Running head: ACTIVITY SCHEDULE FOR PLAYTIMES: CHOICECUBE

Activity Schedule for Playtimes: ChoiceCube

Cynthia Putnam

University of Washington

Activity Schedule for Playtimes: ChoiceCube

Activity schedules are commonly used by educators to encourage children to independently manage their work and playtimes. Typical activity schedules are notebooks or strips of cardboard that can display images and/or text graphics. The graphics are sequenced so the user is cued to perform tasks or activities. Activity schedules are often used at the pre-school level to help children with autism when they are asked to direct their own time, for example playground time or free-choice play times.

While many studies have supported the efficacy of activity schedules for children with autism, they present two challenges for educators during play-times; (1) they typically require prompting by the instructor to encourage adherence to the schedule and (2) they require an instructor to create the schedule in advanced so the instructor, not the child, is making choices on what to play. If created in a linear display, the instructor is also implying an order in which to engage in the play activities. Essentially, activity schedules used for playtimes present something that is supposed to be fun (play) as a series of tasks which require prompting; this is incongruent to the quintessence of play. This paper will introduce an experimental activity schedule, "ChoiceCube" that is designed to facilitate fun choice making for children with autism.

Background

Autism is a spectrum disorder, typically diagnosed by the age of three. Because it affects each individual to different degrees, autism is considered a spectrum disorder with three general areas of impairment (often referred to as the "triad of impairment"): 1) communication, 2) socialization and 3) repetitive, unimaginative and stereotyped patterns of behavior, play and interests (Sicile-Kira, 2004). Autism is one of five disorders categorized as a Pervasive Development Disorder (PDD); the other four disorders categorized as PDD are Aspergers syndrome, Childhood Disintegration Disorder, Rhett's Syndrome, and PDD – Not Otherwise

Specified (PDD-NOS). In common usage, Aspergers syndrome, PDD-NOS and autism are diagnoses that are collectively referred to as Autistic Spectrum Disorders (ASD). While ASD impacts individuals differently, there are some similarities among people with ASD.

Related to the third triad of impairment, children with ASD often display unimaginative patterns of play (Hughes 1998, Jarrold 2003). While for most children the experimental nature of play is naturally reinforcing, this is not always true for children with ASD. Additionally, there is believed to be a strong relationship between pretend play and the development of social skills, abstract thought, problem solving abilities and language (Bergen, 2002); therefore developing play skills is highly important to child development. Consequently, children who are unable to participate in typical play experiences are thought to be at risk for future deficits (Morrison, Sainato, Benchaaban, & Endo, 2002). Many investigations have examined methods to teach play skills to children with ASD.

Investigations examining play skill instruction include common therapies derived from behaviorism, such as discrete trial training and pivot response training which include reinforcement (Stahmer, Ingersoll & Carter, 2003). Other methods that have been studied to teach play skills include modeling for object and social play (Jahr, Eldivir & Eikeseth, 2002); and establishing play groups with typically developing children to encourage social pretend play (Wolfberg, 2003). A critical component and goal of all experimental play studies is for the child to move beyond the structured environment of the study and make his own play choices and then to find those choices reinforcing. It is common for children with ASD to show resistance to making choices and then a subsequent unwillingness to try new things, play with novel toys or engage in new activities.

Playtimes, such as playground recess or free-choice playtimes, are structured so that children are required to make play choices. If a child is resistant to trying new things, he may

behave disruptively when asked to make a choice that would result in a new experience (Dooley, Wilczenski & Torem, 2001); disruptive behavior can include crying, temper tantrums, and violent behavior towards themselves or others Additionally, children who have trouble trying new things tend to depend on adults to guide them from one activity to the next and do not develop critical independent choice making skills. Independent choice making becomes even more important as children age because performing independently is a prerequisite for success in inclusive classroom settings where child-teacher ratios are high (Bryan & Gast, 2000).

Many studies have examined the availability of choice as an antecedent intervention for individuals with ASD; the literature supports that the availability of choice positivity influences learning, responsiveness and other adaptive behaviors while decreasing maladaptive conduct (Carter, 2001). Since independent choice-making is an important learning objective for pre-school children, it is valuable for educators to develop strategies to facilitate independence and decrease reliance on prompts from adults. Activity schedules are one effective strategy for promoting independent behavior during free-choice play times. Previous research has evaluated the use of activity schedules to help children attend to tasks, encourage independent seeking of novel toys and activities, and develop independent choice making.

Bryan and Gast (2000) used activity schedules to help school-age children with ASD to independently engage in on-task and on-schedule behaviors during language art instruction in their classroom. Four children ranging in ages seven through nine were each given a picture activity schedule book composed of photos and line drawings of their classroom's four language art activity centers and associated tasks for each center. The study participants showed a 90-100% on-task and on schedule rate when they were using the schedules in contrast to a 10-20% rate without the schedules. The efficacy of activity schedules to increase play skill activities has been another research focus.

Morrison, Sainato, Benchaaban and Endo (2002) used activity schedules as part of a larger intervention aimed at increasing independent seeking of novel toys and activities and on-task behavior during free-choice play. In a multiple baseline design, four participants ranging in age 42-70 months helped construct their own activity schedules each morning by determining the order by which they wanted to engage in the four possible play areas. Results indicated a dramatic increase in on-task behavior, a decrease in disruptive behavior and a strong willingness to follow their co-constructed schedules. Additionally the authors collected extensive social validity data and found that both parents and teachers identified play skills as "very important" to preschool child development.

Activity Schedule Design

While the efficacy of activity schedules for helping children make novel play choices, stay on task, and increase their ability to make non-prompted independent toy choices is well supported by the literature (Massey & Wheeler 2000; Dooley et.al, 2001; Bryan & Gast, 2000; Morrison et. al., 2002; Tiger, Hanley & Hernandez, 2006; Wheeler & Carter, 1998), there have been limited investigations into different activity schedule designs. By far most research uses low-tech activity schedules designs, such as notebooks or display boards that display activities through photographs or illustrations in a sequenced order. High-tech versions, such as computer-based slideshows created in Microsoft PowerPoint and videos, have also been effective in teaching children with ASD a variety of skills including independent play, socio-dramatic play and following schedules at home (Dauphine, Kinney, Stromer 2004; Kimbal, Kinney, Taylor & Stromer, 2003). However, low-tech or high-tech, all previous research has been on schedules that present activity options in linear, sequenced presentations that are not necessarily preferred in all types of activities.

Activity schedules presented in a linear method create two challenges for educators

during play-times; (1) they typically require prompting by the instructor to encourage adherence to the schedule and (2) they require an instructor, either alone or with the child, to create the schedule in advanced so there is an implied order in which to engage in the play activities. Essentially, activity schedules present something that is supposed to be fun (play) as a series of tasks which require prompting; this is incongruent to the quintessence of play. The purpose of this study is to investigate an experimental low-tech activity schedule, "ChoiceCube", that presents activities in a non-linear mode on a stuffed cube designed to facilitate fun choice making for children with ASD (full description of the device is in the methods section).

Specific research questions are (1) does the ChoiceCube provide the same advantages found in using linear schedules, for example, does it help to increase (a) on-task behavior when a child is engaged in a specific play activity, and (b) independent choice making. Additionally, since some children with ASD have difficulties with making new toy choices, this study will measure if the ChoiceCube increases the number of activities participants will independently engage in during free-choice play and decreases any associated disruptive behavior observed when engaging in a new activity. Finally, we will use surveys with the participant's teachers to investigate social validity and usability measures to determine if (1) the Choice Cube was perceived as a "fun" choice making tool and (2) did it require less work from their perspective than previous activity schedules they have constructed.

Method

Participants and setting

The study will be conducted during free choice playtimes in the Project DATA program, which is part of the Experimental Education Unit (EEU) at the University of Washington. Project DATA is an intervention program designed for pre-school children with ASD. Three children with ASD who have exhibited resistance to making new activity choices during free-choice play

time and are familiar with the Boardmaker images will be chosen as participants.

Boardmaker images are illustrations currently used in the Project DATA classroom for schedules and signage. The teachers create the images on their computers, print them out, laminate them and attach Velcro to the back. They are typically about 2 ½ inches square.

Recruiting participants will involve sending letters home to the parents of children that fit the targeted profile. The letters will explain the study and include a drawing of the ChoiceCube and a detailed list of all materials used to create the cube. Additionally, a sample ChoiceCube will be available at the EEU for parental inspection.

Free-choice times for Project DATA occur after lunch and last one half hour from 12:00 to 12:30 PM. The room, approximately 40 feet wide by 25 feet deep, is accompanied by an outdoor play area open for free-choice during times of good weather. Typically there are six to seven indoor play areas established which include a combination of (1) an art area, (2) a blocks/building area, (3) a setting that might include a small city where the children can manipulate cars or people or a small farm setting, (4) a dramatic play area, (5) a book area, (6) a puzzle area and (7) a game area. During free-choice children are typically prompted to "make-a-new-choice" if they are perceived to be either playing in an area too long or behaving disruptively.

Apparatus

The ChoiceCube is a prototype stuffed toy weighing approximately 5 lbs using a simple construction described below:

- Stuffed cube approximatly 7" x 7" x 7" covered with non-flammable nylon Velcro-able fabric
- Stuffing is new washable non allergenic polyester toy filling
- The cube accepts existing board-maker symbols on the surfaces used currently for

activity schedules in the Project DATA classroom

- The cube has a timed battery-powered (2 AA batteries) vibrating alarm clock installed inside that can be removed
- Timer is a kitchen alarm: Polder 212-00 Digital Timer with vibrating alarm, audible alarm and alarm light weighing approximately 1 lb
- The cube is 100% washable with the timer removed
- All seams are double stitched and terminated by backstitching
- No attachments will be part of the ChoiceCube that could cause choking hazards such as buttons or eyes.

The cube is constructed by six individual panels attached by Velcro flaps (see drawings in the Appendix 1), each with an interior plastic stiffener composed of high-density polyethylene panels (HDPE). While it is not expected for the children to come into contact with the plastic, HDPE was chosen because it is considered safe; so safe it is currently used in water and milk bottles, cereal box liners and margarine tubs. Plastic panels will be cut and sanded so they have rounded corners to prevent injury in the unlikely event the cube is damaged. Timer panels will use a ¼ inch thick stiffener while all other panels will use a 5/8 inch thick stiffener to counter the timer's weight.

The timer panel is constructed so access to the timer is available through a Velcro fabric covered flap. The flap is sewn so that it is entirely self contained. The interior stiffener for the timer panel is cut so that the timer can clip onto the panel using the timer's existing clipping mechanism. The timer can be set for any increment designated by a teacher. Once the timer goes off, an instructor will be required to open a flap and push a single button that will reset the timer to the previous increment.

Procedure

A multiple baseline design will be employed across three participant children. The measured independent variable will be the introduction of the ChoiceCube toys during the after-lunch free-choice play time from 12:00 to 12:30 PM. We will measure three primary dependent variables over 20 minute observation periods beginning at 12:05: (1) the percentage of intervals of on-task behavior observed; (2) in the case of a new activity choice we will measure (a) was it prompted, (b) was the ChoiceCube used (after baseline), (c) how the cube was used (rolled or was a new center selected directly off the toy), (d) did making a new choice result in any disruptive or aggressive behavior; and (3) activity center data which will include the mean time spent in each activity and how many different activities the child engaged in during the observation period. See Appendix 2 for the code collection sheet.

On/Off task interval data. The following will be coded every 20 seconds as on-task behavior: (a) if the child's eyes were directed to the toy activity or a playmate (peer or teacher) also involved in the materials or toy in the activity center; (b) if the child manipulates the toy or materials appropriately (and not repetitively); and (c) if the child is engaged in conversation with a playmate (peer or teacher) who was also engaged in the play center activity. Off-task behavior will be coded if the child is (a) not performing as described above, (b) involved in self-stimulatory behavior or (c) behaving disruptively or aggressively.

ChoiceCube introduction. After the baseline collection period, seven ChoiceCubes (one for each activity center) will be introduced and presented to the entire classroom. During free-choice play the teachers will set up the cubes with Boardmaker symbols that represent the various play centers. The cube's timers will be set to vibrate five minutes after the start of free-choice time, and then will require a press of the timer button (located under a Velcro latch) so that the alarm will vibrate again in another five minutes. The children will be instructed that they

will have to move to a new center if the cube alarms more than one time while they are at the center, but they are free to come and go as they wish otherwise. They will be permitted make a new choice using the cube by (1) rolling their cube and doing whatever the top-facing side displays or (2) choosing a new play area by simply picking from the cube. Any child was welcome to use the cube; however, only data will be collected on the three participant children.

Measurement schedule. Baseline data will be measured by observing each child once a week and alternating the order in which they are observed each time. For example, in week one, Monday child A will be observed, Wednesday child B and Friday child C; then in week two the children will be sequenced CAB and then BCA. The ChoiceCubes will be introduced when stable baseline data for all three children is established. Experimental data will be collected for three weeks after baselines following the same schedule.

Interobserver reliability. Interobserver reliability will be assessed for 33.3% of all observations. Interobserver agreement will be determined by dividing the number of agreements by the number of agreements plus disagreements; minimum acceptable interobserver agreement for the on-task interval data will be set at 80%. Remaining event-related data will be set at 90%..

Procedural integrity. Procedural integrity will be assessed for 33.3% of all observations. Checklists will be used to determine if (1) the cube's timers are working correctly and (2) that the cubes are properly set-up with Boardmaker symbols that the participant children understand.

Social validity. Social validity and usability of the ChoiceCubes will be assessed after the study by a simple survey taken after the experimental phase by preschool teachers involved during free-choice playtimes. See Appendix 3 for the actual survey questions. The survey is intended to determine if (1) the Choice Cube was perceived as a "fun" choice-making tool by the participants and (2) did it require less work from their perspective than previous activity schedules they have constructed. (Results and discussion would follow here after the study).

References

Bergen, D (2002). The Role of Pretend Play in Children's Cognitive Development. *Early Childhood Research & Practice*, 4(1).

Bryan, L. C.& Gast, D. L. (2000). Teaching On-Task and On-Schedule Behaviors to High-Functioning Children with *Autism* Via Picture *Activity Schedules*. *Journal of* Autism *and Developmental Disorders*, 30 (6) p. 553-67.

Carter, C.M. (2001). Using Choice with Game Play to Increase Language Skills and Interactive Behaviors in Children with Autism. *Journal of Positive Behavior Interventions*, 3 (3) p. 131-151.

Dooley, P., Wilczenski, F.L., Torem, C.(2001). Using an Activity Schedule to Smooth School Transitions. *Journal of* Positive Behavior Interventions, 3 (1) p. 57-61.

Dauphin, M., Kinney, E.M., & Stromer, R. (2004). Using video enhanced activity schedules and matrix training to teach socio dramatic play to a child with autism. *Journal of Positive Behavior Interventions,* 6, p. 238-250.

Hughes, F.P.(1999). *Children, Play, and Development*. Needham Heights, MA: Allyn& Bacon.

Jahr, E., Eldevir, S. & Eikeseth, S.(2002). Teaching Children with Autism to initiate and Sustain Cooperative Play. *Research in Developmental Disabilities*, 21, p.151-169.

Jarrold, C. (2003). A review of research into pretend play in autism. *Autism*, 7(4), p.379-390

Kimball, J. W., Kinney, E. M., Taylor, B. A. & Stromer, R., (2003). *Lights, Camera, Action!: Using Engaging Computer-Cued Activity Schedules. Teaching Exceptional Children,* 36 (1) p.40-45.

Massey, N. G. & Wheeler, J.J. (2000). Acquisition and Generalization of Activity Schedules and their Effects on Task Engagement in a Young Child with Autism in an Inclusive Pre-School Classroom. *Education and Training in Mental Retardation and Developmental Disabilities,* 35 (3), p. 326-335.

Morrison, R. S., Sainato, D. M., BenChaaban, D. & Endo, S. (2002). Increasing Play Skills of Children with *Autism* Using *Activity Schedules* and Correspondence Training. *Journal of Early Intervention,* 25 (1) p. 58-72.

Sicile-Kira, C. (2004). *Autism Spectrum Disorders: A Complete Guide to Understanding Autism, Asperger Syndrome, Pervasive Developmental Disorder and Other ASDs*. New York, NY: The Berkley Publishing Group.

Stromer, R., Kimball, J. W., Kinney, E. M. & Taylor, B. A. (2006). *Activity Schedules,* Computer Technology, and Teaching Children with *Autism* Spectrum Disorders. *Focus on* Autism *and Other Developmental Disabilities,* 21 (1) p.14-24.

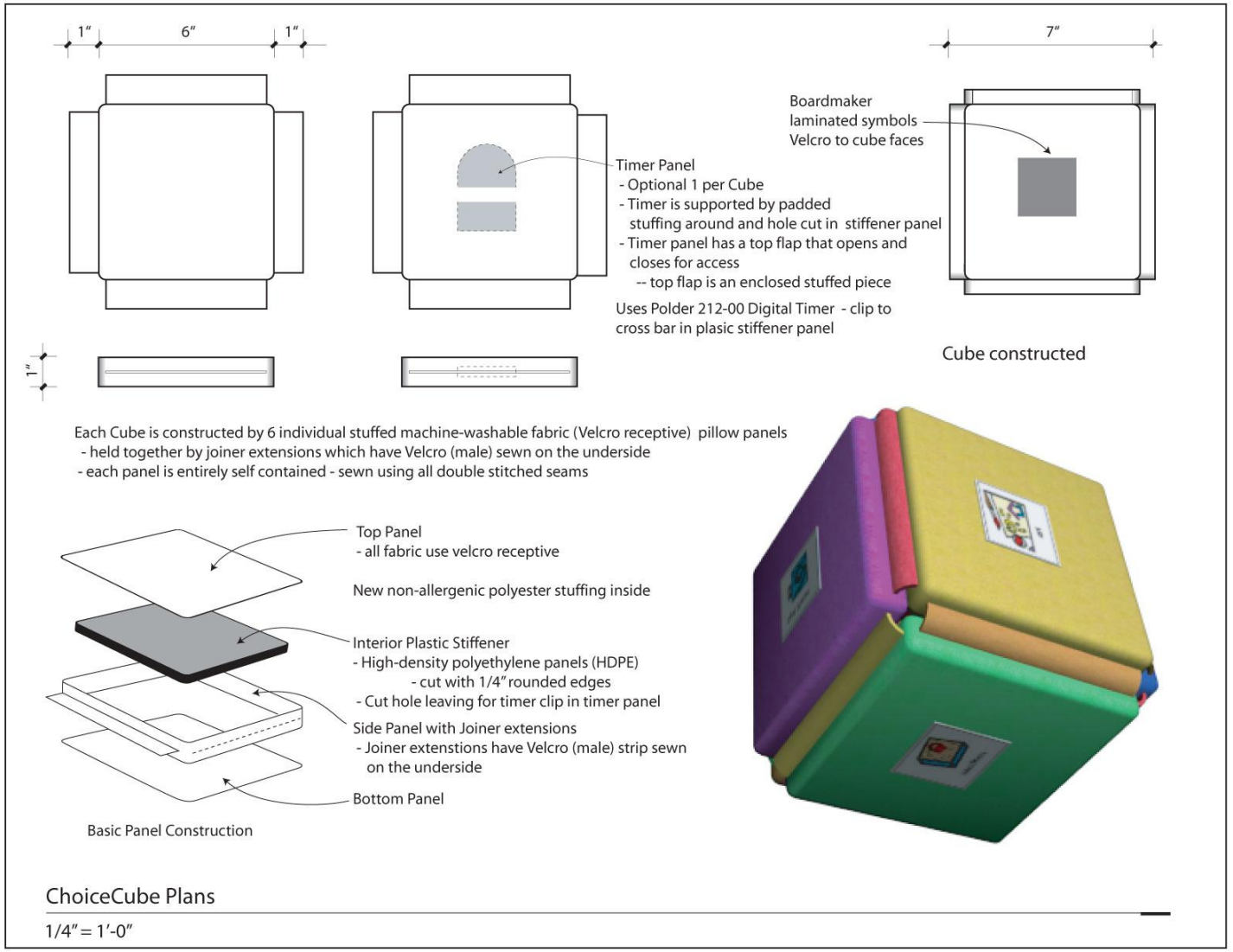
Tiger, J.H., Hanley, G.P. & Hernandez, E. (2006). *An Evaluation of the Value of Choice with Preschool Children.. Journal of Applied Behavior Analysis*, 39 (1) p.1-16.

Wheeler, J.J. & Carter, S. L.(1998). Using Visual Cues in the Classroom for Learners with *Autism* as a Method for Promoting Positive Behavior. *B.C. Journal of Special Education*. 21 (3) p. 64-73.

Stahmer, A.C., Ingersoll, B., & Carter, C.(2003). Behavioral approached to promoting play. *Autism, 7(4),* p.410-413.

Wolfberg, P. (2003). *Peer Play and the Autism Spectrum: The art of Guiding Children's Socialiation and Imagination.* Shawnee Mission, KS: Autism Asperger Publishing Company.

Appendix 1: ChoiceCube drawing



Appendix 2: Data collection materials

ChoiceCube: visual schedule observation code

Child Pseudonym _____ Observer _____ Date: _____

Goal (max) time in each activity center ____ Current Favorite activity center (s) 1 2 3 4 5 6 7

Interval Data (20 sec)			New Choice Event		
Int.	Activity Center	ON task (Interval)	Prompt	Cube	Disrp
1	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
2	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
3	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
4	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
5	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
6	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
7	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
8	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
9	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
10	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
11	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
12	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
13	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
14	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
15	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
16	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
17	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
18	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
19	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
20	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
21	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
22	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
23	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
24	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
25	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
26	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
27	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
28	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
29	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N
30	1 2 3 4 5 6 7 Trans	Y N-E N-T N-St N-Di	Y N C	Y-R Y-P N	Y N

ChoiceCube: visual schedule code

The purpose of this observation code is to record preschool children's activities during free choice play time and on the event of making a new choice. For each session, one child is observed for 20 minutes, at the end of a 20 second interval data observations researchers will record the activity center the child is physically present. Additionally, the observer will be asked determine if the child is on task. If the child is perceived as not on task, the researcher will record if it was because of a lack of eye contact, not playing with the toy or materials correctly, involved in self stimulation or behaving disruptively.

Additionally, each child will be observed during a new choice event; data will be collected on whether or not the new choice was prompted by an instructor and whether or not the ChoiceCube was used to facilitate a new choice (not applicable during baseline). If the ChoiceCube is used the researchers will record how the cube was used to facilitate a new choice (rolled or directly selected). Finally, record whether or not the child behaved disruptively either during the new choice event or directly after.

The following is a list of categories found in the code. These categories are defined in the subsequent pages:

1) Interval Data
   a) Location: prior to beginning a recording each activity center will be identified with a number available on a room floor plan, for example, the blocks activity center is identified as center 3.
   b) On/Off Task
      i) Y = Yes
      ii) N = No
         (1) N-E = No because of lack of eye contact
         (2) N-T = No because of inappropriate play with the toy or materials
         (3) N-St = No because the child was engaged in self stimulation
         (4) N-Di = No because the child is behaving disruptively

2) New Choice Event Data
   a) Prompt
      i) Y = Yes
      ii) N = No
      iii) C= Cube, the cube's timer vibrates which initiates the new choice
   b) Cube use (not applicable during baseline)
      i) YR = Yes, rolled
      ii) YP = Yes, new choice was directly picked from the cube
      iii) N= No, the new choice was made without using the cube
   c) Disruptive behavior
      i) Y= Yes
      ii) N= No

Interval Data Code

a) Location: each activity center will be identified with a number available on a room floor plan
   i) The child will be considered "IN" the activity center if he/she is physically in the proximity of the center
   ii) This will be coded at the end of each interval. For example, if during interval 13 Steve is playing with blocks, and then for interval 14 he continues to play with blocks for the first 5 seconds of the interval, and then moves to the art table for the last 5 seconds, he will be considered in the block activity for interval 13 and the art activity for interval 14.

   Example: Joe is sitting on the floor and playing blocks.

   Example: John is standing on the edge of the art table and is observing the teacher demonstrate a task to another student.

   Non-example: Sophie is standing on the edge of the art table but is playing with a toy transported from another area. (This would be coded as transition)

b) On/Off Task
   i) The researcher will code the child as on task (Y) if
      (1) The child's eyes are directed on the toy activity or a playmate (peer or teacher) also involved in the materials or toy in the activity center
      (2) The child is manipulating the toy or materials appropriately (repetitive actions are not considered appropriate)
      (3) The child is engaged in conversation with a playmate (peer or teacher) who is also engaged in the play center activity

   Example on task: Josie is watching the teacher as she demonstrates how to play a game

   Example on task: Beth is at the art table using the tools available to create the current project.

   Example on task: Ben is asking the teacher a question about the book he is reading

   ii) The researcher will code the child as off task if
      (1) N-E = No because of lack of eye contact

   Example off task: Brian is physically at the art table but is looking around the room at other centers or non-task related items.

      (2) N-T = No because of inappropriate play with the toy or materials

   Example off task: Sean is aligning his crayons in order rather than using them to draw.
   Example off task: Ian is banging the blocks together rather.

(3) N-St = the child is involved in self-stimulatory behavior

Example off task: Noah is standing in the dramatic play area flapping his hands

(4) N – Di = the child is behaving disruptively

Example off task: Clair is grabbing a toy from another child's hands.

New Choice Event Code

On the event of a new activity chosen researchers will note whether or not the event was prompted or self initiated.

a) Prompt will be coded either yes or no, or prompted by cube

i) Y = Yes: The child is considered prompted if a teacher reminds the child to pick a new play area or to use the cube to choose a new play area. Note that if the cube's timer vibrates and the child uses the cube on their own, this is considered a cube prompt. ONLY teacher prompts are tabulated as yeses

Example: Tasha has been playing at the sensory table for five minutes and the teacher verbally reminds Tasha to play with something new.

Example: Dillon is playing with blocks and the teacher leads Dillon by the hand to a new activity center.

Example: Ryan is at the art table and the teacher reminds Ryan to use the cube to make a new choice.

Example: Olive is playing with blocks, the cube's timer vibrates, and she rolls the cube and it comes up with a new activity, but ignores the outcome choosing to stay with the blocks. When prompted she then moves to the new activity.

ii) N=No: The child is considered not prompted if he/she readily moves to a new area on their own

Example: Mary is reading books and puts the book down and engages herself at the art table.

iii) C=Cube: If the cube's timer vibrates and this initiates a new-choice, it is considered cube prompted

Example: Jake is reading books and the cube timer vibrates the toy, he either throws the cube for a new choice or picks a choice from the cube and moves to a new activity center.

Example: Jesse is playing with blocks and the cube's timer vibrates for the second time. He looks at the cube without using it, or another child is using it, but he still moves to a new activity center.

b) Used Cube (Cube): The cube will be considered as used for a new choice if the child throws or looks at the cube immediately prior to moving to a new activity area. If the cube is rolled and the same activity center is "rolled" the cube is still considered used.

   i) YR = Yes, the cube was used and rolled

   Example: Rhonda is playing in the drama center and picks up the cube (without it vibrating) and throws it, and then moves to a new activity center.

   Example: Hanna is playing with blocks, the cube's timer goes off, she throws the cube, blocks come up in the roll, and she continues playing with blocks.

   ii) YP = Yes, the cube was used but not rolled; The cube does not need to be thrown to be considered used – the child can simply point or choose an activity off of the cube; however, if it is not thrown the child should not have the option to stay in the same activity center.

   Example: Gerry's cube timer vibrates the toy; he picks up the toy, looks at it and moves to a new activity.

   iii) N = No, the cube was not used to make a new choice.

   Example: Scott is playing with puzzles and he gets up and moves to the art table without looking at or throwing the cube.

   Example: Jen is playing with blocks, the cube's timer alarms, and she gets up and moves to the book area without using the cube (this would be coded as Prompted by cube).

c) Disruptive behavior: on the event of a new activity chosen or prompted observers will note if there was any associated disruptive behavior
   i) Y = Yes, which includes crying, kicking or hitting a peer or teacher, throwing a toy etc.

   Example: Brady is playing with trains is either prompted by the cube's timer vibrator or the teacher to make a new choice. He resists using the cube or moving to a new activity center and engages in disruptive behavior, for example crying or pouting.

   ii) N = No, which will be coded any time a new choice is made without any associated disruptive behaivior.

Appendix 3: Social Validity Survey

Q.1 Have you ever used activity schedules before?

☐ Yes ☐ No – move to Question 2

1a. If yes, what types of schedule did you use?

☐ Notebook using Boardmaker images

☐ Linear cardstock with Boardmaker images

☐ Other, describe:

1b. Tell me a bit about the problem the activity schedule described above was meant to ameliorate:

Rate the Cube: How do you feel about the following statements?

Q.2. I feel the children had fun making new choices with the ChoiceCube

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐

Q.3. The cube was very easy to set-up and use

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐

If Yes on Question 1: Q.3. The cube easier to use than previous activity schedules

Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
☐	☐	☐	☐	☐

What improvements could be made to the cube's design?