Tablet-Based Activity Schedule for Children with Autism in Mainstream Environment

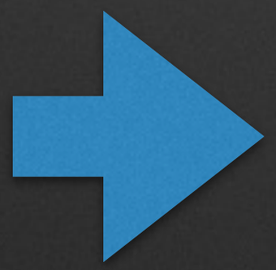
C. Fage[1,2], L. Pommereau[1], C. Consel[1], E. Balland[1], H. Sauzéon[1,2]

1. Phoenix Research Team, Inria, Talence
2. Disabilities and Nervous System Lab EA-4136, University of Bordeaux, Bordeaux

Mentor : Mary Pietrowicz

School Inclusion of Children with ASD

- **Proven benefits** ***(Hunt & McDonnell, 2007)***
- **Autonomy impeded by difficulties in classroom activities** ***(Cramer et al., 2011)***
  - Managing daily routines
  - Making transitions between activities
  - Engaging in social interactions



Activity Schedules to support classroom activities

Activity Schedules in School Context

- Goal-directed activities
- Decomposing an activity into successive steps
- Each step represented by a text and/or a picture
- Paper-based supports

Examples of paper-based activity schedules
(Hayes et al., 2010)

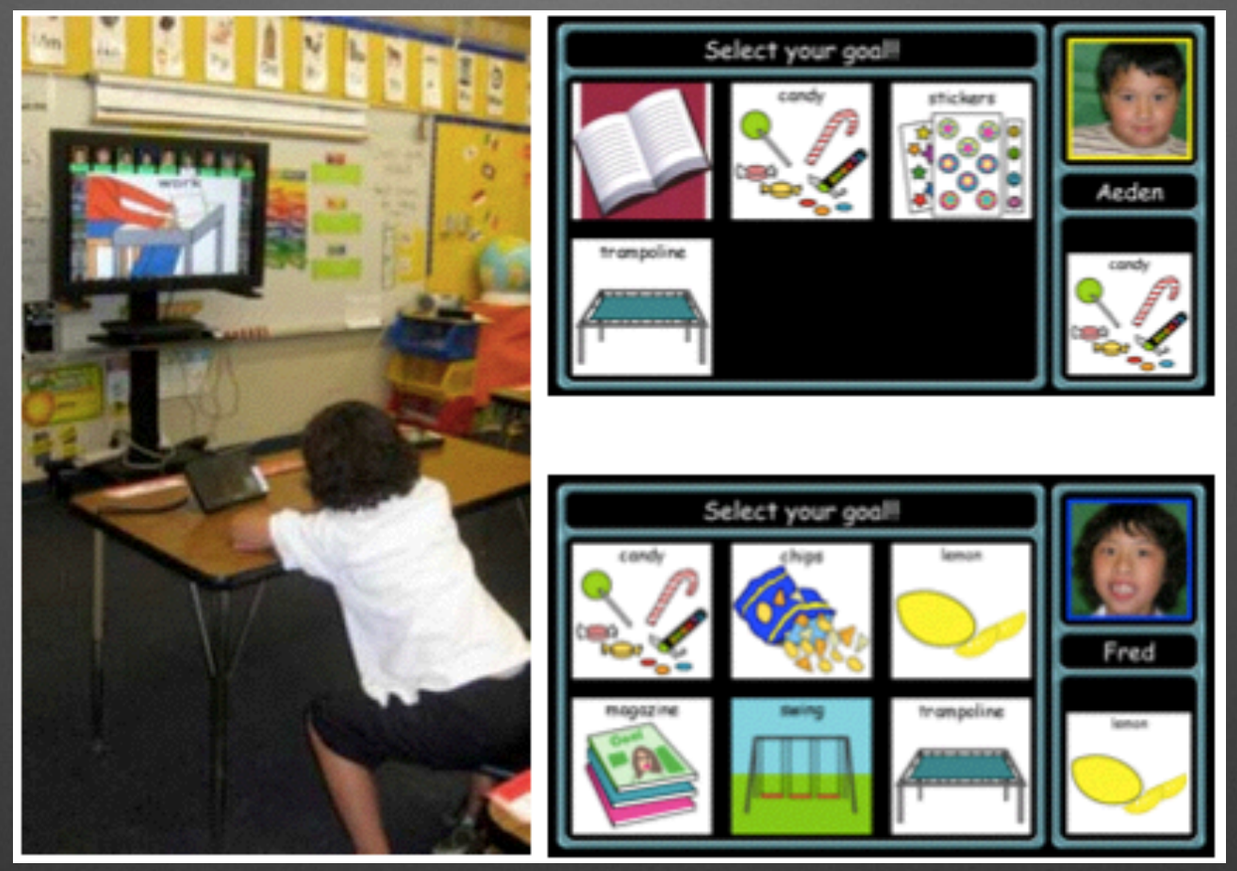
Their usage promotes autonomy *(Koyama et al., 2011; Lequia et al., 2012; McClannahan & Krantz, 1999)*

Limitations of Paper-Based Activity Schedules in School Context

- Time-consuming to create for stakeholders
- Not flexible
- Cumbersome to use for children
- Stigmatizing

Examples of paper-based activity schedules
(Hayes et al., 2010)

Activity Schedules on Technological Support in School Context



vSked *(Hirano et al., 2010)*

Effective in protected environments

Requirements for Designing Interactive Technologies for Children with ASD

(Hirano et al., 2010; Hayes et al., 2010; Hourcade et al., 2013)

Protected environments

Specific and individualized tasks for special education classrooms

- Special education teacher
- School aids
- Therapists

Clear-mapping between actions

Rely on visual supports

Flexible

Simplicity

Mistake-free

Predictability

Avoid distractive stimuli

Requirements for Designing Interactive Technologies for Children with ASD

(Hirano et al., 2010; Hayes et al., 2010; Hourcade et al., 2013)

Mainstreamed environments

Tasks ?

Stakeholders ?

?

Clear-mapping between actions

?

Rely on visual supports

?

Flexible

?

?

Simplicity

?

Mistake-free

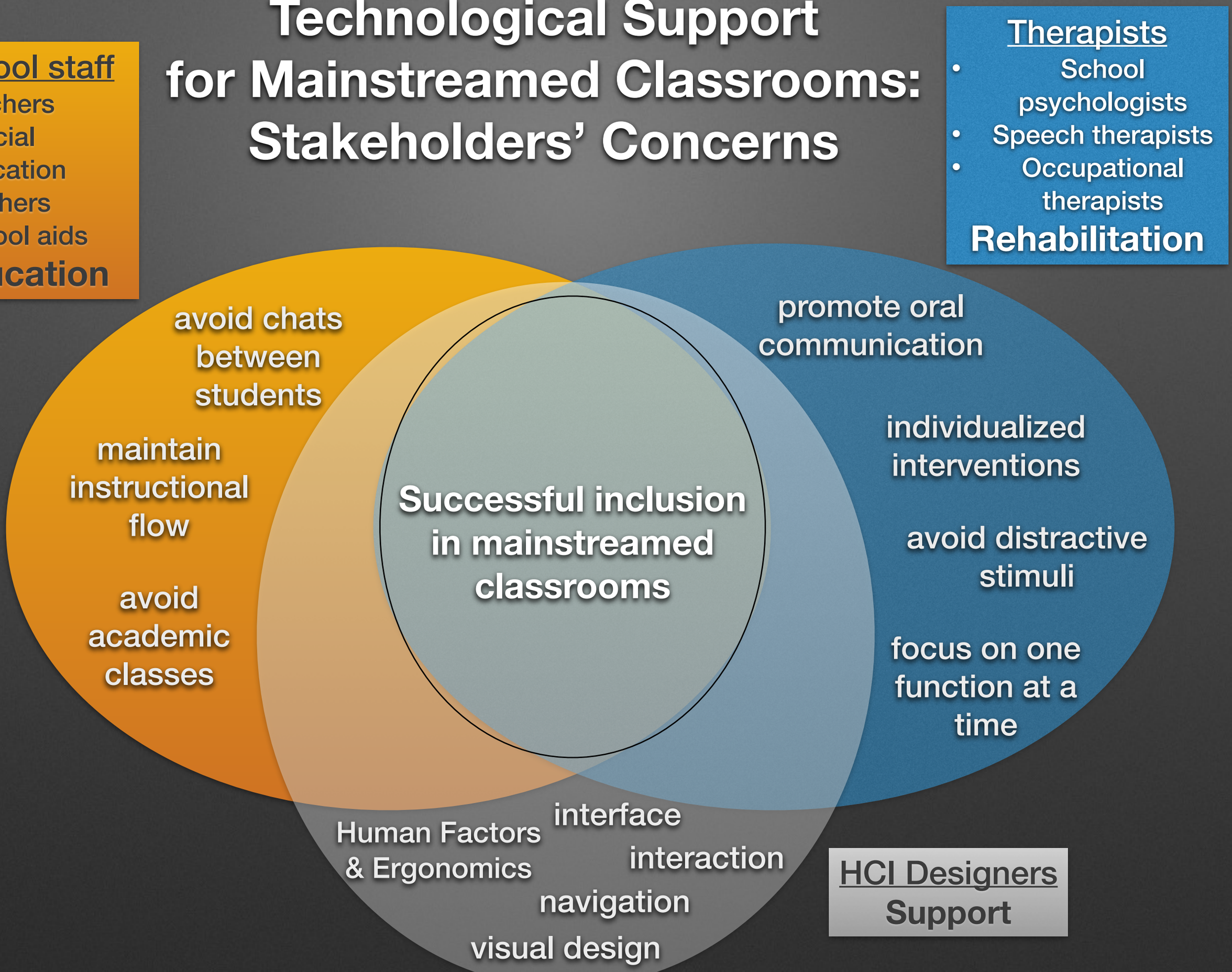
?

Predictability

Avoid distractive stimuli

?

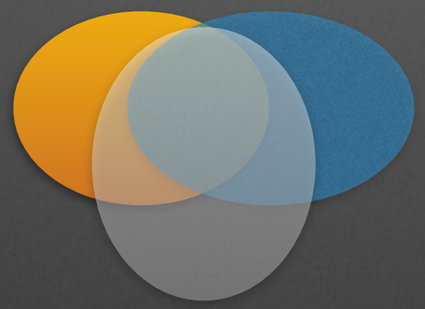
Technological Support for Mainstreamed Classrooms: Stakeholders' Concerns



Our approach for Designing Interactive Technologies for Mainstreamed Environments

Mainstreamed environments

Participatory Design

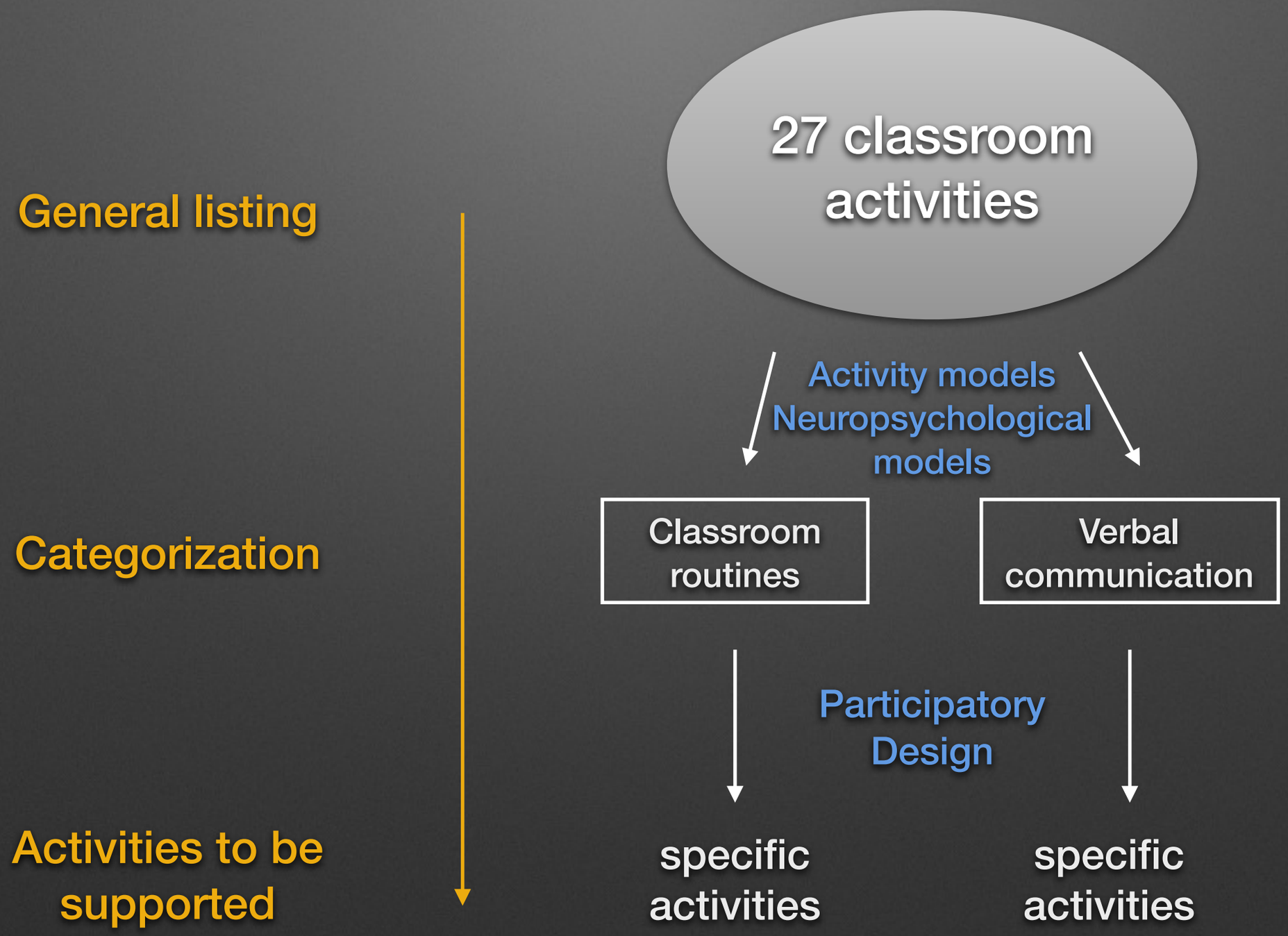


Activities to be supported

Design Principles

- Teachers
- Special education teachers
- School aids
- Therapists

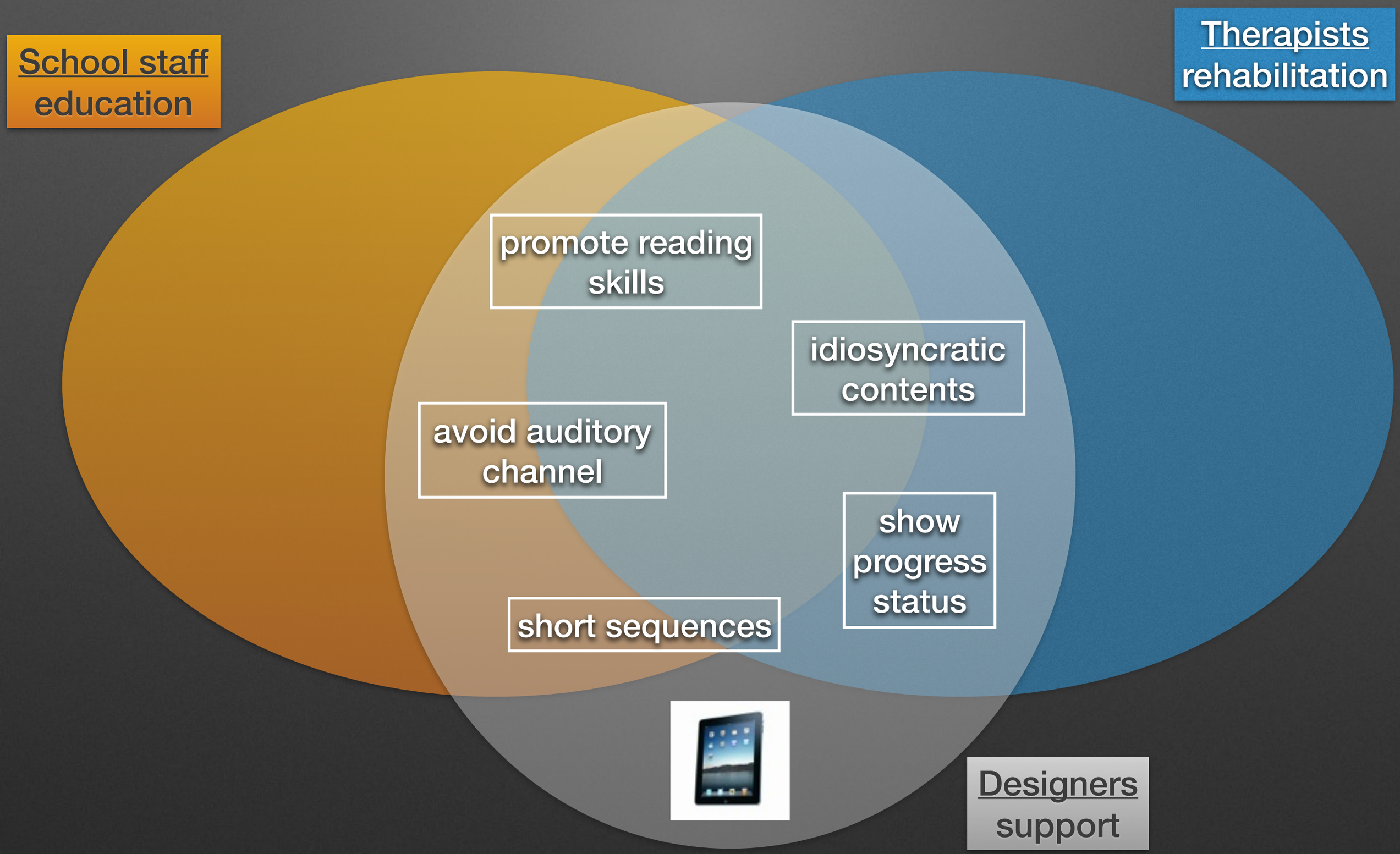
Outcome of Participatory Design: Design Principles



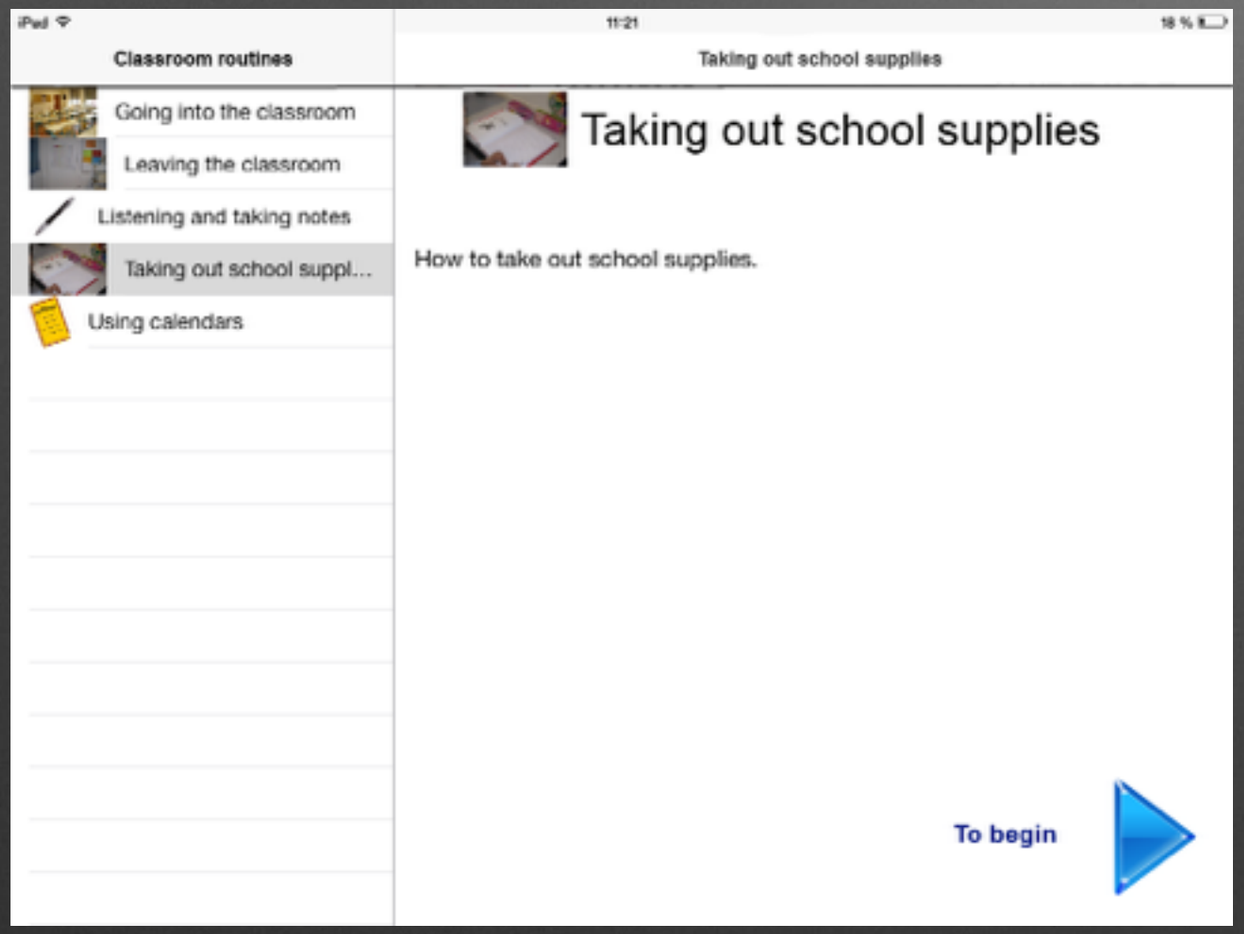
Outcome of Participatory Design: Activities to be Supported

CLASSROOM ROUTINES	VERBAL COMMUNICATION
Going to classroom	Answering the teacher
Taking out school supplies	Answering a classmate
Listening and taking notes	Talking to teacher
Using calendar	Talking to classmate
Leaving the classroom	

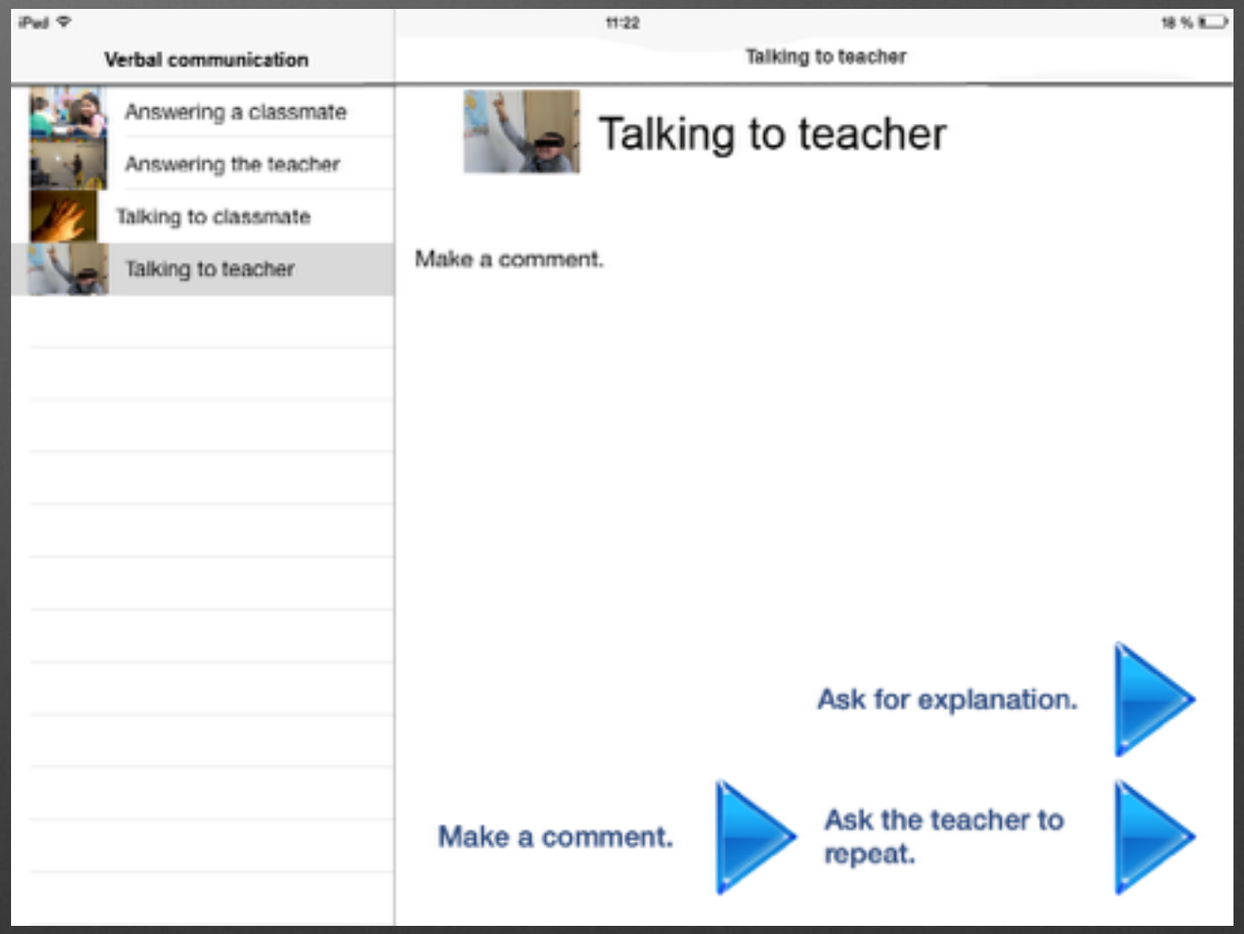
Outcome of Participatory Design: Design Principles



Classroom Schedule+: An Example of Implementation

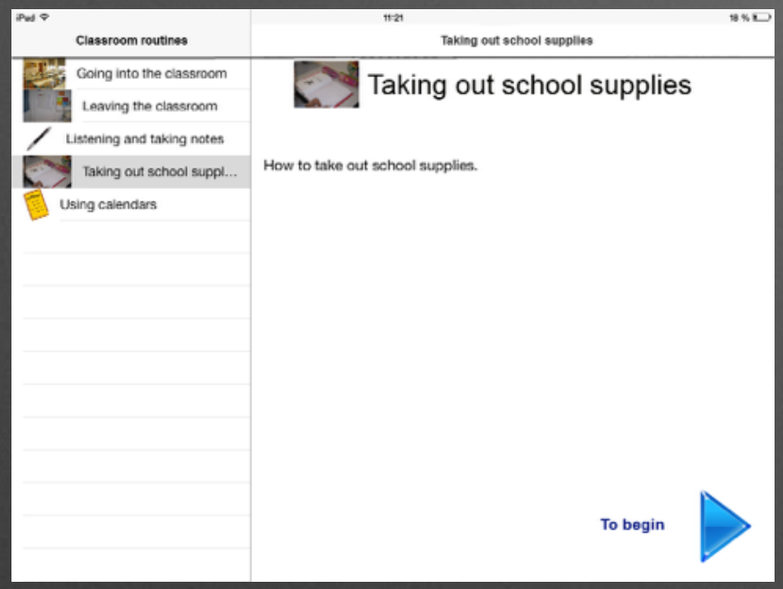


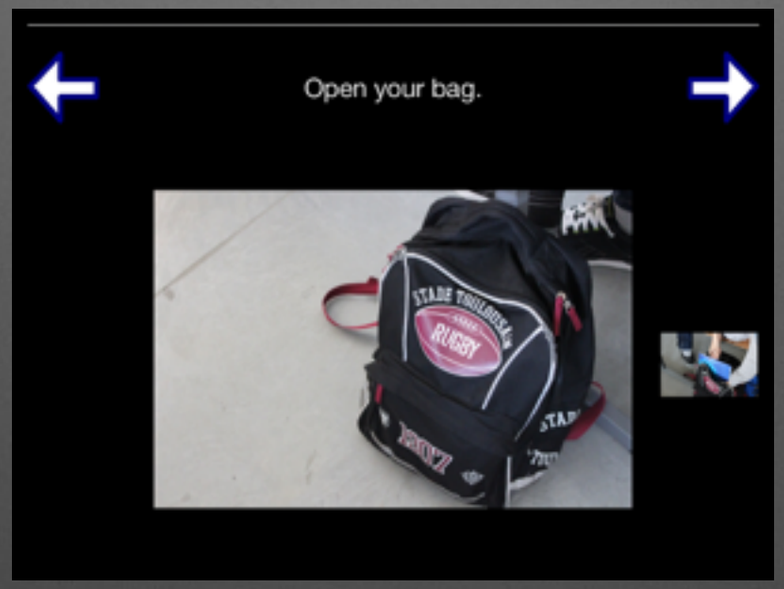
Classroom routines

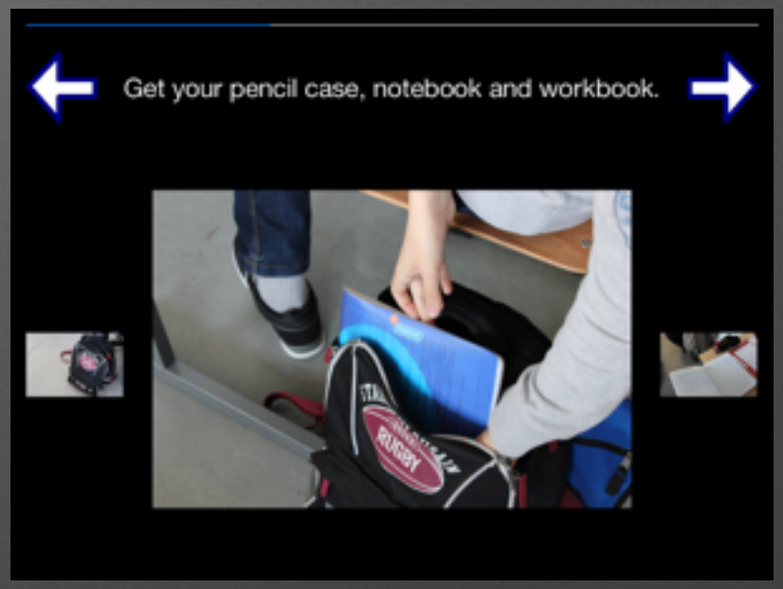


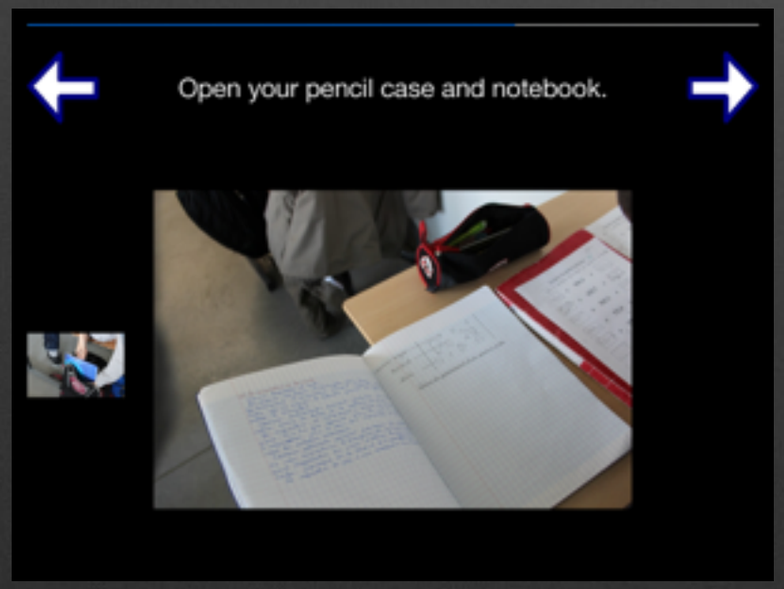
Verbal communication

Classroom Schedule+: An Example of Implementation

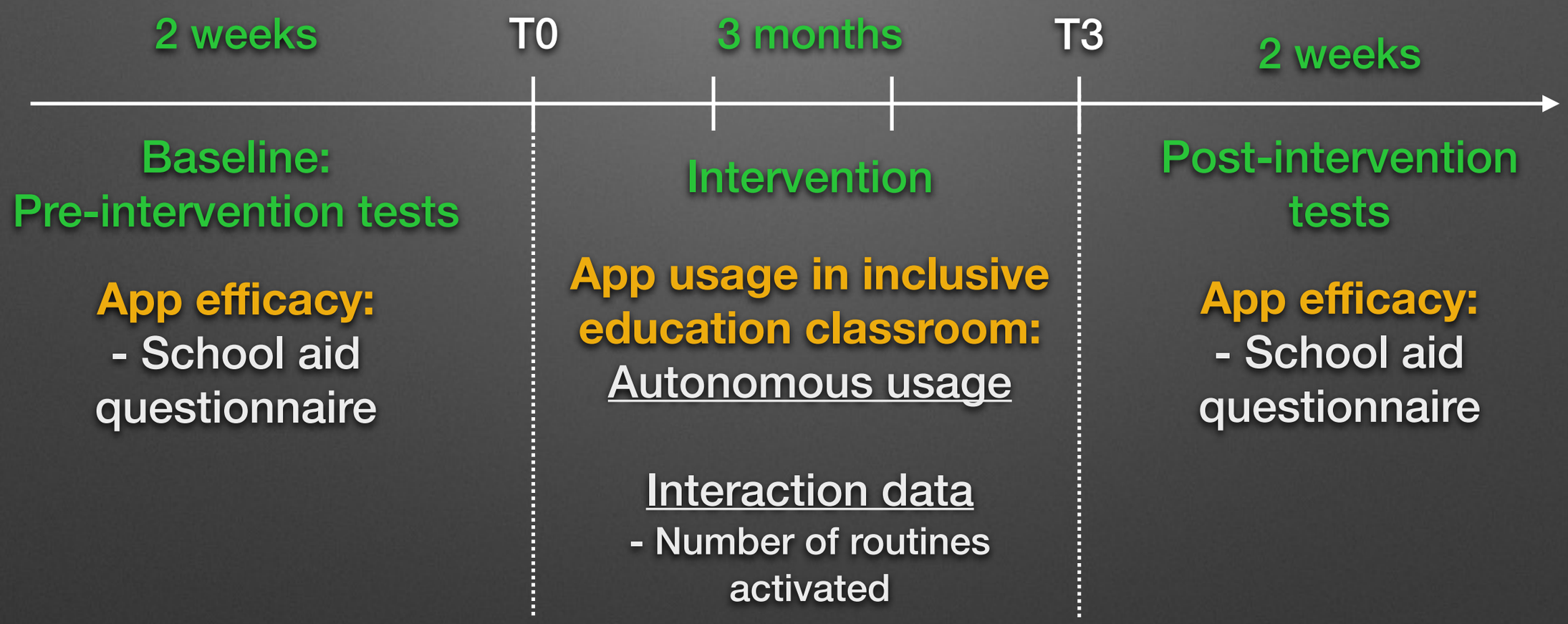








Assessment: General Procedure



- Can Classroom Schedule+ be used in mainstreamed classrooms ?
- Is Classroom Schedule+ effective to support for activities in mainstreamed classrooms ?

Assessment: School Aid Questionnaire

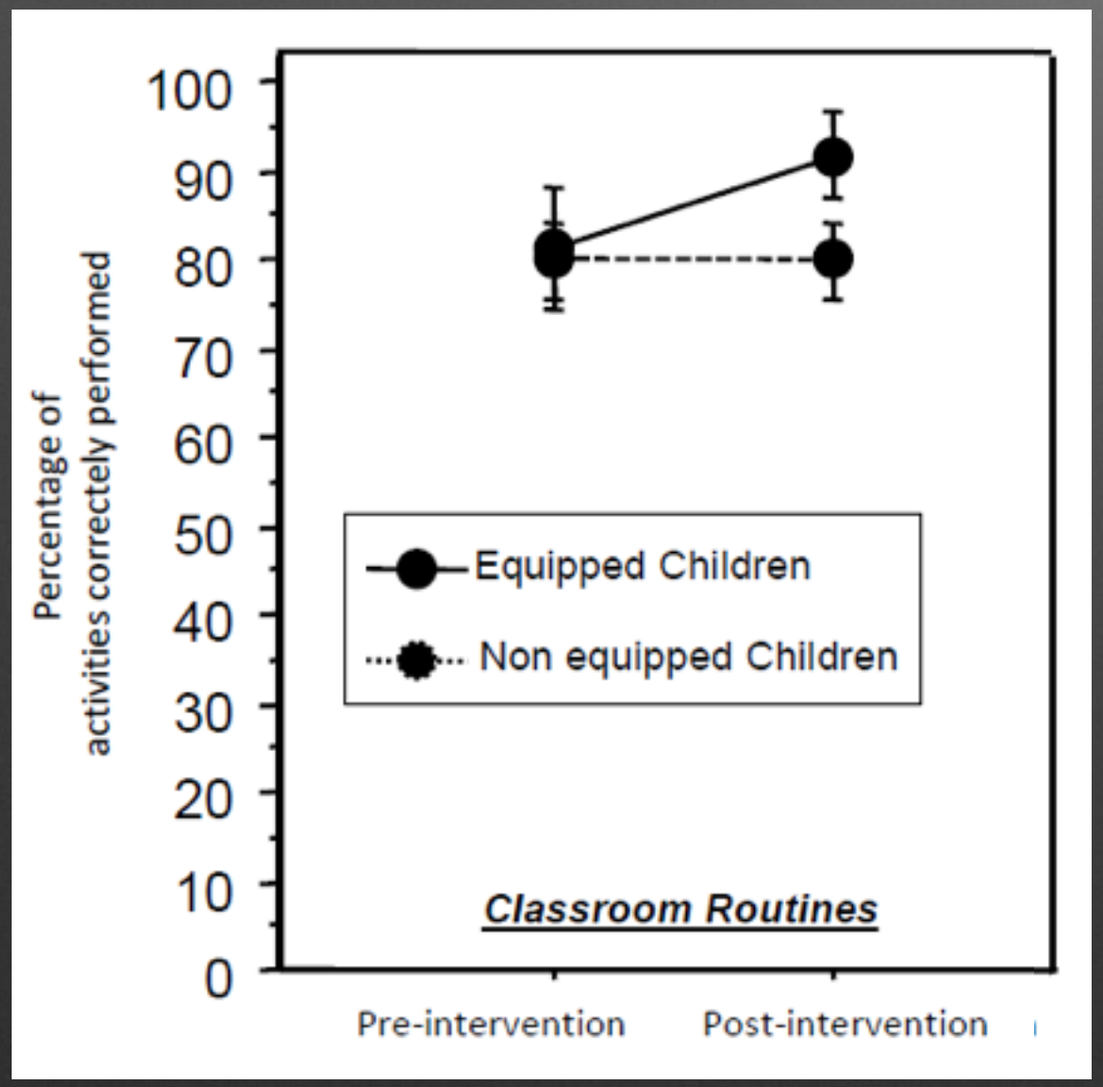
TAKING OUT SCHOOL SUPPLIES	UNOBSERVABLE / NOT DONE	DONE WHEN REQUESTED / WITH HELP / BADLY	DONE AUTONOMOUSLY
OPEN YOUR BAG			
GET YOUR PENCIL CASE, NOTEBOOK AND WORKBOOK			
OPEN YOUR PENCIL CASE AND NOTEBOOK			

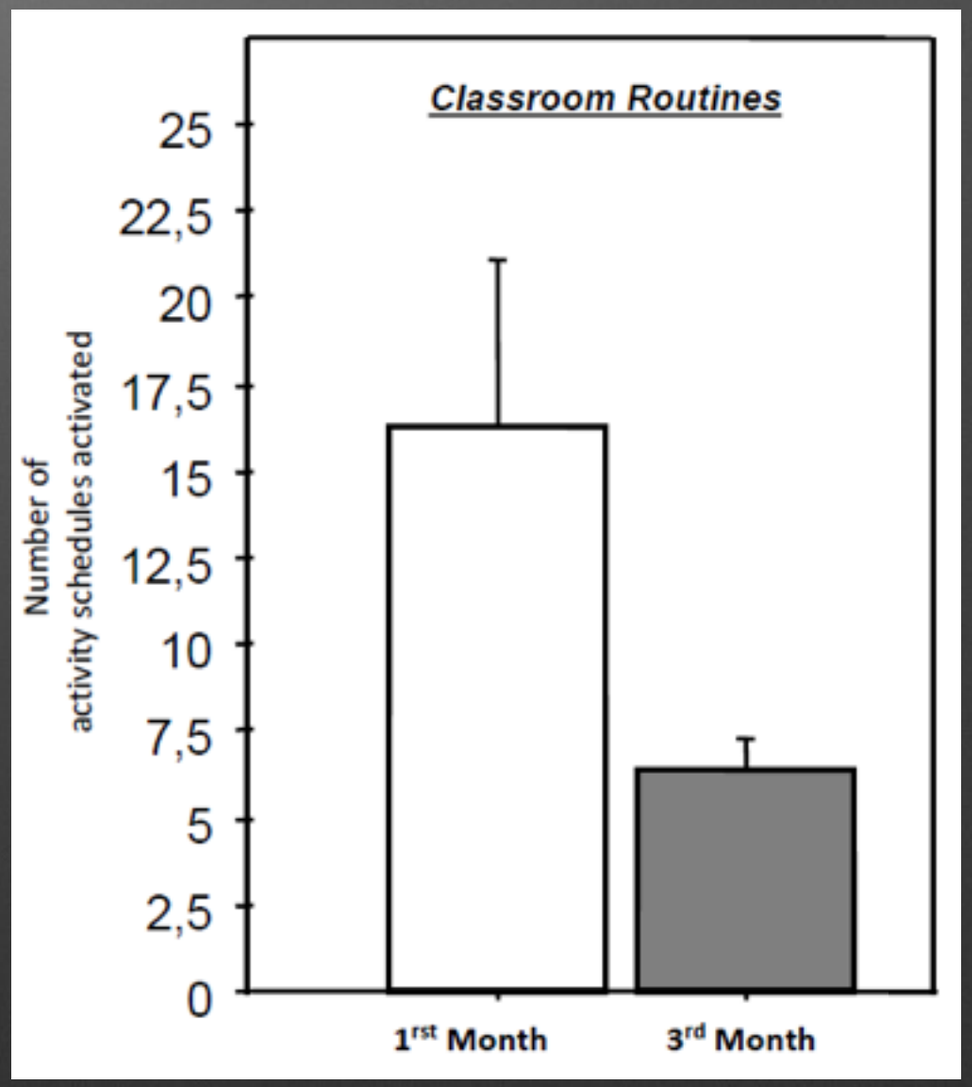
Assessment: Participants

	EQUIPPED CHILDREN WITH ASD (N = 5)	NON-EQUIPPED CHILDREN WITH ASD (N = 5)	MANN & WHITNEY U-TEST P VALUE
Age M (SD)	15.00 (1.22)	14.60 (1.14)	> .700
IQ M (SD)	74.00 (29.83)	66.50 (26.72)	> .600
SRS M (SD)	79.80 (37.42)	86.80 (30.51)	> .700

Results:
Classroom Routines

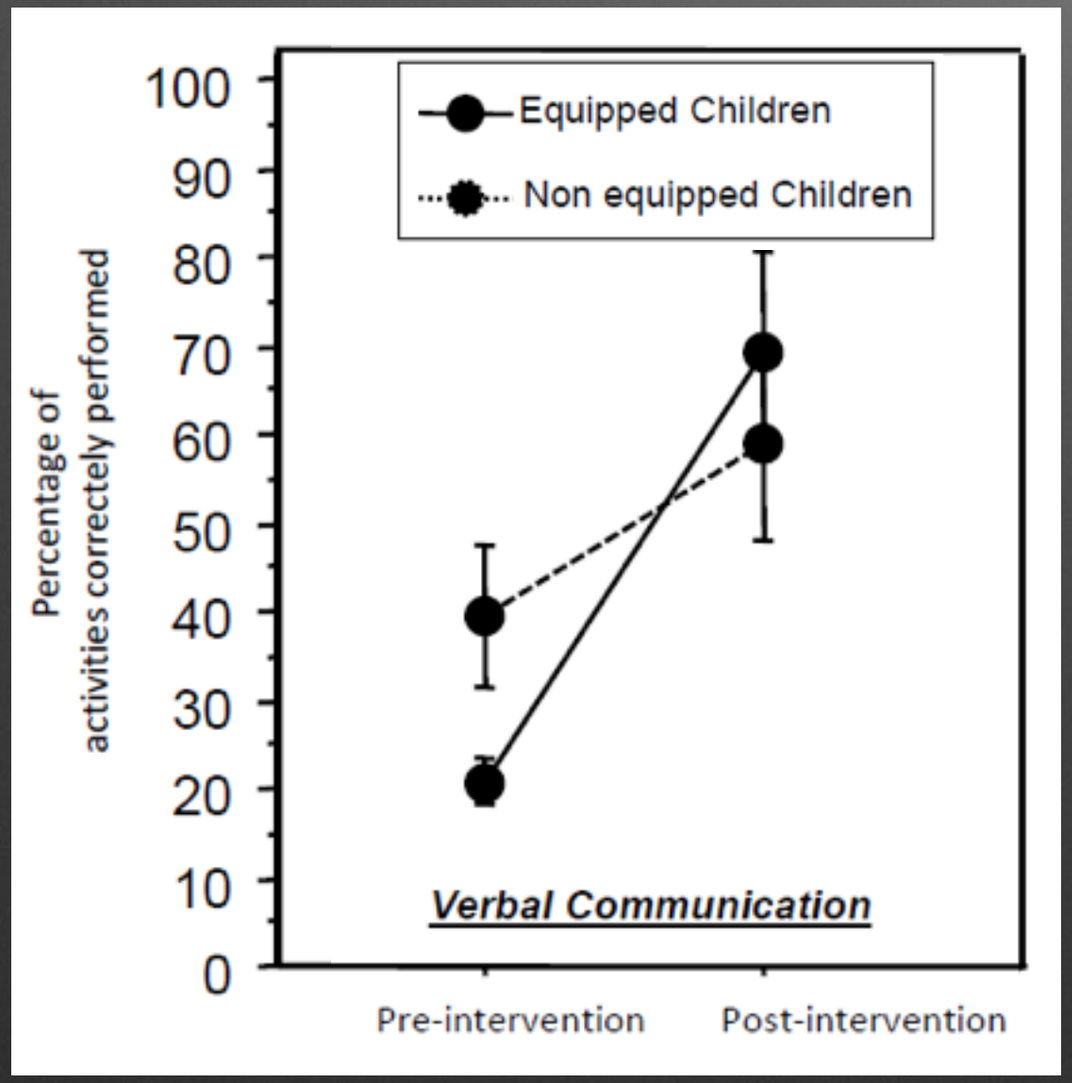
Classroom routines are improved and seem to be acquired

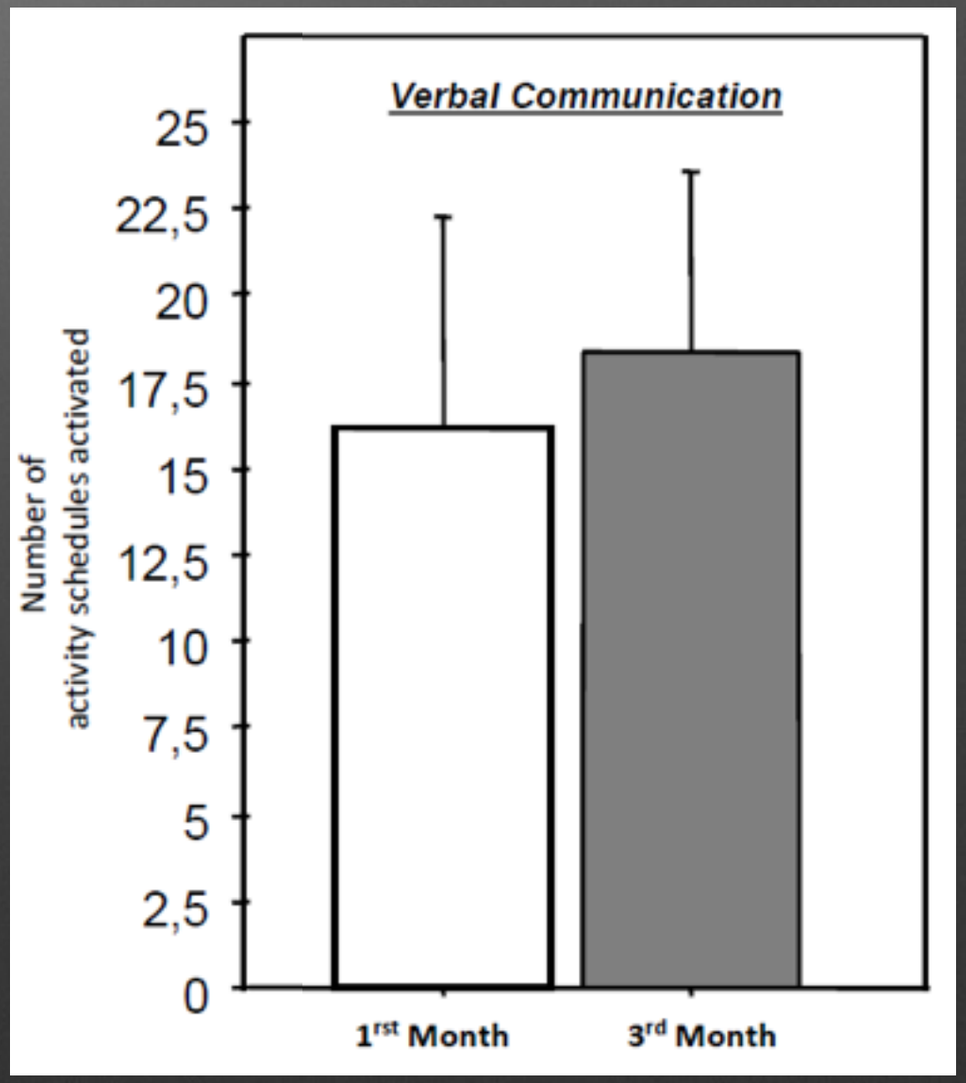




Results:
Verbal Communication

Verbal communication is improved but still requires assistance





Discussion

- Autonomous and efficient use of Classroom Schedule+ in mainstreamed environment
- Participatory Design allowed app infusion in mainstreamed environment
- Relevance of flexible visual supports for AS in school settings

Conclusion

- Classroom Schedule+: a tablet app supporting task-management
- Increased socio-adaptive behaviors in mainstreamed classrooms
- Insights on design of AS in mainstreamed classrooms

Perspectives

- Larger study:
    - 18 students with autism equipped with Classroom Schedule+
    - 18 students with intellectual disabilities equipped with Classroom Schedule +
    - 18 students with autism non-equipped with Classroom Schedule+
- Generalization of the approach to other tasks (emotion regulation, etc.)
- Funding for a longitudinal follow-up of equipped students