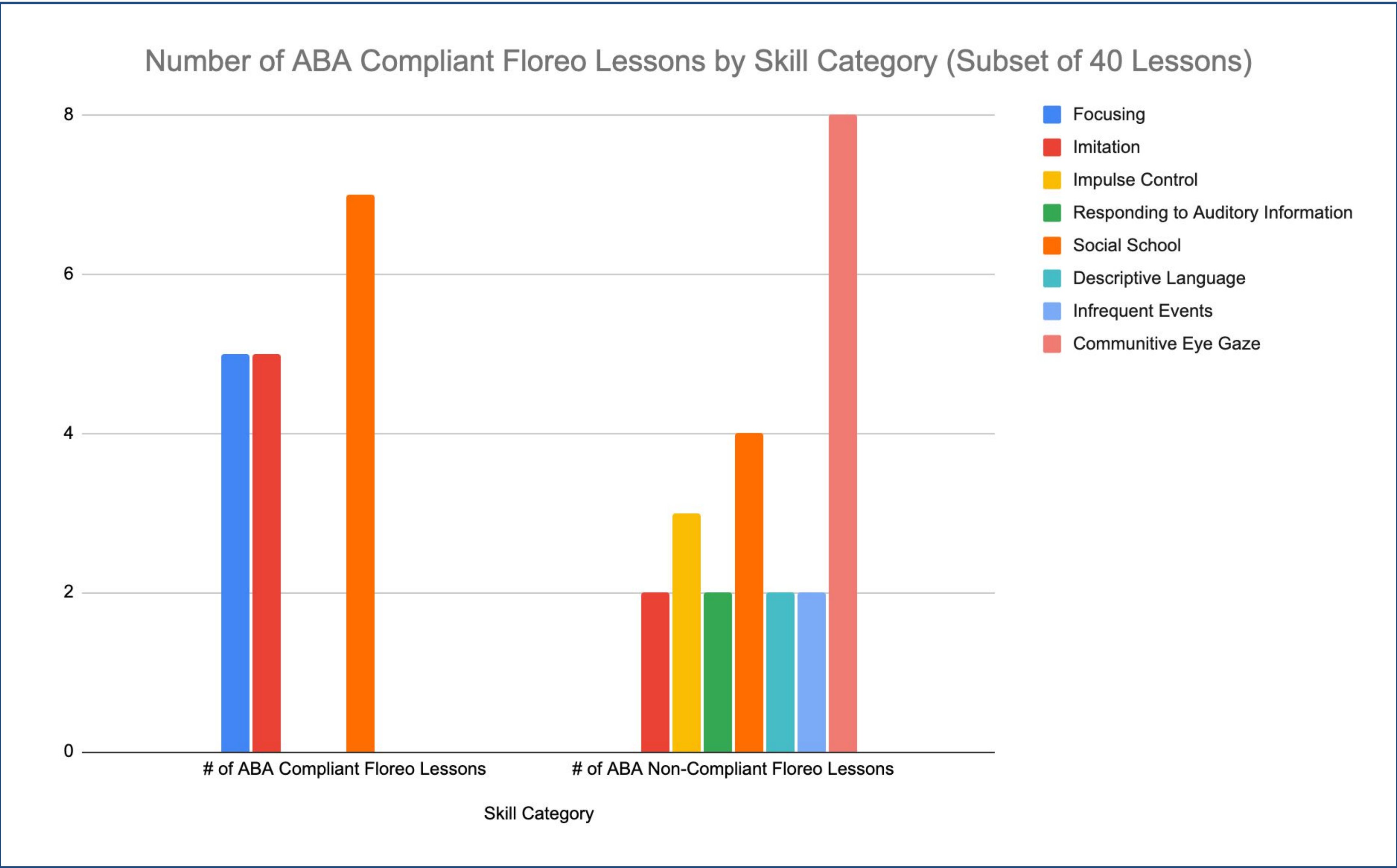
LEGEND

2 Stars - Explicitly ABA compliant as is

1 star - Available, but not explicitly ABA compliant; requires coach facilitation

0 stars - Not available in lesson

Figure 1. ABA Compliant Floreo Lessons by Skill Category

Number of ABA Compliant Floreo Lessons by Skill Category (Subset of 40 Lessons)

Legend:
- Focusing
- Imitation
- Impulse Control
- Responding to Auditory Information
- Social School
- Descriptive Language
- Infrequent Events
- Communative Eye Gaze

The Floreo System

Figure 2. A Floreo session consists of a learner and a coach. The coach (often a therapist, teacher, parent, etc.) uses an iPad to see the learner's visual field and to help the learner progress through the lesson using system-provided coach buttons in the dashboard. This allows the coach to monitor the learner's attention to the virtual environment and give appropriate feedback at pivotal times during the lesson.

Summary & Discussion

- The focus of the current study was to apply a framework and procedure to systematically determine whether or not specific technology-based intervention lessons are ABA compliant.

- We applied this framework and procedure to 40 Floreo Lessons.

- Findings indicate that 17 of the 40 Floreo Lessons analyzed are ABA compliant, with 5 of these Lessons scoring higher on immediate applicability, and the remaining 12 Lessons requiring small-scale coach-led modification of the lesson in order to be implemented within the scope of ABA practice.

- The current findings serve to confirm that a number of Floreo intervention Lessons are compliant with the core principles of ABA and are, therefore, within the scope of ABA practice.

- The results of the current study provide a critical first step pathway toward establishing both a theoretical framework and systematic procedures that can be applied to systematically determine the ABA compliance of individual technology-based intervention programs and lessons.

- Future research should seek to refine the currently applied procedure, and to apply it to other technology-based intervention programs and lessons.

- Future research should also consider and address the role and relationship of ABA compliant technology-based lessons within the context of the learner's broader ABA intervention program.

References

McCleery, JP, Zitter, A., Solórzano, R, Turnacioglu, S, Miller, SJ, Ravindran, V., & Parish-Morris, J. (2020). Safety and feasibility of an immersive virtual reality intervention program for teaching police interaction skills to adolescents and adults with autism. Autism Research, 13(8), 1418-1424.