

NCTI Technology in the Works FINAL REPORT

About This Study (Original Abstract)

To address the increasing need for solutions for serving children with Autism Spectrum Disorders (ASD) in the schools, it is important to consider options that are more accessible and affordable such as Computer-Assisted Instruction (CAI). However, it is even more essential that these solutions are effective and research is needed to address this issue. In this collaborative study with TeachTown, Los Angeles Unified School District, and California State University, Los Angeles, a CAI program which targets language, cognitive, academic, social, and life skills will be assessed in a large public school system. Approximately 50 preschool and kindergarten-1st grade children with ASD will participate with 25 children in a treatment group and 25 children in a control group. Children in the treatment group will receive 50-100 minutes per week of CAI and 50-100 minutes per week of supplementary off-computer activities designed to enhance generalization to the natural environment. The CAI and off-computer activities will be provided through *TeachTown: Basics*, which is currently being used in many schools across the United States, but which has not yet been tested in a randomized research study. In addition to the automatic data collection provided by the software, school staff will be asked to keep a daily record of their use of off-computer activities and students will be assessed using behavioral and standardized outcome measures. It is anticipated that the classrooms using the *TeachTown: Basics* program will demonstrate significantly higher rates of acquisition across learning areas and will also show more improvement in their spontaneous language and social interaction. It is also expected that children in the treatment group will exhibit less inappropriate behaviors following treatment than their peers in the control group. Following this study, it is also anticipated that teachers and parents involved in the treatment group will show higher satisfaction ratings with their child's program than those parents and teachers associated with the control group. The results of this research will help demonstrate to school districts the effectiveness and social validity of implementing CAI, and will help districts such as LAUSD secure funding for these types of programs by having data to demonstrate the effectiveness.

About LAUSD Population

District Population: 688,138

Special Education Students: 82,326

English Language Learners (ELL) Students: 39,455

Autism Spectrum Disorder (ASD) students: 8,516

- Primary eligibility
- Additional 55 with ASD as secondary eligibility

LAUSD Autism Programs

- Preschool Autism Special Day Programs (SDPs) - 1/2 day
- Intensive Comprehensive Autism Program (ICAP) (ages 3-6)
- Autism SDP (primary – high school)
- Autism SDP for students with High Functioning Autism (HFA) /Asperger
- Any/all other options

Issues in LAUSD Autism Program

- Staff-student ratios

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- Funding
- Staff training and implementation
- Accountability
- Behavior problems of students
- Access to general curriculum
- Rapid increases in ASD
- Access to evidence-based interventions
- Paucity of appropriate staff (have to contract out)

Potential Benefits of *TeachTown: Basics* for LAUSD Students

- Evidenced-based intervention with built-in data collection
- Differential instruction
- Motivation for “hard to teach” students
- Flexibility as students transition from one setting to the next
- Collaboration with parents
- Curricular guidance for teachers

Participating ICAP Classrooms in LAUSD

Classroom	Grade(s)	# of Participants	Avg. CARS (Childhood Autism Rating Scale) score
Treatment #1	Preschool: 8 students	6	33 (mild-mod autism)
Treatment #2	K-1: 5 students	5	39 (severe autism)
Treatment #3	Preschool: 8 students	5	44 (severe autism)
Treatment #4	K-1: 8 students	6	52 (severe autism)
		Total: 22	Avg: 42 (severe)
Control #1	Preschool: 8 students	7	45 (severe autism)
Control #2	K-1: 7 students	5	37 (mild-mod autism)
Control #3	Preschool: 7 students	6	45 (severe autism)
Control #4	K-1: 7 students	7	45 (severe autism)
		Total: 25	Avg: 43 (severe)

Treatment Procedure

- *TeachTown: Basics* Curriculum (Dev Ages 2-7 years)
 - Academic/Cognitive Skills
 - Social Understanding
 - Receptive Language
 - Life & Community Skill Understanding
- Daily computer sessions on school days for 20 minutes/day (can be done in 2 10-minute sessions)
- Daily off-computer activities on school days for 20 minutes/day (1:1, small group or circle activity)
- 3 months of intervention

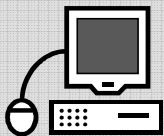




Purpose and Design of Research


- Purpose: To assess the efficacy of the TeachTown: Basics program in self-contained special education classrooms in a large, urban school district.
- Design: Between and Within-Subjects Group Design, 4 schools – each randomly assigned in the fall to Treatment or Control, in spring, Control classrooms begin treatment.

About the *TeachTown: Basics* Program (the Intervention)

TeachTown: Basics includes the following: 1) On-computer lessons where the child gets on the computer and completes lessons in an ABA (Applied Behavior Analysis) format with engaging reward games to keep them motivated; 2) Off-computer activities to work on skills that are not targeted on the computer (e.g. Expressive Language, Play, Imitation, Social Interaction, Motor Skills) and to enhance generalization of skills learned on the computer to the natural environment; 3) Automated data collection and tracking to assess the child's progress as they move through the computer program and for school staff to use to assess the effectiveness of the intervention and to determine which skills may need more work off the computer; 4) Note taking system for school staff to jot down anecdotal information about the child's performance or any other relevant information to the child's success with the program; and 5) Synchronization and updating of data which allows the teacher to eventually share information with the families (not in this study) and for the child to be able to use the program at home (not in this study). In addition, this feature allows the research team to look at data on a regular basis to determine how the study is progressing and to conduct final data analysis.

About TeachTown Basics

On-computer lessons	Off-computer activities	Data tracking	Note taking	Synchronization and update
 <ul style="list-style-type: none"> Comprehensive self-adjusting curriculum Engaging for children Covers 4 learning domains Over 500 lessons (each with 4 or more concepts) 	 <ul style="list-style-type: none"> Relationship-building Naturalistic play activities Enhances generalization Covers 7 learning domains Over 100 activities 	 <ul style="list-style-type: none"> Automatically tracks progress Share with other team members to set program goals 	 <ul style="list-style-type: none"> Leave session notes Connect everyone on the child's team 	 <ul style="list-style-type: none"> Portable therapy, synchronizes across multiple locations Secure server Updates curriculum automatically



Results: Teacher Usage

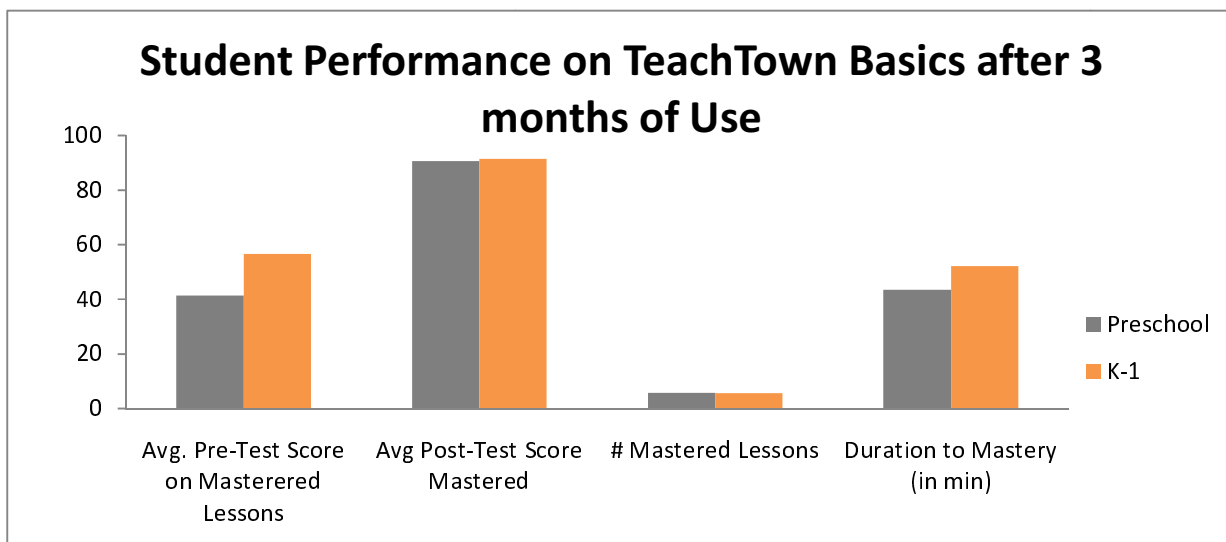
Teachers used the program as often as recommended, but were not able to use for the suggested length of time for all students. Teachers have been asked to gradually increase the time for these students, who may be having difficulties using the computer due to either cognitive, behavioral, or motor impairments. The number of facilitators per student is as suggested (the teacher and all aides working with the students in the classroom). This summer, when the research is completed, LAUSD will invite parents to use the program at home with their children if they wish.

	Avg. # of Sessions of Student Use	Avg. Student Session Time	Avg. # Facilitators/ Student
Teacher #1	50	15 min	4
Teacher #2	57	18 min	4
Teacher #3	55	9 min	4
Teacher #4	58	9 min	3
Recommended:	50-60	15-20 min	3-4

Results: TeachTown: Basics Software Program

Fifteen of the 22 students mastered lessons using the *TeachTown: Basics* software program. This does not mean that the other students did not make progress on the program, it just means that some of the children are still working toward mastery on their lessons, which will likely result in some mastered lessons by the end of the school year for most students. It is not unusual for students to not master lessons in only 3 months time. Students not meeting mastery are those with more severe cognitive delays, and those that were unable to complete 20 minute sessions. Data below is shown for the 15 students who did master lessons in 3 months time. There was statistical significance at the $p > .0001$ level from the Pre tests to the Post tests, which are a part of the *TeachTown: Basics* program and test the child’s knowledge of concepts using a different set of stimuli from the training to ensure that the children are learning the concepts (i.e. targets) and not just memorizing pictures. In 3 months, students, on average, mastered lessons in about 43 minutes (Preschool) to 52 minutes (K-1) and mastered 5-6 lessons (20-24 concepts/targets).

n=15



Results: Language Changes on the Brigance Assessment from Pre (November, 2008) to Mid-Treatment (Feb, 2009)

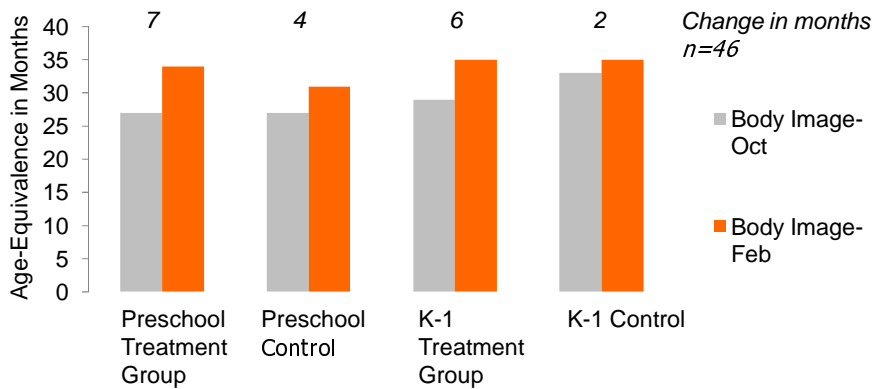
The Brigance is a standardized developmental assessment that is frequently used to identify deficits and track progress in various developmental areas including language, cognition, social skills, and motor skills. LAUSD uses the measure in their ICAP and other autism programs to assess the progress of the children enrolled in their programs. This measure aligns well with the *TeachTown: Basics* curriculum and was used in this study to measure progress for students in the Treatment and the Control groups. Body Parts measures the knowledge of body parts; Receptive Language measures comprehension and vocabulary; and Expressive Language measures labeling and expressive communication.

All classrooms demonstrated improvement in language areas on the Brigance, but

- The TeachTown Treatment Group showed much bigger changes in Body Image (i.e. identification of body parts) and Expressive Language.
- The students in the preschool groups performed similarly on Receptive Language, but,
- the K-1 students in the TeachTown Treatment group showed greater change than the Control K-1 students

Students in TeachTown Treatment Group showed bigger change in identification of body parts

Results: Brigance Assessment: Body Image

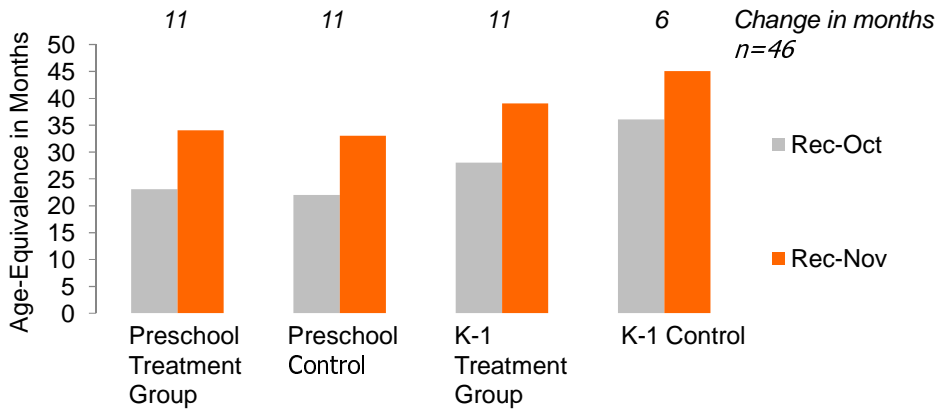


Source: Brigance Assessment



Students in TeachTown Treatment Group showed bigger change in language measures than the control

Results: Brigance Assessment: Receptive Language

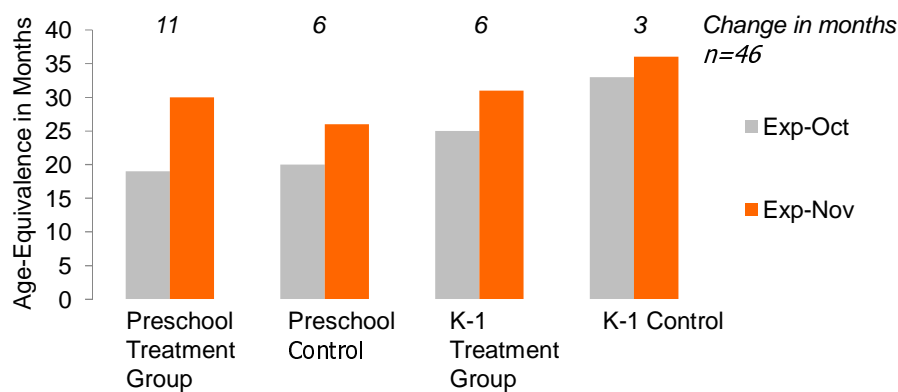


Source: Brigance Assessment



Students in TeachTown Treatment Group showed bigger change in language measures than the control

Results: Brigance Assessment: Expressive Language



Source: Brigance Assessment



Results: Cognitive and Social Skill Changes on the Brigance Assessment from Pre (November, 2008) to Mid-Treatment (Feb, 2009)

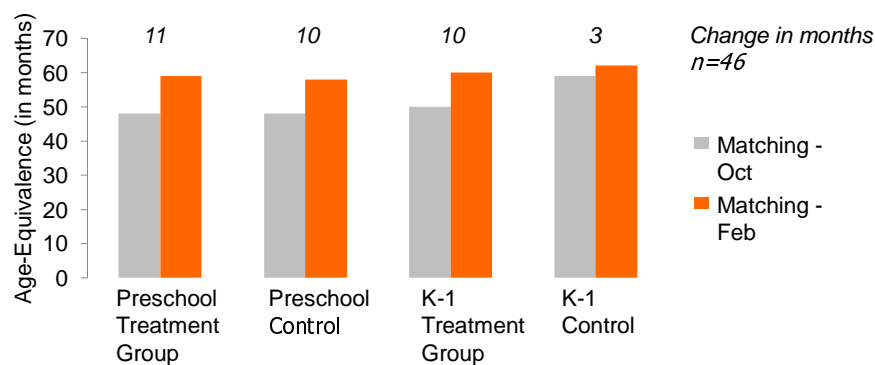
The Preschool students had similar improvements in Matching on the Brigance, but TTB students (Tx Grp) made bigger gains than the Control group in Auditory Memory, General Concepts, and Social Skills.

The K-1 Students had similar improvements in General Concepts and Social Skills, but the TTB students (Tx Grp) made bigger gains in Matching and Auditory Memory.

Matching measures the child's ability to match objects and categorize, Auditory Memory measures the child's ability to understand and follow directions and to remember information that was presented to them, General Concepts measure the child's basic early academic abilities (e.g. letters, numbers, etc.), and Social Skills measure the child's knowledge of social situations (e.g. emotions, friendship, etc.).

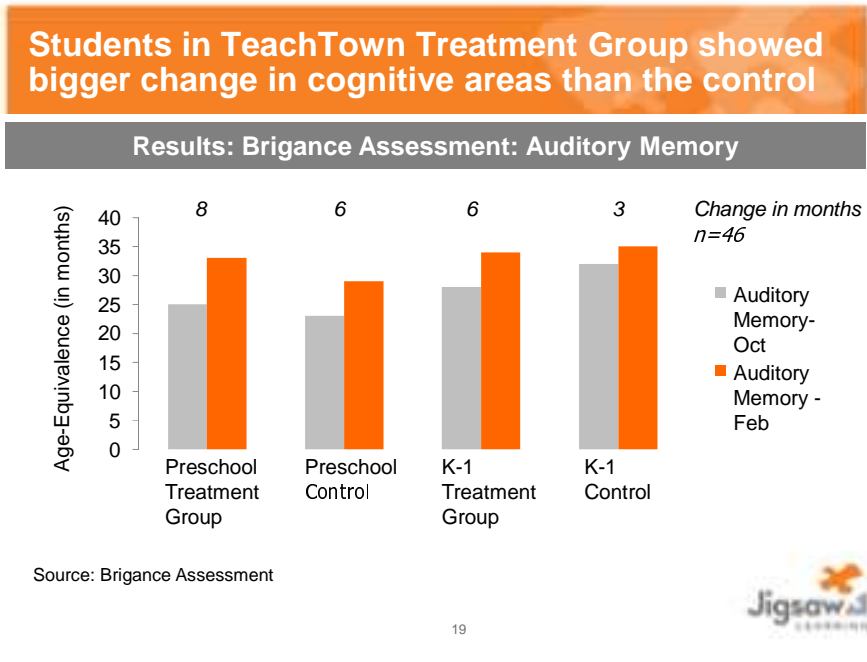
Students in TeachTown Treatment Group showed bigger change in cognitive areas than the control

Results: Brigance Assessment: Matching



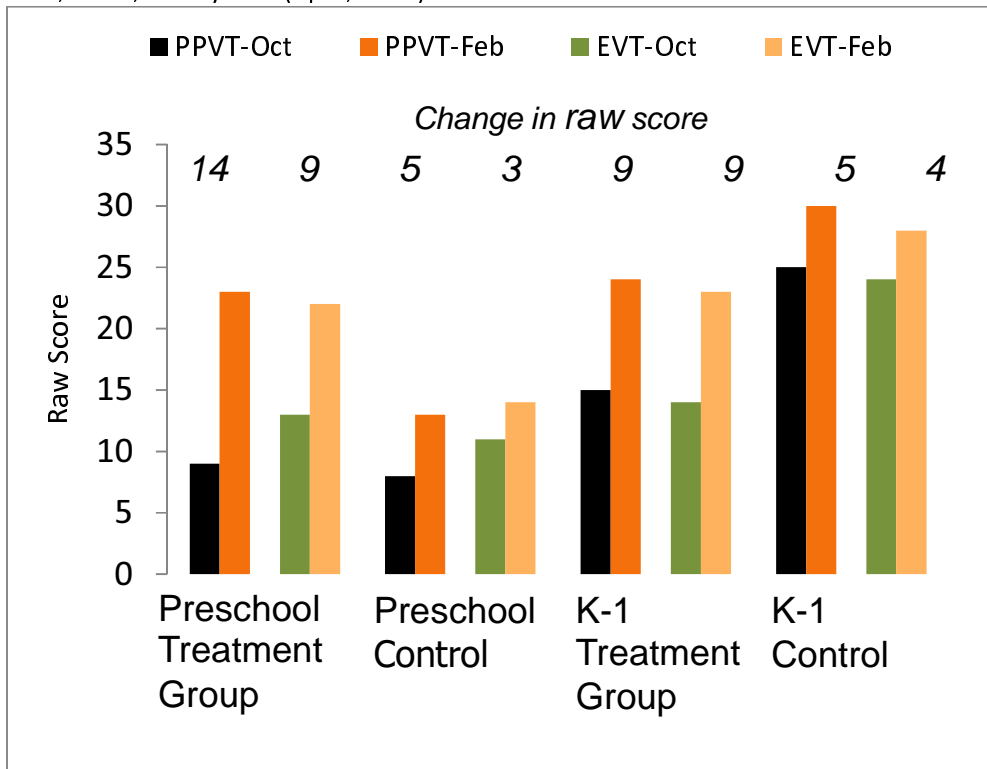
Source: Brigance Assessment





Results: Language Changes on the PPVT-III and EVT Assessments from Pre (November, 2008) to Mid-Treatment (Feb, 2009)

The Peabody Picture Vocabulary Test (PPVT-III) and the Expressive Vocabulary Test (EVT) were used to further measure changes in Receptive and Expressive Language skills. Age-Equivalents are not shown because many students did not establish basal in Oct. In Feb, there was a larger increase in the number of Preschool students establishing basal in the TeachTown group (4 additional students on PPVT, 5 additional students on EVT) compared to the Control group (1 additional student on PPVT & EVT). The TeachTown (Tx) group also had slightly more students establishing basal in Feb (2 additional students on PPVT & EVT) compared to the Control group (1 additional student on PPVT & EVT).



Summary of Results

The Treatment group demonstrated much bigger increases in

- Receptive and Expressive language using the PPVT-4, EVT-2, and the Brigance
- Auditory Memory, General Concepts, and Social Skills for the Preschool students using the Brigance
- Matching and Auditory Memory for the K-1 students using the Brigance

They also showed slightly larger increases in

- Matching for the Preschool students using the Brigance
- General Concepts and Social Skills for K-1 students using the Brigance

After 3 months of using the *TeachTown: Basics* program, students in the Treatment group:

- Made significant gains from Pre to Post Tests in the *TeachTown: Basics* software
- Learned 34-39 target concepts (on average) in the *TeachTown: Basics* software with the largest gains in Receptive Vocabulary

Plans for Study Completion

Children in the Treatment group will continue to use the program through the end of the school year and their results will be compared to the first part of the school year and to the Control group. The Control group has just started to use the program in their classrooms and will use through the end of the school year. Outcome data from the first part of the school year (no treatment) will be compared to outcome data from the last part of the school year (treatment) to assess within subject improvements. In addition, children were videotaped in 5-minute teaching sessions with their teacher at Baseline (November) and again at Mid-Point (Feb), and will be

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taped again at Post (June). Children in the Treatment group were also taped at Mid (Feb) and will be taped again at Post (June) using the *TeachTown: Basics* computer program. Children in the Control group will also be taped using the *TeachTown: Basics* computer program in June. Videotapes are currently being coded by graduate students at Cal State, Los Angeles, under the supervision of Dr. Jennifer Symon. Students are blind to the group placement of the children. Tapes are being coded for motivation, language, social interaction, attention, and behavioral issues. Inter-observer reliability is being conducted by graduate students and Dr. Christina Whalen for 33% of the segments, as is standard in behavioral observation studies. Data from these tapes will be analyzed over the summer of 2009, along with the final automated data from the *TeachTown: Basics* software, and the standardized assessment data in June. To assess social validity, all participating parents and teachers will be asked to complete a Consumer Satisfaction questionnaire regarding their experiences and thoughts on the intervention and future use of the *TeachTown: Basics* program with their children.

The data we have collected so far, which is presented above, has been presented at the following conferences: California Association for Behavior Analysis (Burlingame, CA); Association for Positive Behavior Support (Jacksonville, FL); International Conference on Technology and Persons with Disabilities (Los Angeles, CA); Council for Exceptional Children (Seattle, WA). Ongoing results will also be presented at the following upcoming conferences this Spring: International Meeting for Autism Research (Chicago, IL) and the Association for Behavior Analysis International Meeting (Phoenix, AZ). Once all data is analyzed and summarized (anticipated by August, 2009), results will be written up for publication in a peer-reviewed journal (e.g. Journal of Autism and Developmental Disorders; Focus on Autism). A press release from Jigsaw Learning (i.e. TeachTown) will be released in April, 2009 regarding the early results (presented above) in this study, and another one when the final results are available (August, 2009).

Contact Information

If you have any questions about the following study, please contact Dr. Christina Whalen at chris@jigsawlearning.com. You may also contact Debbie Moss, from LAUSD directly, at debbie.moss@lausd.net.

For more information about *TeachTown: Basics*, you may visit www.teachtown.com, or contact Dr. Whalen for additional information.