

Current and Future Possibilities in Mobile Technology and Autism Education

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This presentation is partially based on work undertaken collaboratively with:

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And other members of the HANDS Consortium

Some of the slides are adapted from a joint presentation with Dr Gyori for the Research Autism Lorna Wing Seminar Series in 2011.

My Key Points

- ▶ Mobile tech can potentially make a difference to social and life skill functioning in ASD
- ▶ Research projects have shown the potential
- ▶ The current market has lots of untried and untested apps; hard to make it pay
- ▶ Mobile tech could be used to achieve inclusion of ASD in mainstream, but there are challenges
- ▶ Future developments could offer new opportunities – esp. re wearables, monitoring..

Autism Spectrum Disorders and social skills

- ▶ Developmental disorder resulting in lifelong condition:–

Triad of impairment* (DSM 4) – social engagement, communication and flexible regulation of behaviour, self and interest* often leading to feelings of being on the edge of society.

* Wing and Gould, 1979, Bailey, Phillips&Rutter, 1996

Autism Spectrum Disorders and social skills

▶ DSM 5–

- Persistent deficits in social communication and social interaction across multiple contexts
 - Restricted, repetitive patterns of behavior, interests, or activities
 - Symptoms must be present in the early developmental period (but may not become fully manifest until social demands exceed limited capacities)
 - Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning.
- 

Mobile Systems for Autism

Life Skills

Social Skills

Emotional Regulation

Behaviour Change



A number of recent studies:

Mechling, Gast, and Seid (2009) Mobiles for task transition

Gentry, Wallace, Kvarfordt, and Lynch (2010) Mobiles as cognitive aids in high school students

Tentori and Hayes (2010) Mobiles for cues in social situations

Neely et al (2013) iPADS on reducing challenging behaviour

Other recent iPad studies

the HANDS project

Helping **A**utism–diagnosed teenagers **N**avigate and
Develop **S**ocially

June 2008 – October 2011

7th Frame Programme of the European Commission
Accessible and inclusive ICT (ICT–2007.7.2)

10 partners from 6 countries



the HANDS project: aims

a mobile-ICT-based support system for HF teenagers with ASD

> specific aims

- > *enhance social integration & participation*
- > *daily life skills, social behaviours & communication*
- > ***via supporting well-established intervention approaches***

> further potential benefits

- > *on efficiency of intervention*
- > *on efficiency of human resources*
- > *novel ways of data collecting/research*

the HANDS system

two-component software system

mobile component – for the client

can be brought into focus situations of intervention

individualised contents

multimedia

easy-to-handle

web-based component – for the professional

creating & managing contents ...even from away

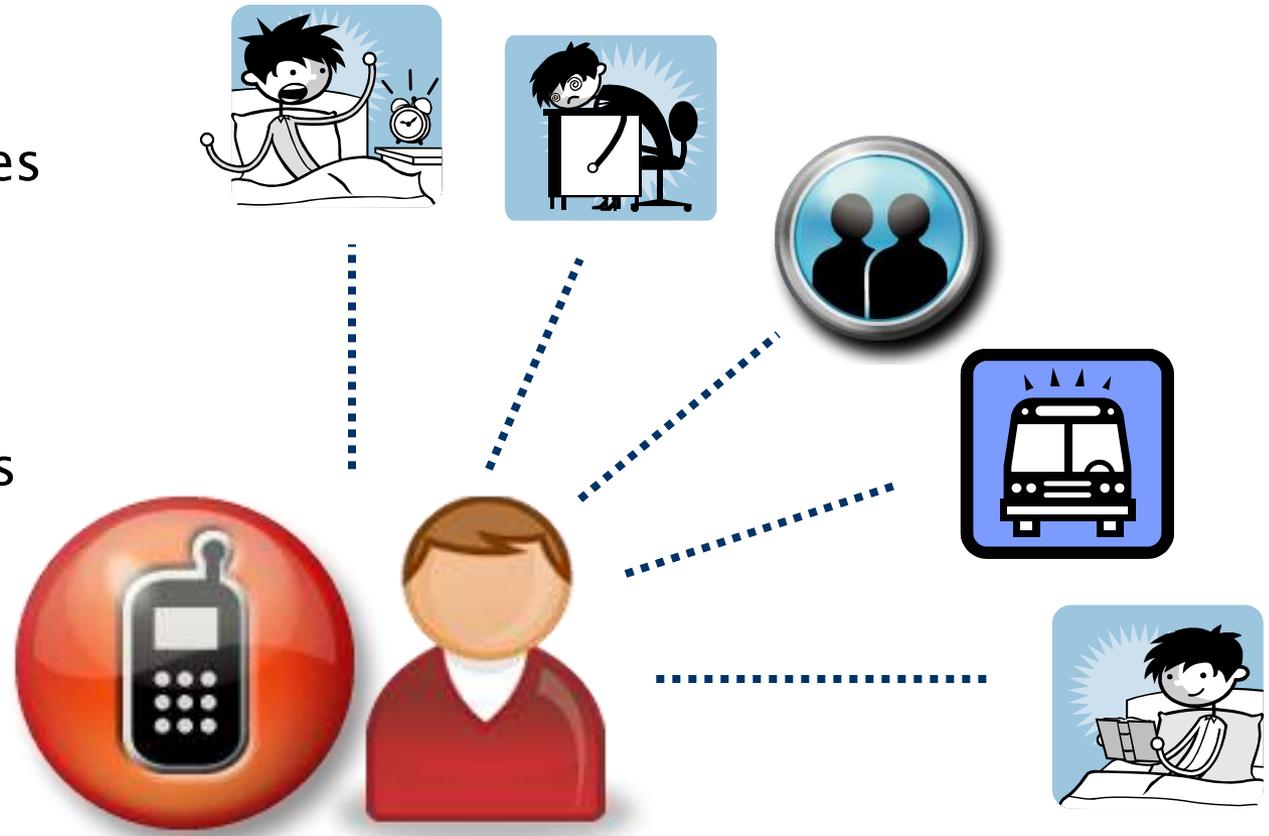
supervising mobile activity ...even from away

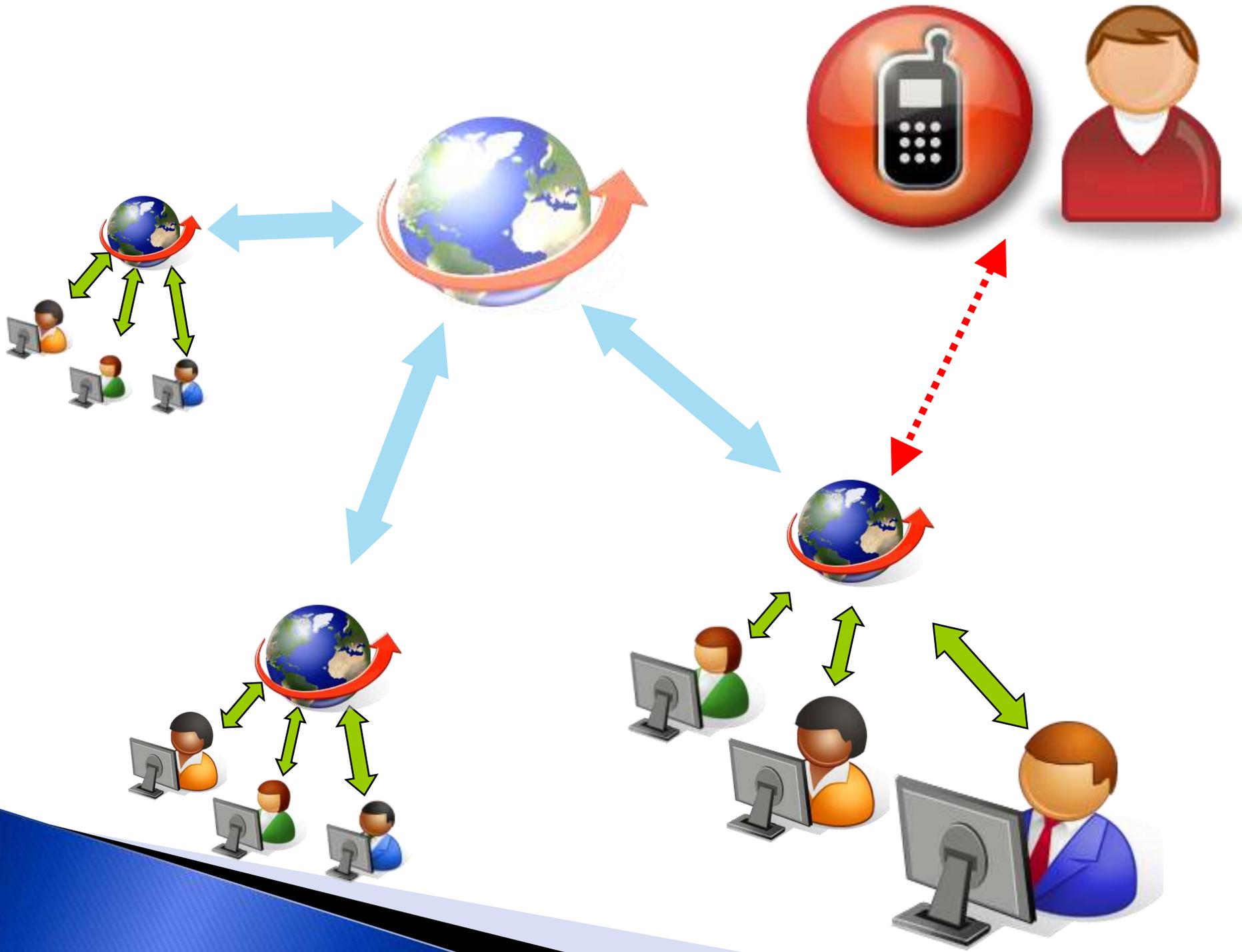
sharing knowledge

mobile ↔ web **remote synchronisation**



- > daily routines
- > institutional routines
- > social situations
- > transportation
- > free time
- > learning novel skills
- > etc.





Hands tool was designed to be used to support independence in areas including:

- ▶ Managing money
- ▶ Preparing for difficult situations
- ▶ Understanding and managing time
- ▶ Emotions and appropriate reactions
- ▶ Organisation within and beyond school
- ▶ Health and hygiene
- ▶ Food preparation
- ▶ Travel
- ▶ Shopping



an example

- > high functioning boy (12) with ASD
- > diabetes
- > swimming classes are vital but hard to manage for him



PT Steps

PT Steps - administration
Story: visiting the dentist

[Back to PT list](#)

Add as Template

visiting the dentist

- ring the door bell and li...
- follow signs to the rece...
- wait for the receptionis...
- Say your name and the...
- Listen to where the rec...
- Wait until your name is...
- go to the dentist room
- the dentist will check t...
- the dentist will tell you

Story

Name:

Description:

Update story

Cancel story

Story Steps

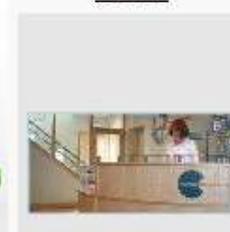
[ring the door bel...](#)

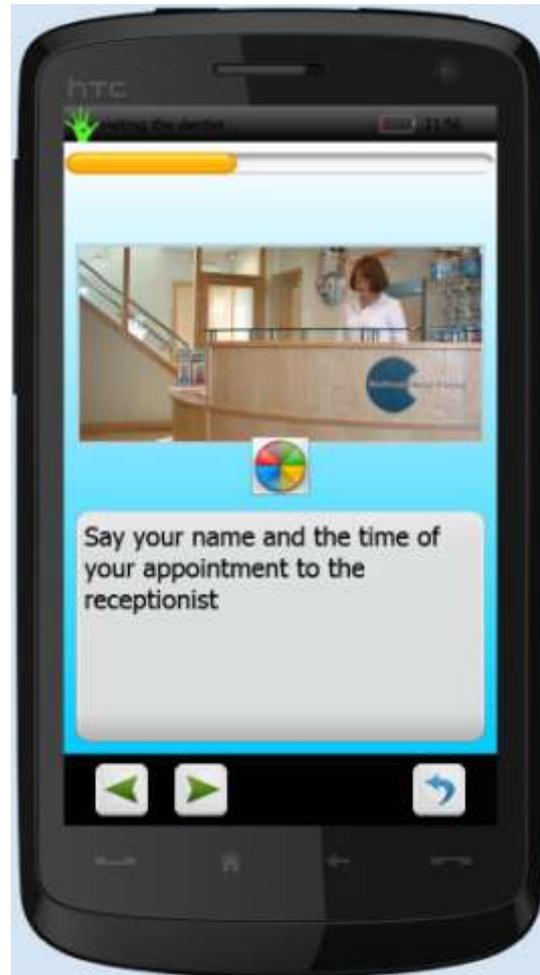
[follow signs to t...](#)

[wait for the rece...](#)

[Say your name and...](#)

[Li...](#)





developing & testing HANDS

- > 2-phase iterative development process
 - >> 2 prototypes
- > 2 streams of scientific expertise & research
- > challenges and difficulties about **development**
 - > *quickly evolving technological context*
 - > *efficient communication across disciplines*
 - > *etc.*

Quantitative Approach, led by ELTE University team

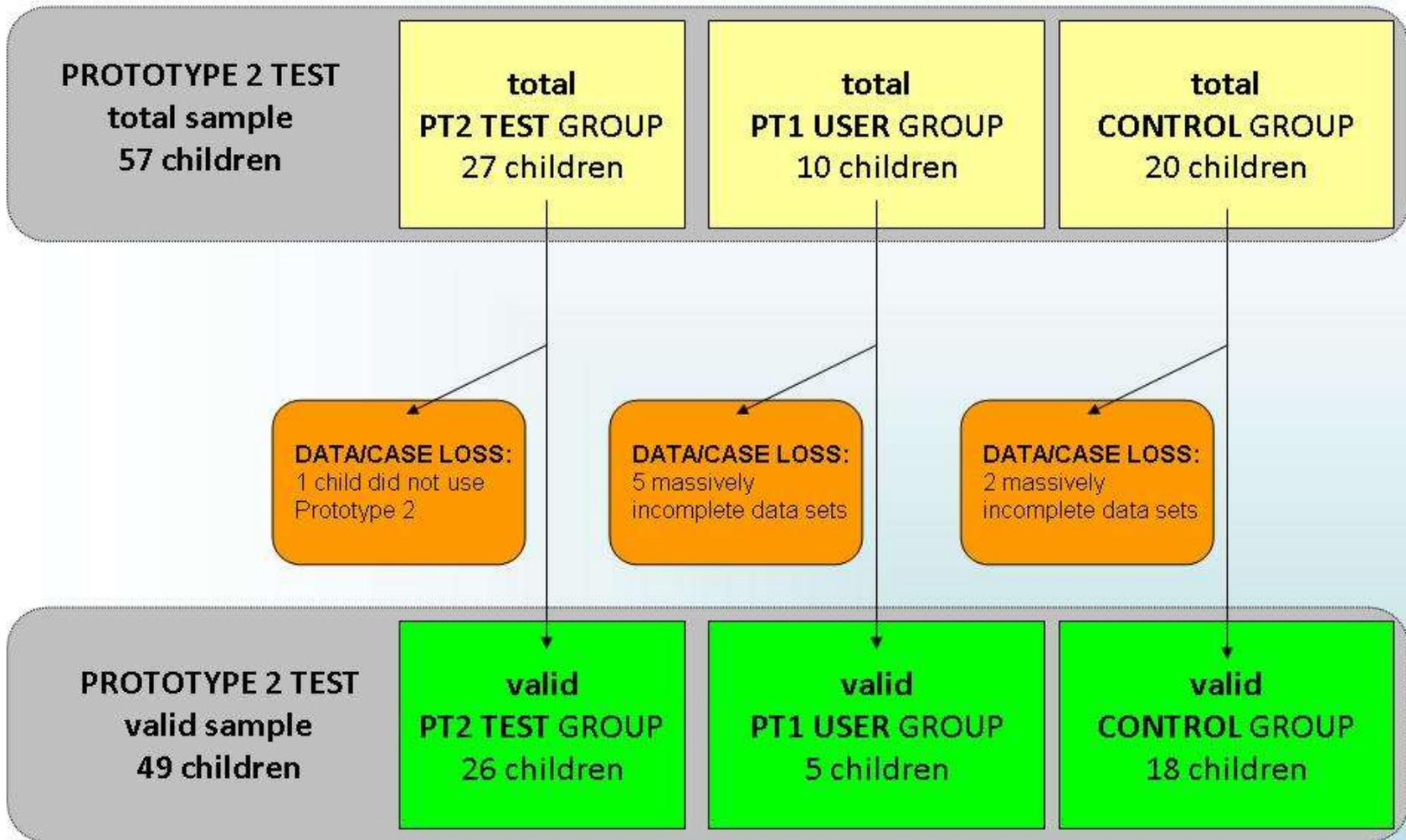
> **'quasi Randomised Controlled Trial'**

- > test group: HANDS-assisted educational support
- > matched control group: 'treatment as usual'
- > pre-test / post-test & test / control comparisons
- > Testing 1st prototype 2010 academic year, 2nd prototype 2011 academic year

sample

- > 4 countries, 6 schools, total N=49 (57) teenagers with ASD
- > male/female = 45/4
- > age: m= 14.38 years; SD=1.7; range 10,68 - 17,72
- > IQ: m= 85.37; SD=15.93; range 53 - 118
- > diagnosis: clinical, confirmed by *ADI-R* and *ADOS*
- > educational context:

autism-specific school or class with an evidence-based approach on a daily basis



Qualitative (led by Dr Mintz)

- ▶ 4 schools – 15 teachers, 27 children and parents.
- ▶ Naturalistic case studies:–
 - Interviews with all parties involved,
 - Observations in classrooms,
 - Questionnaires to 10 overseas teachers.
- ▶ Codes and categories for analysis created a priori and in situ and the data was analysed using Nvivo.
- ▶ .

Findings from quantitative studies

> **on the HANDS support system**

- > seems effective on both short and longer term...
- > in developing highly specific behaviours as well as wider skills
- > though *not* for all teenager–teacher user pairs
- > on conditions of success >> **Qualitative**

Findings from qualitative studies

What are the key mediating factors?

- Social aspects of mobile technology use by adolescents
 - Use and effects in school and at home – exploiting the credibility of the teacher
 - Some children prefer to receive behavioural messages from a device
 - Mobile Marriage – other functions are important too
- 

Conclusions from qualitative studies

- **Social Aspects for Teenagers and Mobile Devices – is it the same or different for ASD?**

Findings from qualitative studies

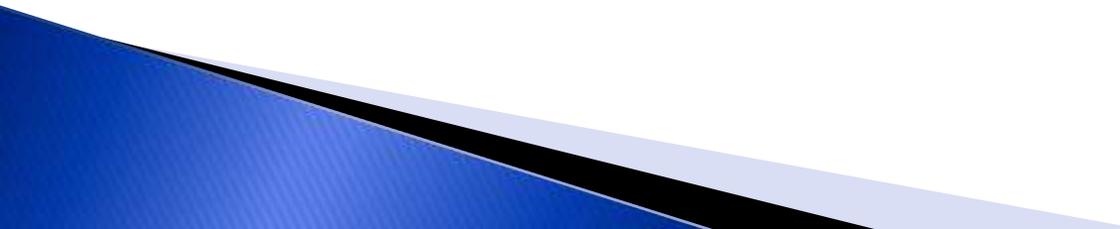
➤ **Teenagers and Mobile Devices – is it the same or different for ASD?**

- Independence, Adolescence, Group Identity, Mobile Loyalty
- Jealousy, Bullying, Fear of Theft/Attack, Inappropriate Behaviour – text bullying – what did we see?

Interviewer: Do you think he saw it as credible? Is it more than just playing with it, or is he responding to the interventions and doing what they tell him?

Parent: Yeah, he definitely would, without a doubt, if he was out on his own, he would use it. if he got into a problem it would give him a great deal of confidence and it would focus him as opposed to him feeling the panic that I think he would feel if he did find himself on his own situation.

[Parent Interview, HA]

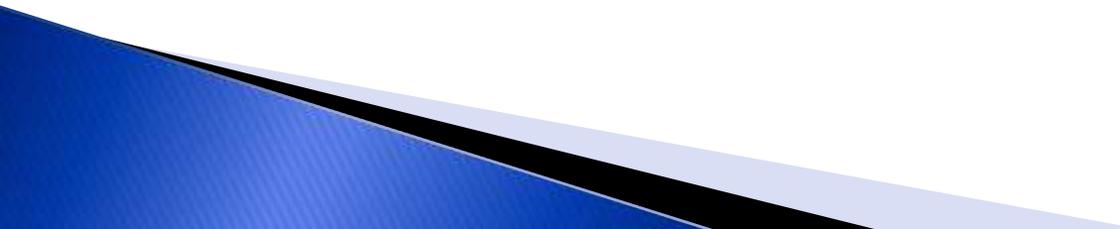


➤ **Across Home and School**

➤ **Teacher Source Credibility and a focus on the home**

- Interviews and classroom observation showed that children can be positively disposed to receiving mobile interventions from their teacher, instantiated as a message from their teacher in video, image or text format.
- The study provided evidence to support the exploitation of teacher credibility in the domain of life and social skills functioning. This very much part of the school curriculum for young people with ASD, yet in many instances the context for practising and developing social skills is as much in the home and in out of school contexts as within the classroom itself.
- Observed in 16 cases across PT1 and PT2.
- Important to note that not seen in all cases

➤ Preference for Device Instructions

- Children may actually prefer to receive persuasive messages from HANDS than from their teacher.
 - Six out of ten of the children at UK school commented on whether they preferred support / prompts from a person or from the HANDS device.
 - Two students preferred prompts from a person, including parents, teachers and support staff.
 - In contrast, the other four students at the UK school felt that they would rather receive persuasive messages from the HANDS phone than an adult.
- 

- A potential rationale for this preference is that many children with ASD have cognitive impairments in processing speeds (Luna et al., 2007).
- For example, in one of the cases, the child was using HANDS to support him in the life skills task of making toast independently.
- In a classroom observation he is observed completing the task successfully using HANDS as a support and voices that he prefers to receive the instructions from HANDS as opposed to from his teacher.
- The teacher suggests that this may be because he “can do it in his own time”, that is that **he has longer to process the individual intervention messages** from the mobile device and can control the rate at which the messages are supplied.
- In the follow up interview the teacher comments:

I think they felt more relaxed because it was up to them to move to the next step, whereas you present someone with this long list of instructions written down. Someone with autism that you know, it works their minds when they see what they've got to do, because it does look a lot of set when it's written down. Whereas on the HANDS phones they move to the next step when they felt confident enough to do so, and they worked through it didn't they?[HA Teacher Interview]

➤ **And in another case...**

Lucy: ...we had parents evening, and he actually said that he wanted all his tasks put on the HANDS phone like that, so he didn't have us nagging at him...He knows he has to have early lunch, come round to the department, get changed, be ready for when the minibus from the college pick him up and that. I said right we can put that on there. Don't then tell him, nag him as he says... Just say to him check your HANDS phone...because Adam doesn't like being told what to do [HA Teacher Interview]

➤ **Mobile Marriage / User Device Attachment**

- Fogg (Fogg, 2003; Fogg and Eckles, 2007) proposes that the effectiveness of specific behavioural messages delivered via mobile devices is enhanced when there are ongoing repeated positive interactions with a range of cognitive and social functions on the device.
- Observed in 18 cases across PT1 and PT2
- Important to note that not seen in all cases
- Implications for use of mobile devices with ASD in special and mainstream settings [Considered in Mintz J (2013) Journal Assistive Technologies]

Where are we now with
apps and autism?



Explosion of apps for autism since 2012



Carrier

12:42 PM

Back

Edit

Emma Goes To Playground



Emma

Goes To

Car



Emma

Goes To

Playground



Emma

Goes To

Car



YouTube is now full screen.

Allow

Exit full screen



Feelings Board

Help understand and cope with feelings

Customize feelings and coping strategies

Save multiple boards

Companion book included: When I get upset

Tiffany Sherman

3,907 subscribers



**I need
a break**



‘Mums and Dads at home...’

App Quality

But no one wants to pay...

Apps for inclusion?



Mobile:

Aid for social and life skill support

Kairos

Stands out less?

Issues with school policy, bullying,
teacher perception

A 2010 USA study indicated that 62% of teenagers are allowed to have mobiles in school but not in the classroom, with only 12% allowed to use their mobiles in class (Lenhart et al., 2010)

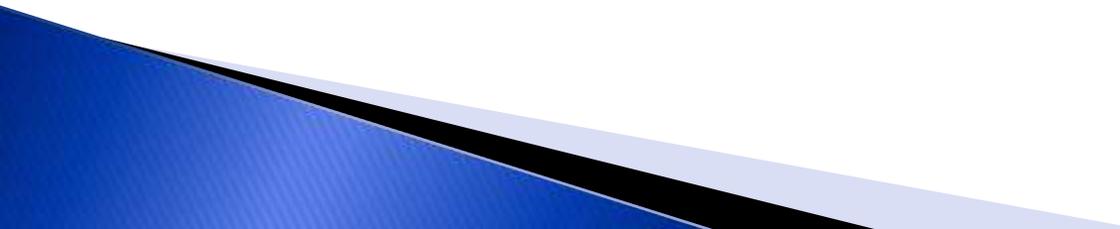
A 2012 US study found that only 6% of middle school students were allowed to use smartphones in class (Teenage Research Unlimited, 2012).

No UK Data

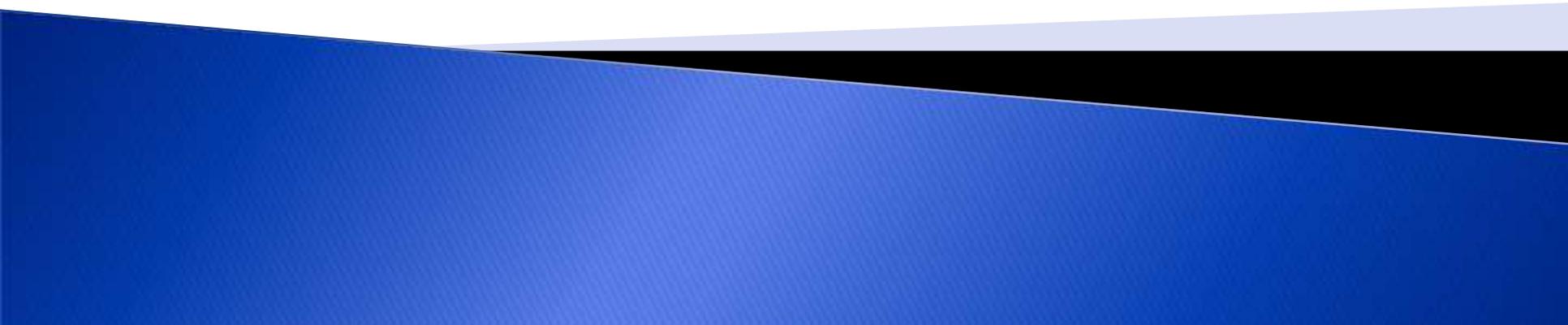


In HANDS the same worries by teachers were there at the start, but....

Different issues for Tablets and Smartphones



Future Developments?



...the technology happened
already...

..where's the research?

iPADS/Tablets...lots of use and
small scale research

Q Sensors
Galvanic Skin Response

NIH Grant

Children's National
Medical Center's Center
for Autism Spectrum
Disorders



Leijdekkers et al 2013 at IEEE CBMS
Conference 2013

CaptureMyEmotion app using a
wireless galvanic sensor



Better designed apps?

IoE and CRAE with Liz Pellicano and Sara Price on design aspects for apps to achieve emotional regulation in children with ASD

Selected References

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