



Project Nudge: A First Look at the Influence of 10 Books A Home on a Child with Autism

August 2016 – May 2017



Introduction

In 2012, a [robust longitudinal study](#) involving 6,975 Autistic children in California investigated both the intellectual ability of children diagnosed with Autism as well as possible reasons why some of the observed children ended up functioning on more advanced developmental trajectories than others. These ‘bloomers’, as the paper puts it, had a few things in common: first, they were usually the children who were not cognitively impaired (which accounted for 63% of children overall), and second, they were generally from higher income backgrounds. **Autistic children born into low-income immigrant and minority families had a much lower chance of ‘blooming’, due in large part to a lack of awareness and available services** (Fountain et. al., 2012).

That’s where 10 Books A Home (10BH) comes in. 10BH is an organization founded in 2009 by Paul Thiebaut III to provide early childhood education to the low-income, predominantly minority and immigrant communities of East Palo Alto and East Menlo Park, CA using an in-home tutoring model. It currently serves over 150 families in the area, and is rapidly expanding. In just implementing 10BH’s standard pedagogy, which simply follows the learning motivations of each individual child, we have anecdotally observed dramatic improvements in Autism symptoms from his diagnosed learner, Danny. Although it is not a program designed specifically to address special needs, **10BH was formed under the philosophy that every child, no matter what, has an intrinsic desire to learn.** While we have seen immense improvement in 10BH Learners who display

neurotypical development (see our [Report Card Study](#)), we also find that the program is effective at moving the dial on children with special needs. Documenting this observation is important to understanding the true impact and applicability of the program and pedagogy, in what 10BH terms a “dynamic evidence-base” for its programming.

However, it’s not enough just to say that 10BH is anecdotally effective at helping to nudge Autistic participants towards more neurotypical development: we wanted to be able to quantify that improvement to begin to verify its validity. This study seeks to specifically track elements of Danny’s cognitive, physical, and social development through a qualitative coding methodology using videos taken of his lessons with Paul. We set out to answer the following questions:

1. What impact, if any, has 10 Books A Home had on Danny’s verbal communication and reasoning?
2. What impact, if any, has 10 Books A Home had on affecting Danny’s physical responses to his surroundings?
3. What about 10 Books A Home’s program might be attributed to any of the perceived changes in Danny’s behavior?

A video supplement to this report that shows examples of Danny’s cognitive, verbal, social, emotional, and physical growth can be found [here](#).

Key Takeaways

1. Danny showed significant improvement in the rate by which he answered questions and used more complex word formations – well over doubling the rate by which he did both of those things. This indicates that he is better able to process and communicate information after just 30 weeks of 10BH programming.
2. The rate at which Danny looked at other people and initiated physical contact during the lesson did not quantifiably change over the span of 30 weeks in this research; however, it seems possible, if not likely, based on qualitative follow-ups, that the nature of his sociality and physicality has changed to become more affectionate during that time span.
3. While we have many areas to follow-up on this initial research, initial findings point towards 10 Books a Home providing a useful and sustainable framework for helping children of any socio-economic and developmental background by associating “joy” with “learning” and providing a structure to continuously practice that pedagogy in the child’s home.

“He used to be kind of a bully, and now 10 months into 10 Books A Home that’s pretty much vanished...He doesn’t go one day without giving a hug and a kiss to everyone in the house.”
—Lucia, Danny’s mother



Danny initiating contact.

Participant Background

10 Books A Home currently serves children between the ages of 3-5 years old in the high poverty communities of East Palo Alto, CA and East Menlo Park, CA. All “Role Models” are volunteers from the community and surrounding areas that help tutor the “Learners”, who are enrolled by their parents or guardians. Mainly, the

children that participate in 10BH are from low-income, immigrant families who are highly at-risk for dropping out of school. 90% of former 10BH Learners are “English Learners”, of which only 8% typically perform at or above grade level in math or reading in their school district.

Methodology

Over the course of 31 weeks, from August 2016 to May 2017, 10 Books A Home founder, Paul Thiebaut III, led a home mentorship (“Learning Party”) session with 3-year-old learner Danny for approximately one hour once a week, utilizing the 10BH fundamental teaching philosophy of Intrinsic Learning Motivations (ILMs). ILM theory claims that every child has certain inherent proclivities towards various interests that can drive their fascination and love of learning, helping them continuously associate enjoyment with learning. The pedagogy of 10BH is designed to follow those innate interests to dictate lessons and the learnings from those lessons. This lets the child, or “Learner” as they are known in the program, guide the path each lesson and subsequent lessons take, while it is the job of the mentor, or “Role Model”, to draw numerous subject area connections from every activity. In this way, the philosophy seeks to develop a personalized learning curricula for every child.

Each one of these sessions was taped from start to finish with the permission of his parents, and utilized for our video coding purposes. We chose to focus on the first five videos and most recent five videos at the time of the research to allow for variation in outside factors and get a more realistic snapshot of Danny’s growth from the beginning of the program to 31 weeks in.

Following the [example of Baranek](#) in establishing precedence for retrospective video coding of children with autism (Baranek, 1999), while also using [Autism Treatment Evaluation Checklist](#) (ATEC) as a guideline, we set about establishing our own coding schema adaptation for pre-school age children with an understanding of what resources we had available to us to do so. We zeroed in on the physical and cognitive development aspects of autism, since it would allow for the most objective measurement based on the available source material. Specific definitions of the variables chosen are provided in Figure 1.

Figure 1. Video Coding Variables

Variable	Definition	Video Example
Initiates physical contact	Danny purposefully initiates physical contact with someone in the room. In these examples, contact was purposeful and of his volition.	
Looks at person	Danny looked directly toward another person's face (note: ensuring eye contact was hard to see in the videos).	
Answers questions	If asked a question, Danny clearly answered with an answer that made contextual sense.	
Uses multiple words at a time	Danny used more than one word in a row at any time during the lesson.	

In establishing the coding schema, we had two independent video coders code a series of example videos to reach inter-rater reliability. In the final results, they have a reliability ranging from 75% on the low end to 98% on the high end for each of the coding variables in each video. All videos were coded in a randomized order.

Echoing the approach of Baranek (1999), we normalized the results between the first five videos and the last five videos and computed rates of our coder's average frequencies for each variable (average frequency/hour), as seen in Figure 2. We then ran an ANOVA looking at the effect of the lesson week on each of our outcome variables to gauge significance.

We also ran a few qualitative follow-ups to better understand the nature of our results. After each of the videos, the coders were asked to rate a series of questions regarding how they perceived Danny's actions and state of being during the lesson they just watched, the results of which were averaged in Figure 3. Lastly, we interviewed Danny's mother, Lucia, and grandfather, Jose, to gain better perspective on the changes measured in this study, and to better understand the perceived effect 10 Books A Home has specifically had in shaping these results. His mother participates in every lesson with him, and his grandfather has watched many of the lessons in addition to living with him and helping to take care of him.

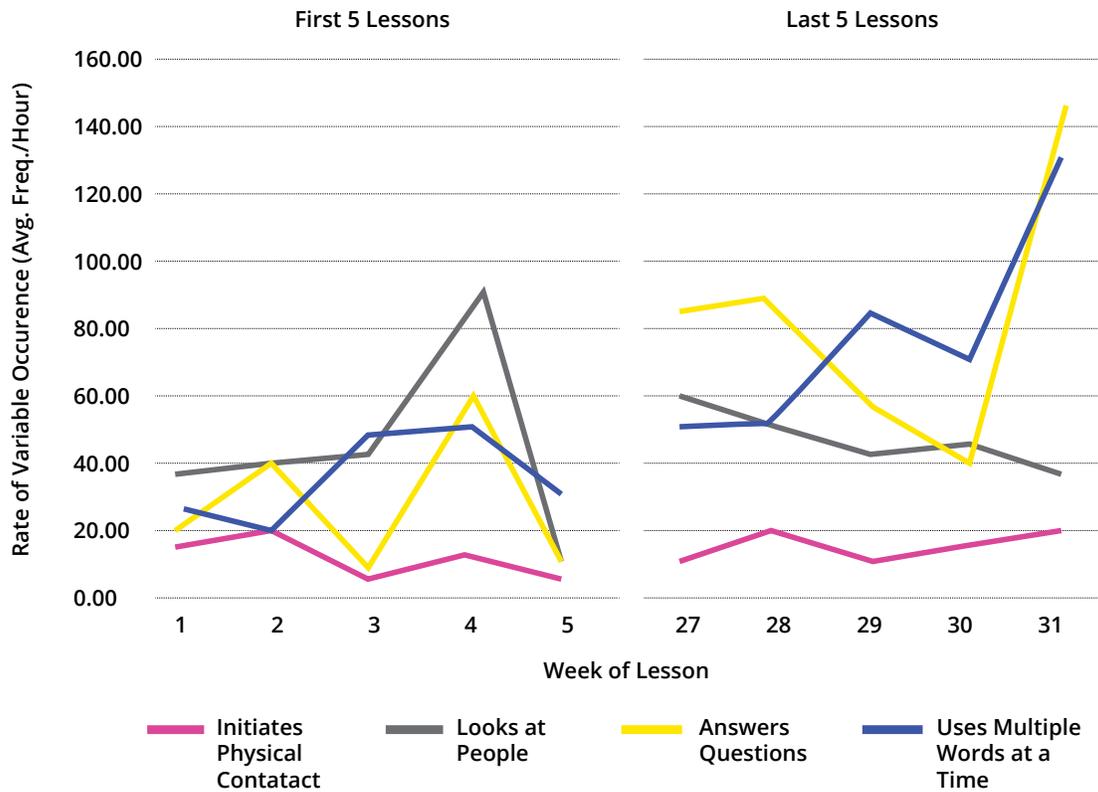
*10 Books A Home helped give him that little bit of a push...For me to see that he's learning so much and making so much progress, not just in his space in the classroom but also as a person...has been something that he hasn't been able to do and 10 Books A Home pretty much helped him branch out."
—Lucia*



Danny answering questions.

Results and Discussion

Figure 2. Rate of Variable Occurrence over Time



Week of Lesson	Initiates Physical Contact	Looks at People	Answers Questions	Uses Multiple Words at a Time	Total
1	14.2	37.00	21.91	25.32	101.7581823
2	19.12	41.95	41.42	19.65	123.1858407
3	6.17	42.56	11.72	47.50	109.8012337
4	12.68	91.96	57.08	51.26	212.9770992
5	5.20	8.08	10.97	25.41	49.66313763
27	9.13	59.90	97.29	47.35	204.8177496
28	19.35	52.79	89.15	48.68	215.2492669
29	7.95	42.60	52.26	82.36	186.304828
30	15.24	44.20	40.39	73.92	173.7510584
31	19.75	38.35	144.67	129.57	332.3434474
Average, first 5 lessons	11.45580282	44.31066946	28.61875586	33.82673092	119.4770987
Average, last 5 lessons	14.28524862	47.56763549	82.75185837	76.37639891	222.4932701

Between the first five weeks of participating in 10BH and the 27th – 31st week, Danny showed remarkable progress, particularly around verbal and communication growth. **On average, between the first five lessons and the most recent lessons in the study, Danny over doubled the rate he was answering questions and using multiple words at a time.** Specifically, he went from answering questions at a rate of 28.62 avg. times/hr. to 82.75 avg. times/hr. (**increasing by a factor of 2.89**), which was significant to the .01 level. He was also using multiple words **2.2 times as often**, from a rate of 33.83 avg. times/hr. to 76.38 avg. times/hr., which is also significant to the .01 level. With a low sample size of 10 videos, there are still many factors to tease out: how many questions were asked in each session to begin with, for instance. However, this indicates that there is evidence to believe we are seeing a significant improvement in Danny's communication skills during this period.

Although the rate at which Danny looked at people and initiated physical contact stayed fairly static with a slight observable increase, further research could help tease out if other related variables did change regarding his physical interaction. In following studies, we would want to better understand how often he was looking at/touching his mom vs. Paul, the duration of his gaze/physical contact (whether or not it increased over time), and the nature of the physical contact (whether it was affectionate, resistant, etc.).

We do have some indication that Danny has progressed physically and socially during this time through follow-up interviews with his mother and grandfather. His mother, Lucia, stated, "He used to be kind of a bully, and now 10 months into 10 books a home that's pretty much vanished...now he waits for you [Paul] to come and he's so excited and

he gives you high fives and he's pretty much built up on that with all of us here... He doesn't go one day without giving a hug and a kiss to everyone in the house". Danny's grandfather agreed, stating "Now he comes to me...he didn't do that before... just now he just climbed on me. He knows how to give affection now. He is getting more attached to us now".

The coders also rated four statements on a 5-point scale (with 5 being the most in agreement and 1 being the least in agreement), as seen in Figure 3, providing another data point as to Danny's behavioral growth and mindset in each lesson. They indicated that between the first five and the last 5 five lessons, Danny became excited and affectionate, and acted less like he was "in a shell". While we weren't able to tease out a quantitative difference using the measures of "initiating physical contact" and "looking at people", we have some evidence in these qualitative follow-ups to suggest that looking at other variables and/or digging deeper into the ones we have already coded could produce quantifiable differences.

The dip in Lesson 5 can also be attributed, at least in part, to Danny having an "off" day, displaying behavior akin to being "in a shell" throughout. For each lesson, there are always outside factors that we were not able to measure the help to drive participation and behavior, which is why we chose to analyze 5 lessons from the start of Danny's participation and his 5 latest at the time of this analysis -helping to account for outside factor variation when averaged. However, this also begs the question of what the full distribution of such lessons looks like over time, and whether or not they too lessen over the course of the program. In follow up analyses, this is another variable we would like to analyze.

Figure 3. Qualitative Follow-Up Questions (Averages)

On a scale of 1-5 (with 5 being most in agreement, and 1 being the least in agreement), how would you rate the following statements:

Week of Lesson	Danny expressed excitement about the lesson	Danny was in a shell (you could not reach him or her) throughout the lesson	Danny was affectionate during the lesson	Danny was tuned in throughout the lesson
28	4.5	1	3	3.5
3	3	2.5	1	4
27	3.5	1.5	1.5	3
2	4	2.5	2	3
29	5	1	3	4.5
1	3.5	3	2.5	3.5
30	3.5	1.5	3.5	3.5
4	5	1.5	3	4
31	5	1	4.5	4.5
5	1	5	1	3
Average, first 5 lessons	3.3	2.9	1.9	3.5
Average, last 5 lessons	4.3	1.2	3.1	3.8

Attributing Danny’s growth to 10 Books A Home is naturally unfeasible with this study alone, especially he started preschool in August 2016. The closest we can come to understanding the role that 10BH specifically played in producing the aforementioned significant developments is through the eyes of his family, alongside these results.

When asked what, if anything, do they see 10 Books A Home contributing to Danny’s improvements, Lucia replied, “10 Books A Home helped give him that little bit of a push...to pretty much be able to understand not just everything that goes on in school...arithmetic and how to

write...but also pretty much building up on his social skills and how he processes things. I feel like with 10 Books A Home doing all of these activities that get his attention, that pretty much make him want to learn, has pretty much had him going above and beyond. **So we had an IEP meeting with the school district. He has surpassed all of his goals and some of his goals for next year...** For me to see that he’s learning so much and making so much progress, not just in his space in the classroom but also as a person...has been something that he hasn’t been able to do and 10 Books A Home pretty much helped him branch out.”

For instance, they give examples of Danny discovering enjoyment in reading during participation in 10 Books A Home. Lucia explains, “He never used to like to read. Books wouldn’t really interest him. So now that pretty much most of the books have been cars or trains...it will catch his attention right away. And he still has not stopped wanting to read Railway Rhymes that has Thomas the Tank Engine in it”. Jose and Lucia both give various examples of counting and how it has become a thing Danny does on his own all

the time, after doing it with Paul in his lessons. It is also clear from these interviews that Danny’s mom and grandfather have both embraced the lessons and pedagogy in their home, throughout the week in between Paul’s sessions – which is a major goal of the program. This begins to point towards evidence of promising programming successfully instilling learning with the concept of fun being sustainable for a longer term through continued propagation in the household.

Conclusion

Differences in the first 5 and latest 5 videos of Danny’s lessons with Paul suggest that he has significantly improved in his communication skills. Danny was 2.89 times more likely to answer questions and 2.2 times more likely to use multiple words during later lessons compared to earlier lessons. This amounts to substantial growth over such a short time span, which both his mother and grandfather attributed at least in part to Danny’s participation in 10 Books a Home during their interviews. On the other hand, we were not able to see quantifiable growth in his physical responses to his surroundings, with little movement in the rate by which he looked at people or initiated physical interaction. When we dug further into those metrics, however, we found evidence in our qualitative follow-ups that the answer may not be that simple.

While the coders did not code measurable differences in the rates by which he engaged physically or looked at others in the room, they did seem to find that Danny was more engaged, excited, and affectionate during the later lessons. Danny’s mother and grandfather both also indicated that this was true during their interviews,

leading us to believe that either the variables we specifically coded were not the right ones to delineate those changes over time and/or that we could dig into the minute differences in those variables to find where that perceived variation may be coming from.

It is hard to deny that Danny is progressing developmentally at an exciting rate, but there is a great deal more research we would need to do in order to discern the underlying causes of what we’re seeing. This study was small in scope – one of the inherent drawbacks of its design, but it was meant to be explanatory. **The fact that we were able to see differences after only coding 10 videos of one child in total, gives us hope that if we were able to increase the sample size to include all lessons of multiple children along multiple developmental trajectories that we would be able to draw far more robust conclusions about the influence of 10BH on developmental growth.**

In follow-up studies, we will not to not only increase the sample size of both videos and children and compare developmental trajectories as previously stated, but also gather more

information about outside influences to build a comprehensive effect model and discern a more unbiased effect of 10BH vs. parental involvement levels, home environment, past programming, etc. on child development. We would also want to be able to compare the effect of 10BH against specific “intervention” programs for special needs and/

or low-income children, to see if there are any differences and distinguish why that might be the case. In essence, this initial study has helped to spur a much larger research agenda, and provide a basis for the applicability of the 10 Books A Home program across a wider spectrum of neurodevelopment.

Citations

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