Blackbear Consultants – “Teaching Tasks”

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**Introduction**

Autism Spectrum Disorder (ASD) encapsulates a broad range of conditions that makes it hard for children and adults who are diagnosed with it to speak, socialize, and learn. People who are diagnosed with ASD and similar disabilities find it hard to integrate into today’s public schools and are in need of special education, where learning is tailored to suit how they think, feel, and act. One method that is popular in teaching young children with ASD and other similar disabilities is Discrete Trial Instruction (DTI).

DTI is a technique found as part of the Applied Behavioral Analysis (ABA) techniques that many teachers and clinicians employ as a method for helping children improve physical ability, cognition, social skills, speech, and independence. The methods in DTI are usually tailored towards the specific child who is being taught, but the processes remain the same. The reason it needs to be tailored is because each child has a different mental and physical age, which is heavily impacted by their learning rate of new material. A person could be 13 years old in physical life but have the cognitive capacity of someone who is just 5 years old.

DTI programs usually have problem solving aspects which are guided by reinforcement of the topic and each trial has some interaction with a parent or clinician that helps with that reinforcement, such as giving the child a treat or play time when they answer questions correctly. Once a child has mastered the basics of a skill or task, they go into more complex tasks that they are scheduled to learn and follow educational goals that they may need. These educational goals are listed in the Early Childhood Learning Guidelines and are designed to help children with ASD, and other similar disabilities grow as people and integrate themselves into society.

**Application Description**

Teaching Tasks (TT) is an application (app) designed to aid in the administration of Discrete Trial Instruction. The goal of the application is to provide games relevant to Discrete Trial Instruction that may be generalized so that it can fit into a DTI program for any child with the end goal of children being able to learn wherever and whenever they need to. This allows for continuous learning provided at a low cost to the parents. The games provided will reflect the progress of the user and get progressively more complex as the child progresses in their learning. Clinicians and parents will be able to track this progress through user statistics which are initially set through a diagnostic and then tracked as the child plays games provided through the app. Goals will be established for each child to achieve, which will show their progression through course material that fit within the guidelines set by the Early Childhood Learning Guidelines. With this application, parents and clinicians who deal with children that have ASD can accelerate learning and make it more convenient for everyone in the process without sacrificing academic performance.

The application will have a user menu landing page. This landing page will have a scrollable list of children names so that clinicians and parents can access accounts. There is a search feature and a feature to add and remove children as well. The clinicians are dealing with multiple children and this is why the add and remove features are necessary.

When a child is added, some diagnostic questions for the clinician and parents will pop up to gauge where the child is at in their academic progress. After this information is given by the clinician or parent, the games that appear will be tailored to the goals and abilities of the children. Once a child is selected from the list to start learning and playing, the user will type a passcode that pertains to the child, so the account is secure, and progress is not tampered with by other parties. No user information will be stored except for the name of the child so that clinicians and parents can identify the profile being dealt with. Only user progress such as trials, goals, and diagnostics are stored on the app locally to maintain the privacy of the clinicians, parents, and children using the app.

**Application Description – Game Menu**

The next section of the application pertains to one specific user. It is accessed after a child is selected in the user menu and the passcode for that child is validated. In this section, we see a few features. Ideally, the game will have a large go button near the center of the screen that they can use to resume where they left off in their progression. If the go button is clicked, users will be taken to the most recent game they had opened. The name of the current game and any progress will be shown just above the go button, with options to switch games from a list designed to help children with ASD learn.

The first game being released is matching, where children will learn to match shapes, then letters and numbers, and finally more complex objects that build from the basics. Some other games that will be offered will be based off the Early Childhood Learning Guidelines (ECLG) and the Verbal Behavior Milestones Assessment (VBMA) and Placement Program Manual commonly referred to as the VB-MAPP. The list of games will include those which help with learning the skills to appropriately identify colors, letters, numbers, and shapes. Skills which target labeling objects such as animals, vehicles, and foods are also a possibility. New additions to the app in terms of games will be designed to closely follow the ECLG, VBMA, and VB-MAPP which stress mathematical, literary, vocal, cognitive, and social development. This encompasses a wide variety of new game ideas in the domains of addition, subtraction, spelling, spatial awareness, and wh-cards for social skills.

As the clients become more familiar with their skill set and show increases in their development, the application will continue to grow as new games are added to the list of already existing games. Near the bottom of devices, some menu changes can be seen. The leftmost button will lead the user to the games section, the middle button will lead the user to the statistics and goals of that child, and the rightmost button will display general settings.

**Application Description – Gameplay**

Matching will be the first game introduced. It will primarily help children identify objects such as shapes, letters and numbers. When the go button is clicked or the game is selected from a scrollable list provided, a child will enter the game. Instructions will be represented at the top with written cues as well as potential verbal cues, and visual cues later on. Children will be prompted to do a specific task such as clicking a square or circle and will be prompted to do so again so that the system knows if they’re guessing or not. Shapes given will be of different colors and potentially different sizes so that the child playing will become aware that shapes can come in different forms. If they get the question correct, a sound will play, or the teacher will reward the child in another way to stimulate reinforcement of the topic.

As children get more and more tests correct, they will be prompted with a test that asks them to choose a shape from a list of shapes to see if they really know it or not. Once they pass a few of the tests the game will grow in complexity by either switching to another shape to practice or increasing the amount of shapes on the screen so that they can better differentiate the target shape from the distractor shapes given.

As children play games, they will be met with initial, short-term, and long-term goals. These goals will help the system recognize what the child knows and what the child doesn’t know. It is initially set through the diagnostic questions given to a parent or clinician to assess where the child is at in their learning. As children play the games, they will slowly achieve goals in learning through trials given to test them on what they have practiced.

Once the child achieves a short-term goal, they will be given another short-term goal to work through. A set of short-term goals will help the child achieve a long-term goal. Long-term goals will prove mastery in a certain skill and will overall help them progress in their education. These goals and progress will be shown through the statistics menu, where parents and clinicians can see how the child is doing as they play more games.

**Implementation**

We’ve decided to use React Native while favoring Android devices as our main goal with support for iOS coming later. After looking over available options for creating an app, we think it’s best to focus on using technologies that could work for both of these platforms in order to save on development time. We will be using Realm as our local database for the ease of use, speed, and most importantly it’s security standards that align with our own. Figma will be a helpful tool for us to create a mockup for our app and show basic functionality during the development cycle.

Cost reduction for parents with children who have ASD is a big goal. The application will be offered on tablets and mobile phones for portability and use at home (We will start with mobile phones on the Google Play Store for android users). Children with ASD, like traditional students in pre-schooling and kindergarten+, need a lot of time to grasp the easier concepts before moving on to more complex ideas such as spelling, reading, and mathematics. The only difference is children with ASD need trained professionals to help them learn, which costs a lot of money. With the creation of this app, families will be able to opt in and use the application as a form of homeschooling so that they can save on the expensive fees and payments and supplement some of their child’s learning at home.

**Similar Applications**

**PBS Kids Games - PBS Kids**

PBS Kids Games is a children’s learning platform. It helps kids learn the basics of mathematics and literature through fun and creative games. Each game specializes in one aspect of child educational material. It hosts 100+ games with special characters that kids may recognize from PBS kids’ television shows such as Sesame Street, Daniel Tiger’s Neighborhood, Odd Squad, and Dinosaur Train. Children can play an array of games like Whack-a-mole words, pizza topping math (Not the actual titles) and they all help the child learn some fundamental core topics in education. The app is available on android and iOS.

The app does a great job of making learning fun by taking shows from popular children’s television and making games with the characters, so that children are engaged and learn while having fun. In a way, this app is designed with the focus of helping kids learn while also disguising that fact from the player in the form of a game. This is a great example of an application that tried to teach kids through games. The difference between this game and the application above is that this game is not designed for children with ASD. It has many great features that may aid kids with ASD retain knowledge through fun games but is tailored mainly for the traditional student who has different strengths and weaknesses than a child with ASD. The app is also reported by users to have crashed and/or frozen on numerous occasions, which we hope to steer away from through user testing.

**Colors & Shapes - Kids Learn Color and Shape**

Colors and Shapes is a game where children learn racing, matching, and building skills. It’s designed to be colorful and playful while letting children perform various tasks to understand a color or shape. The game is available on android and iOS.

The game is very similar to the concepts of our project. We are trying to create a game where children with ASD can match, label, and identify various objects such as colors, letters, shapes, and numbers. This app could be an alternative to our own for children with ASD but will not provide the same goal structure and outcomes that our app is implementing.

A difference between this app and out own is that our app would give parents or clinicians the option to choose which tasks and goals their child should work on instead of the child choosing what to do themselves. Our app would also dynamically change tasks to be easier (or give hints) if the child has answered incorrectly several times.

**Proloquo2Go**

Proloquo2Go is similar to the later stages of our app. It hosts ways for children with difficulty learning words, reading, and writing to develop their skills effectively. The game is designed for children with disabilities in a sense and helps them learn the fundamentals of speaking and reading in both English and Spanish. It is a helpful tool for parents and therapists to use to help their children learn. The app is available on iOS.

The app is similar to what we are doing but does not implement DTI as a way of letting children learn. It targets mainly children who have trouble speaking, and so targets the same audience that would be using our app. It is very similar to the idea of “wh”-cards (“who, what, where, etc.”) that our app plans to host in the future. The difference is that our app will work more with the fundamental ideas of shapes, letters, and numbers rather than just advanced topics such as sentence structure and meaning.

Proloquo2Go also features customizability for cards (color, labels, pictures) which is a feature we would like to implement in later stages of development. For example, the parent user could create a group called “food” and add cards like “apple” or “orange” and then these cards would appear as questions or answer options in the various games.