PROJECT DELIVERABLE

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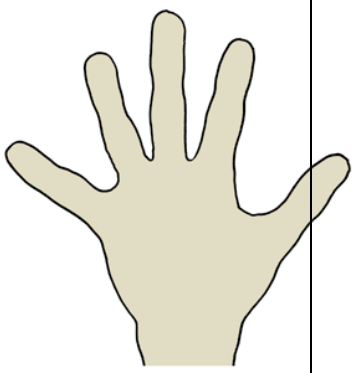
Project acronym:
HANDS

Project title:

Helping **A**utism-diagnosed teenagers **N**avigate and **D**evelop **S**ocially

Funding Scheme:
Collaborative Project



Deliverable description

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Summary:

This deliverable sets out the overview for proposed guidance for the principles and proposals for evaluation in terms of applicability in the learning environment, and guidance on the issues involved with the implementation of the HANDS toolset across the consortium.

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1.0 Overall Approach

This document is in two main sections. Firstly, we consider how we will evaluate the HANDS toolset from the viewpoint of Applicability in the Learning Environment. Secondly, we consider, from the viewpoint of the needs and requirements of whole consortium, guidance on issues for consideration in relation to implementing the HANDS toolset across the four test school sites. Two key terms are used which can be usefully explained at this point. Firstly, "the overall evaluation framework" refers to all the evaluation of the HANDS toolset which will be done across the project, including the set of all tests, interviews, observations, questionnaires and other evaluative instruments developed as a largely unified set, developed from the three research strands within the project and agreed as a coherent set by all consortium partners. Secondly, "the overall implementation and evaluation framework" refers to both the "overall evaluation framework" just described and in addition to the set of guidance and shared understandings about how to use the toolset within the test sites, drawn from input from technical and academic partners as well as from practitioners at the schools. Again this overall framework is envisaged to be agreed as a coherent set by all consortium partners.

2.0 Evaluation – Applicability in the Learning Environment

Overview and theoretical considerations

Evaluation research – definitions, and purposes

Much has been written on evaluation and much evaluation has been carried out. As such evaluation is a necessary step into formulating the validity, feasibility and success of any intervention or programme. The literature on evaluation is vast, it has developed greatly since its golden age in the 1950s and 1960s, and it crosses over different disciplines and practical interests. This section does not aim to offer an overview on all forms of evaluation, focusing rather on the nature and features of evaluation into education. But what is evaluation?

Definitions of evaluation

According to Bennett (2003) the terminology is varied, dependent on perspectives and marred by general disagreements over the nature and purpose of evaluation. Bennett (2003: 5) reports the following definitions:

- 'The process of determining to what extent educational objectives are being realised by the programme of curriculum and instruction' (Tyler, 1949, 105-106)

- 'The collection and use of information to make decisions about an educational programme' (Cronbach, 1963: 672)

- '[…] securing evidence on the attainment of specific objectives' (Bloom, 1970: 28)

- 'Systematic examination of events occurring in and consequent on a contemporary programme – an examination conducted to assist in improving this programme and other programmes having the same general purpose' (Cronbach et al., 1980: 14)

- '[…] discerning the effects of interventions over-and-above what could have been expected if the intervention had not been applied (Davies et al., 2000: 253)

Patton (1982: 15) proposes a more nuanced and multidimensional understanding of evaluation. He states that:

> 'The practice of evaluation involves the systematic collection of information about the activities, characteristics, and outcomes of programs, personnel, and products for use by specific people to reduce uncertainties, improve effectiveness, and make decisions with regard to what those programs, personnel, or products are doing or affecting'.

Evaluation, he continues, should be practical (1982) and creative (1981), that is, it should be responsive to the context and use creativity to meet the changing needs and expectations of the context. The golden standards of evaluation are (1982: 9):

- feasibility
- utility
- propriety
- accuracy

The fulfilment of the golden standards, thus, requires 'situational responsiveness, methodological flexibility, multiple evaluation roles, political sophistication, and probably, substantial doses of creativity' (Patton, 1982: 17). Central to meaningful and effective evaluation is the imperative of 'situational responsiveness'.

Purposes of evaluation

Generally, the main purpose of an evaluation is to assess, judge, measure and estimate the worth or value of something. More specifically, we can identify a number of more practical purposes, and they are:

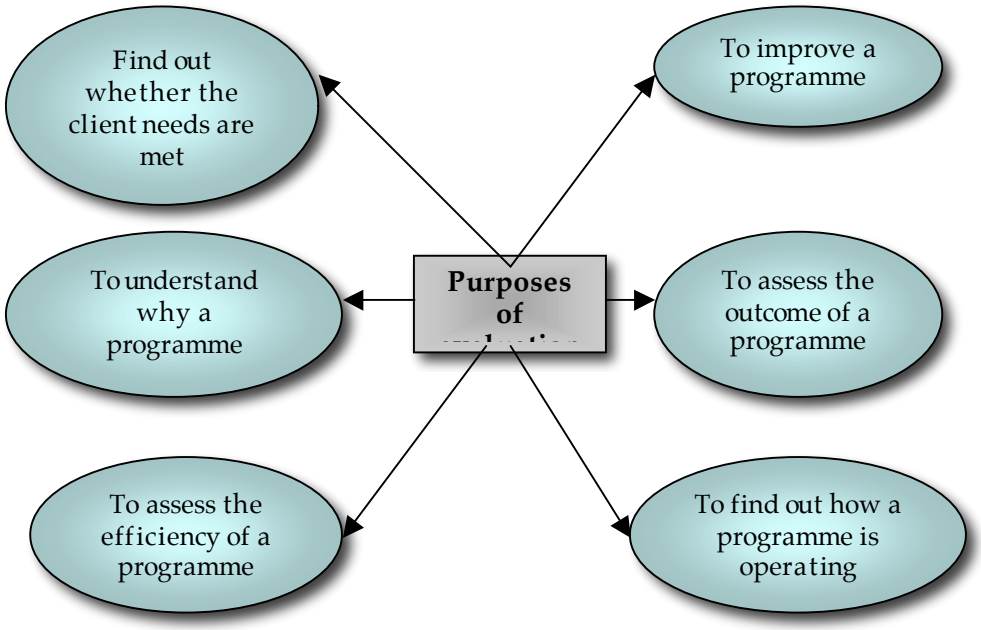


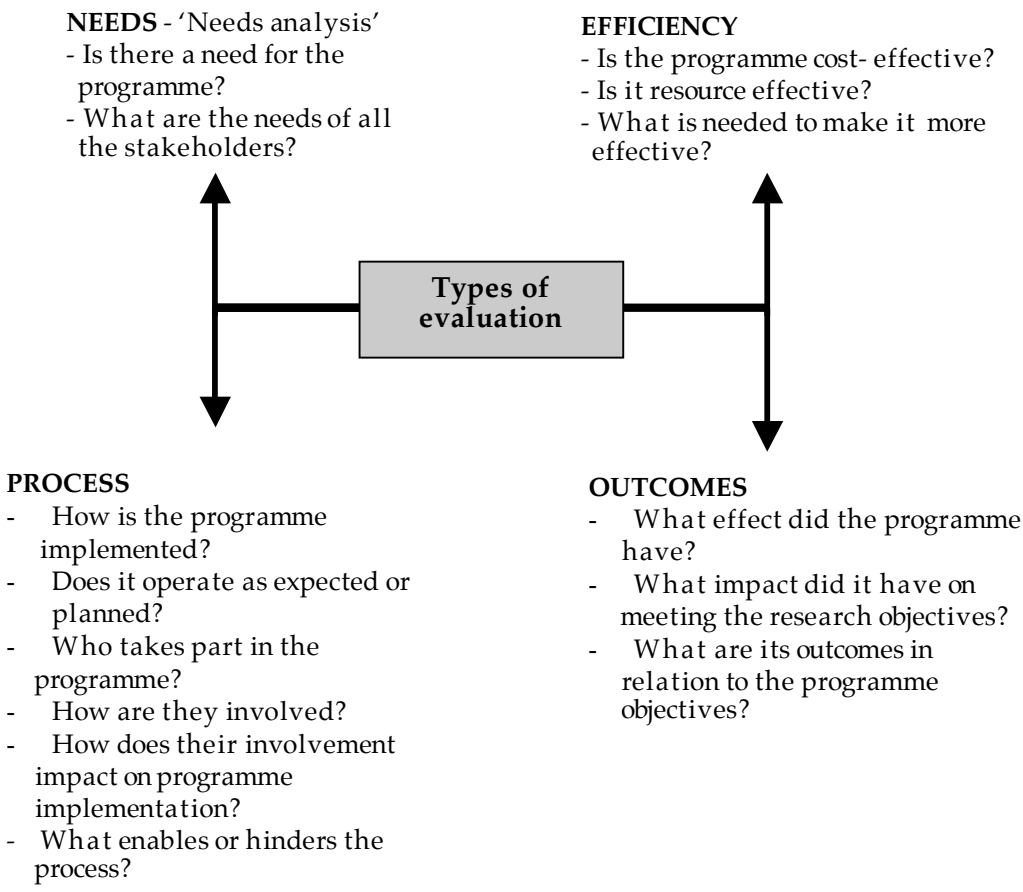
Fig. 1: Purposes of evaluation

While an evaluation might seek to achieve more than one purpose, the identification of the purposes is a first step in deciding the type and model of the evaluation, and then enable in choosing the methodological approach. By methodology we mean the way in which data are collected, analysed and interpreted in order to reach rigorous, valid, reliable, systematic, useful and practically meaningful conclusions on the worth of what is under evaluation.

There is an overlap in the literature about the specific distinctions between types and models of evaluation. What matters here is to show what is available, what the distinctions between types and models are in order to ease the process of methodological decision-making. We assume that 'type' refers to what the purpose of the evaluation; 'model' refers to a general framework for the evaluation design; and 'design' includes an informed evaluation of the choices made at the level and model level.

Types of evaluation

According to Robson (2000) there are four types of evaluation. They answer different generic questions and they are:



Types of evaluation and generic research questions

In 1967 Scriven was the first to coin the terms of **formative** and **summative** evaluation as a way of distinguishing between two types of evaluation, that is, the one focused on process and the one focused on outcomes. According to Robson (2000), the features of each type are as follows:

Popham (1988), unlike Robson, views these not as types of evaluation, but as roles whose aim is appraising the quality of a programme. He defines their features as such:

FORMATIVE EVALUATION

- '*Formative evaluation* refers to appraisal of quality focused on instructional programs that are still capable of being modified' (1988: 13, emphasis in original)

Thus

' Formative evaluators attempt to appraise such programs in order to inform the program developers how to ameliorate deficiencies in their instruction' (13).

In conclusion

'The heart of the formative evaluation's strategy is to gather empirical evidence regarding the efficacy of various components of the instructional sequence and then to consider this evidence in order to isolate deficits and suggest modifications' (13-14).

And …

SUMMATIVE EVALUATION

- '*Summative evaluation* refers to appraisal of quality focused on completed instructional programs' (2000: 14)

Thus

' The summative evaluator gathers information regarding the worth of an overall instructional sequence so that decisions can be made regarding whether to retain or adopt that sequence' (13).

While this distinction has its merits, at least in clarifying the broad features of the two different types, in reality, as Robson (2000: 50) argues:

- Both types can be used in a major evaluation;
- The distinction is convenient, but as Cronbach (1982) pointed out, false; and,
- A combination of both types can actually be effective in developing or testing theory and generalising the applicability of the program to other situations (Mohr, 1995).

In conclusion, as Weiss (1998) proposes, the formative/summative distinction refers to the evaluators' intentions, while the process/outcome distinction refers to phases of the evaluation.

Robson (2000: 52) offers a helpful way of thinking about the practical and methodological implications of the distinction between formative and summative, and thus ease the process of decision-making in relation to the choice of which

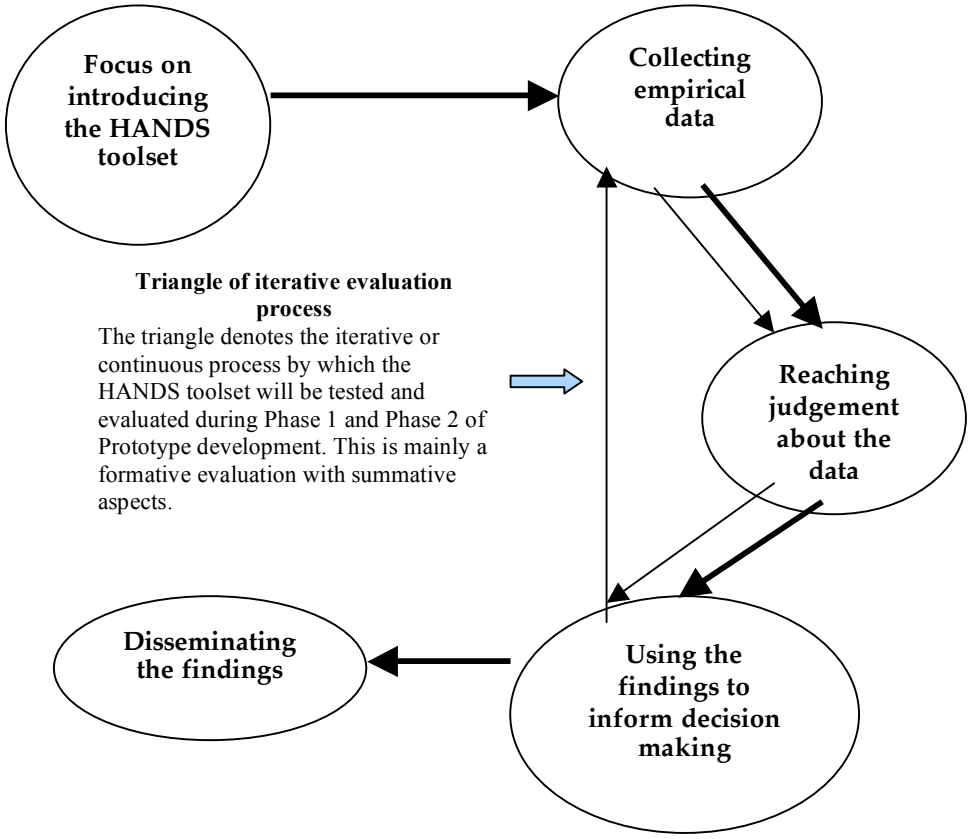
evaluation model might suit the HANDS research project. The table below reports Robson's insights.

	FORMATIVE	SUMMATIVE
Main evaluative approach	Process	Outcome
Main audience	Program team	Policy/decision-makers
Main tasks	• Clarifying goals • Gathering information on program processes and implementation	Documenting outcomes and implementation
Methodology	Mainly qualitative	Mainly quantitative
Data collection	Ongoing	Usually mainly toward the end of the evaluation, or towards the end of each phase of evaluation
Reporting	• Several occasions mainly through meetings and discussions • Emphasis on suggestions fro change and development	• Formal written report at the end • Emphasis on outcomes and their implications
Credibility depends on	• Demonstrated understanding of the programme • Rapport with the team	• Technical competence • Impartiality

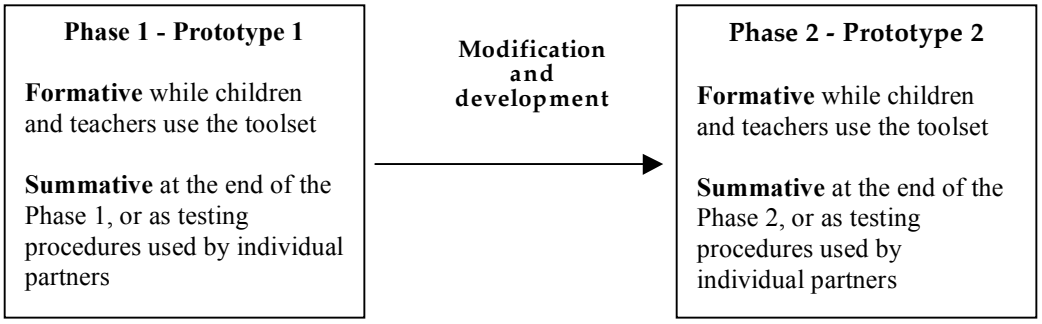
Schematic differences between formative and summative evaluation

Research design: methods and methodology

We would like to suggest the following schematic view of the evaluation process to which items can be added.



The design above aims to show that the process of evaluation, irrespective of the model and type we might end up choosing requires an iterative or continuous process of data collection, analysis and interpretation. This is because in the case of the HANDS project we are not simply testing an intervention, but actually developing it while we test it. This feature already determines the fact that we are looking for both a formative and summative evaluation both in terms of the phases of research and in terms of the content of the evaluation itself. Schematically, it might look like this:



It is envisaged that while the overall aims and research questions will remain more or less the same, specific aims and questions on the ground will need change and adaptation in relation to how the toolset is used. The iterative process of this developmental form of evaluation is such for which it requires an ongoing relationship with the children, the teachers and the parents, all of whom, to a greater or lesser extent can be seen as end-users and stakeholders in the project. This demands a conceptual and methodological shift from 'doing research **on** how people use the toolset' to 'doing research **with** the people who use the toolset'. In more practical terms, it means that the users of the toolset are not objects of research, but active subjects in shaping the use of the phone and in making decisions on its viability, effectiveness, efficiency and practical use.

The implications for how the evaluation is designed therefore are of two kinds. First, considering the children, teachers and parents as subject of research means to think of them as active not only in using the phone as instructed, but also active in reformulating its use and adapting it to their needs as they develop. Second, it means to design an evaluation that takes this into account and which posits the users of the phone as 'experts' in their own way. While the first indicates the need for context-specific awareness, the second requires us to modify the relationship between evaluators and toolset users. On the basis of these two points, we would suggest a **case studies** approach and a collaborative and participatory approach, which are already key features of the project.

A case study approach

Much has been written on case study. A case study is an in-depth analysis of a particular phenomenon within a specific and specified case. The case can be chosen because it is representative of a general population (although this can be argued it almost impossible), or because its features are such for which the case is fundamentally different from the population to which it refers. A typical example of case study is the one used in medicine where individual patients become cases for more in-depth study. While there has been ample discussion on whether case studies offer the generalisability required for 'scientific' research, it can be argued that case studies offer a better understanding of the possible cause-effect within a particular intervention. They add rather than detract from a scientific and rigorous evaluation. This is even more the case for the HANDS project where the existent

of cases and cases within the cases is a feature of the project. In terms of its population, the focus on children with ASD already defines a particular population, and the choice of focusing on special schools further defines particular cases within the general provision of education in all four countries. Not withstanding these 'special' features, both in terms of population, educational provision and consequently cultural and historical background, the findings can be generalised to similar populations and across populations and sites. How this can be achieved is definitely a methodological and conceptual challenge, which a case study approach does not shine from.

In terms of the nature of the cases under evaluation, it is possible to view them as 'nested' cases. This means that while at a very general level we have at least four main cases, that is the four partner schools; in reality in each school we have three broad cases, that is the children, the teachers and the parents as groups, and a number of individual cases. It is envisaged that data should be collected as to explore in as much depth as possible each case, from the general to the individually specific and vice versa. Ultimately the evaluation would be a specific analysis of the functionality and utility of the toolset, together with a comparative analysis of the social and pedagogical circumstances in which the toolset was functional and useful.

Extent and benefits of participation of stakeholders

The second point raised was related to the nature and dynamics of stakeholders' participation in the evaluation process. At the heart of this approach are the principles of practicality and the principle of duty of moral engagement. The first proposes that people as communities and as individuals are central to the implementation, development and usability of the toolset and that therefore the evaluation would not achieve its goal without their support. Thus the ongoing participatory involvement of teachers, other adults, children and parents is key.

Involving Children

The lack of how the children should be involved in the research is a noticeable aspect in the document of the research proposal. Even though there are significant questions to be addressed in involving children with autism in participatory research, and these should be recognized, we should not be too overwhelmed by the medical perspective. So while generally speaking we might agree that children with autism lack, to different extent and measures, the ability to be social, interact with others, and make executive decisions, these should not prevent us from contemplating the fact that the children can, given the right opportunity, exhibit those very qualities we assume they lack.

Moreover more recent research in neuroscience has cast doubts on whether *all* children with ASD behave in similar ways (Williams, 2008). Consequently, the need to involve the children in research can be predicated on how each child

perceives reality, his or her own experience and is able to relay and explore it. Integrating the children's views in the evaluation process, therefore, will not only improve our understanding of how and whether the phone works, but it can shed insights in how it would be possible to involve children with ASD in making decisions on their lives and on what is of benefit to them. Their involvement in research is predicated on research on pupil voice which have shown that listening to the children has benefits for their learning (Fielding, 2002; Rudduck et al, 2006; Rudduck and Flutter, 2000). It is also predicated on the growing research on how through education children with disabilities and learning difficulties can achieve a better quality of life and a better learning experience (Beresford, 1997; Christensen, 2000; Costely, 2000; Dwyford Davies, 1996). Finally, consulting children on intervention or provision that are aimed at facilitating their learning and improving their life conditions are principles enshrined in the *UN Declaration on the Rights of Children*, form part of research on disability rights (Isaacs, 1996), and becoming a central aspect of future educational legislation in the UK (DCSF, 2008). Specifically to the objectives of the HANDS project, consulting the children will enable researchers to develop a better and more suitable product.

With regard to the definition of the specifications for the phone prototype, LSBU sought to include the children in the process. As a result we have some idea of how the children imagine the phone to be and what they think it can help them. There were wide variations in how the children viewed the utility of the phone. Some were sceptical, while others could not engaged fully with what was asked of them. In either case, the children's difficulty in relation to the general benefits of the phone can have implications for their motivation to use it and, consequently, for the quality and purposiveness of the data we are going to collect as part of the testing and evaluation. Schematically, the two categories of benefits for the children are as such:

Externally identified benefits

- Improve social skills
- Improve self-management skills
- Aid social integration
- Support for becoming more Independent and autonomous (at school, at home and outside home and school)

so as to deal with the triad of impairment

(1) reciprocal social engagement
(2) reciprocal communication, and
(3) flexible regulation of self, behaviour and interest

Self-identified benefits

- Decrease in anxiety, fear and frustration
- Knowing what to do and when to do it
- Being less dependent on adults
- Being able to go out with friends
- Being able to enjoy leisure activities
- Being like everybody else
- Sense of ownership

-taking ownership/personal responsibility

With respect to how the children identified and understood how the use of the phone can impact on their life, the analysis of interview data suggest that we should incorporate and make a distinction between *externally identified* benefits and

self-identified benefits. The first category can be derived from the research project's goals and objectives and the findings from the consultation with parents and teachers during the research specification phase, while the second remain still under-researched. *Externally identified* benefits are both broad conceptual goals, at the level of the research project aims, and more practically defined as user stories by teachers and parents. *Self-identified* benefits are less well articulated and empirical data is still scarce. This could be due to methodological limitations, or limitations resulting in the children's lack of knowledge and engagement with the social aspects which are required for them to imagine and form ideas about social interaction. In the first case, there is a need to build on methodological approaches that seek to elicit the views of the children. In the second case, more practical strategies should be incorporated with the use of the mobile technology so as to give the children more hands-on opportunities to experience social interactions and autonomous and self-managed behaviour.

It is important to keep in mind that each child is different and that both categories of benefits needs to be meaningful for each child, and probably adapt to how the child develops during the intervention. It should also be borne in mind when considering the split between self-identified and externally identified benefits that there can for adults working with autism potentially be conflicts between the two and that indeed much of the professional work of teachers is to achieve a balance between the two. It is necessary, therefore, to consider the different weight that may need to be applied to children's views and adult's views when considering working with children with autism, even where a broad participatory approach is adopted.

Working with children

The data obtained by consulting the children on the phone specification points to the relevance and usefulness of involving the children in the evaluatiuve process. Furthermore the reason for involving the children as much as possible in the evaluation as active in determining their own objective is a necessary component for the evaluation of 'persuasive technology' as a valid concept. It is argued here that the extent and quality of the involvement of the children can have appositive impact on the credibility of the phone, but also in the development of self-management skills, social skills and aid towards improving children's motivation and interest in using the phone throughout the testing phase.

From a pedagogical point of view, involving the children with designing the activities and monitoring the usefulness of the phone can have broader implications for learning. So while, the *externally identified* benefits can be restated as learning outcomes which we can be assessed through already existing modes of teacher's assessments, or that we can measures through psychological testing instruments, children stand to learn valuable lessons from being socially involved with parents, teachers and their care workers. In this case, we are not only assessing pre-determined learning outcomes as quantifiable skills, but also as qualitatively important 'outcomes of learning' (Dee, Devecchi and Florian, 2006).

Finally, the involvement of the children has the potential of broadening our understanding of the two central concepts of effectiveness and development. Usually, in relation to children with learning difficulties and with autism in particular, effectiveness it understood as whether the planned intervention achieves the goal of the intervention. The latter, is usually understood in terms of cognitive development and therefore as an improvement in the cognitive abilities of the children. In both cases, effectiveness and development are evaluated against a priori categories of functionality and baseline typical developmental stages. While these are valid ways of evaluating the impact and functionality of the phone, there are by no means the only ones.

Recent research on disability and quality of life has shown that the notion of effectiveness has to be broaden to take into account person-centred wishes and aspirations. With regard to development, social models of disability have suggested that hierarchical and age-defined developmental trajectories are not always useful in determining the extent to which provision and intervention is effective. Consulting children on how the use of the phone can be effective should therefore adopt a redefine conceptual understanding of both effectiveness and development which can be integrated with pre-existing understanding from the disciplines of cognitive psychology and computer science.

The shift advocated here is based on Amartya Sen's capability approach. According to Sen, the evaluation of whether any intervention is effective towards development should start from the examination of whether the intervention was successful in achieving what each individual has 'reason to value as the life he or she wants to lead (Sen, 1992, 1999). Evaluating effectiveness therefore takes into account how environmental and social opportunities enable the individual to choose not only valuable functionings, that is observable behavioural achievements in being and doing, but also whether such opportunities can broaden the set of capabilities, that is the opportunities of choosing what to do and what to be. As pointed out by Terzi (2005a, 2005b) the capability approach offers an alternative to already existing models based on rights, social or medical perspectives. Rather the capability approach evaluate effectiveness in terms of justice by focusing on what the individual is free to achieve and develop into. At the heart of evaluating whether the use of the phone is effective is sustaining development, therefore, is the notion of development as the improvement in the children's freedom to achieve valuable beings and doing that were unobtainable before using the phone.

The application of the capability approach to the evaluation of the effectiveness of the phone has the potential of introducing an innovative and growing interest in alternative approaches to understanding the relationship between intervention and human achievement. It also has the potential of bringing new and powerful insights into the nature of autism and how social opportunities can meet the needs of people with ASD. A focus on how individual children speak about their aspirations and examine their achievement and evaluate the usefulness of the phone will cast them as active subject, rather than passive recipients of intervention.

Methodologically, gaining an understanding of the children's views would require observations of the phone usage, but also of how teachers and children define valuable functionings in terms of social and self-management skills. It will also require interviews or questionnaire appropriately designed to gauge the children's views of what they can do and what they see as their aspirations. This will build knowledge on how the children understand effectiveness and development in relation to what the phone can enable them to be and become.

The findings will support and at the same time challenge pre-existing notion children with autism cognitive abilities, and add valuable information on the nature of persuasion specifically with regard to intrinsic motivation. Consulting the children will not add unnecessary workload on teachers or children. The research will be mainly qualitative, overt, and in participation with the children.

Constraints

The preceding discussion has set out the significant benefits to be gained from a participatory approach to the evaluation. However, it must be recognized that gaining the views of children and parents, and involving them as active agents in the research process would present a number of practical and organizational challenges, which may limit the extent to which such an approach could be adopted. Such constraints notwithstanding, we propose that a broad participatory approach should be adopted in respect of considering the evaluation of applicability in the learning environment. By this we mean that the voice of all the relevant actors in the use of the toolset, including children, teachers, other adults and parents should be elicited and given recognition whenever possible.

Research Questions and Research Goals

In being able to properly evaluate any educational intervention, it is necessary to be explicit about what the research questions are. For an EU Consortium project these must relate to the overall project goals. These goals are:

- To improve the social skills of children with ASD
- To improve the integration in to society of children with ASD
- To improve the self-management skills of children with ASD

These goals must inform the key research questions that are used to inform the evaluation framework – in broad terms, can the HANDS toolset make a difference to the social skills and social integration of children with ASD?

Research goals relating to evaluating the applicability of the HANDS toolset in the educational setting

These include:

- To validate the efficacy of the technology concept in the school environment
- To aid the initial field testing of Prototype 1 and 2

More specifically **efficacy** refers to **usability** in relation to three broad areas:

- **Technical aspects -** Levels of navigability of the interface, ease of customization and application
- **Pedagogical aspects** - Fit for purpose within the classroom environment, ease incorporation of the phone into the typical teaching schedule, levels of pedagogical modification required and their impact, levels of training required, impact on teacher workload, modification to school organisation structure, and impact on home life and aspects of interactions with parents
- **Learning outcomes aspects** – improvement of social skills, social integration and self-management, and influences on other areas of children's academic and pastoral learning.

Overarching research questions

The key, overarching research question is:

1. How does the introduction of HANDS toolset impact on the children?

This question cannot, however, be considered in isolation, as the way in which the technology is implemented and used is very much dependent on the social and pedagogical field of the various settings and classrooms, and on the ways in which the teachers, other adults and children interact. Thus in order to get a valid answer to question 1, it is also very necessary to consider a secondary, but contingent question:

2. How does the introduction of HANDS toolset impact on the teachers and other adults working with the children?

By impact we mean a change in perception and practice. Thus the evaluation aims to measure and explore the nature and effect of the change both on the children and the teachers in order to examine the benefits and disadvantages of the application of HANDS toolset in the classroom and as part of children's learning and teacher's professional experience.

In order to explore the extent and nature of the impact on the children and the teachers, each one of the overarching research questions will seek to answer a number of purposive questions. Such questions are related to exploring and evaluating the impact of the HANDS toolset on the classroom environment, but they take into account different dimensions of the classroom learning experience. The two strands aim to collect data which can be analysed separately and combine to gain a more holistic picture.

Research questions related to the children's experience

1.a. How does the introduction of the HANDS toolset impact on the children's social skills in particular social situations identified as problematic for them?
1.b. How does the introduction of HANDS toolset impact on the children's overall social skills?
1.c How does the introduction of HANDS toolset impact on the children's potential for integration in to society?
1.d How does the introduction of HANDS toolset impact on the children as learners?
1.e How does the introduction of HANDS toolset impact on the children as persons?

Research questions related to the teachers' experience

1.a. How does the introduction of HANDS toolset impact on the *professional* lives of the teachers, including consideration of working practises, capabilities, professional development, patterns of collegiate working, roles and power relationships
1.b. How does the introduction of the HANDS toolset impact on the ways in which teachers and other adults work with children in autism in the classroom?

Methodology

A case study approach is proposed, that allows for an in-depth understanding of the impact in relation to changes and development in the nature and dynamics of the personal, social and professional dimensions.

In considering a research design, the overall objective must be to produce a methodology that allows the capture of data that can provide answers to the research questions, such data being both valid and reliable as far as possible.
The objectives in relation to applicability in the learning environment would be:

Prior to the introduction of Prototype 1:

> to capture individual teachers and children perspectives on their needs and hopes of how the use of HANDS toolset can help them and what they think the challenges are. These phenomenological perspectives would then be combined with data on the school vision and organisation in order to locate the teachers and children narrative into the social milieu in which they work. This will enable to build profiles for each case, that is for each school, and teacher and child within the school.

During the evaluation of Prototype 1:

> This phase aims to monitor and collect data on the evolution of change and development. It adopts a broadly ethnographical approach and seeks to captures how teachers and children cope with the new technology, what changes the new technology demands, as well as most importantly giving indications of the impact of the technology and requirements for review and improvement. At the end of Phase 2 an initial report is drawn that maps change and impact and revises the methodology and conceptual framework to be applied for the final testing of Prototype 2.

During the evaluation of Prototype 2:

> On the basis of the lessons learned during PHASE 2, the use of methods is revised to as to adopt only those that have proven to be successful. At the end of Phase 2, the data collected will be compared with the one collected in Phase 1 and then compared to the ones collected across the four schools. A matrix of change and development will be drawn through cross-case analysis and on the basis of the initial needs analysis carried out in Phase 1.

With regards to specific data collections methods to be employed, we need to bear in mind that a key consideration must be what is practical and possible within available resources.. Having said that, it must be stressed that evaluation is a key aspect of the project.

Practical Research Design

Due to the fact that the schools are situated in different countries, ongoing data collection is challenging. This means that much of the research will have to be carried out at a distance, and without the support of researcher's first hand experience. Keeping firm the fact that to evaluate the impact we need to monitor the ongoing development of social, personal and professional factors, two options are proposed at this stage for consideration.

Options 1 – Researcher-led

This option will take advantage of the technology at our disposal and use to keep in contact with the teachers during Phase 1 and Phase 2. Generally, though, the research is researcher-led and while teachers are continually consulted, they are primarily in the positions of being subjects of the research, and a conduit to collect data on how the technology impacts on them and on the children. This means that they would be asked to fill in end of term semi-structured questionnaires and keeping a weekly log of the implementation and use of the technology.

It is envisaged that in order to maintain a constant and positive relationship, at least one annual trip to the school would be desirable besides having virtual conferences where and when possible. In order to organise the research, one teacher in each school should be responsible for keeping in contact with the lead researcher. This teacher can be the same who is in charge of implementing the use

of the technology, or another teacher depending on the resources and availability of teachers within the school.

Advantages	Disadvantages
• Efficient use of limited human resources (not enough researchers in each location) • Cost-effective (not enough funding for frequent trips to each school) • Standardization of data collection tools (questionnaires) • Highly structured	• Loss of depth of data (no possibility of researcher observing implementation in action) • Loss of multi-perspective • Weaker personal and professional links • Reliance on individual teachers and school's organisational and managerial input • Dispersed communication leading to misunderstanding and loss of valuable time

Options 2 – Teachers as co-researchers

This second option is not fundamentally different from the first, but it allows for a more complete and in-depth understanding of the personal, professional and organisational factors that can influence the impact of using the HANDS toolset. It also allows for a closer match with the ideal research design outlined above. However, it requires us to reconsider the teachers not as objects of research, but also as subjects and active contributors. While the first options viewed teachers (and children to a certain extent) as part of a research done *on* and *with* them, this second options views research as done also *by* them. The extent of their collaborative input may vary from school to school and from teacher to teacher but fundamentally it envisages the teachers active in carrying out the research, that is as *co-researchers*. This requires training the teachers in the basics of doing research and collecting data and will position them as active contributors at all levels of research including data analysis and interpretation.

Advantages	Disadvantages
• Efficient use of limited human resources, including the intellectual resources available in each school • Cost-effective (not enough funding for frequent trips to each school) • Gain in in-depth knowledge • Standardization of data collection tools (questionnaires) • Flexible structure	• Training is resource and time consuming (a training manual and course will have to be devised, decisions will have to me made on when and where to deliver the course, costs for travelling and accommodation will have to be met within the already agreed budget)

• Increased sense of ownership, participation, and personal commitment • Opportunity for professional development and career advancement • Acquisition of valuable research knowledge • Building and strengthening capacity within the schools and within the research consortium • Building a strong research team • Strengthening the capacity to influence and collect data on WP2 and WP4 testing requirements • Course manual could be used for other research initiative • Course manual can be published as a book	• Quality of qualitative data collected (e.g. observations) dependent on individual co-researcher's knowledge and experience • Possible high variability in the quantity and quality of data collected • Decreased generalisation due to variable quality of data

Considerations about gaining the views of the children

As indicated above, how to gain the views of the children about the usability and benefits of the HANDS toolset is still an underdeveloped area of the evaluative plan. While the children are the end-users of the technology, aspects of the evaluation proposed across the consortium have aspects of children as "research objects". Whilst this reflects to some extent legitimate differences in outlook between the academic disciplines involved in the project, it is possible to consider a more 'person-centred' approach to both the evaluation of the tool and to the research. Whilst it is recognised that involving children in research, either in terms of consulting them or as co-researchers in their own rights, is complex, strategically challenging and ethically problematic, such an approach could gain in the quality of the data and also in future credibility. The UK has a long tradition now of involving children in research and in consulting them on issues that are relevant to their lives and wellbeing. Furthermore, the principle of consultation is enshrined in the 1989 UN Declaration of the Rights of the Child, thus making it more compelling to devise methodological ways of seeking to involve the children. There are clearly also specific issues involved in relation to working with children with autism, but perhaps it is also possible to follow the growing influence of adults with ASD writing about their lives (Grandin 2006) as pointing the way towards a richer ways about thinking about the experience of autism.

However, as discussed, it also needs to be recognized that involving children in the research in this way across a number of settings with differing approaches and philosophies may be problematic. In particular, Dr Cristina Devecchi, of the LSBU team, has relevant expertise in this area and could develop these ideas further,

potentially adding valuable and innovative knowledge to the objective of planning for the inclusion of children with ASD in society.
One strong possibility would be to use "alternative methods" of investigating children's ideas about and evaluation of the HANDS toolset. For example, getting children to write a story about their use of the toolset, or to record and audio or video diary about its use, and perhaps to use the device to mediate these recordings.

We recognize, therefore, that it may be necessary to mediate the views and ideas of the children primarily through their teacher's reporting. Thus, for the purpose of this draft, the focus is on the teachers only.

Considerations about gaining the views of the parents

In order to gain a rich and accurate description of the impact of the HANDS toolset and to locate the teachers and children narrative into the social milieu in which they work, it is also important in the evaluation to gain information from the parents. With the particular potential within the HANDS project for interventions that can cross the boundary between home and school, this is of particular importance. Again, there are practical and organizational issues with regards to gaining access to and conducting interviews with parents in the various settings. It may be that in the "teachers as researchers" model the teachers could conduct interviews with parents, but further consideration needs to be given to this aspect of the evaluation

3. DRAFT OF RESEARCH TIMELINE

TIME	PHASE	ACTION	METHODS	RESPONSIBILITY
March-June 2009	1	Need-analysis	Questionnaire	• LSBU • Teacher in charge of liaising for each school
		Analysis of data and report	Content and comparative analysis	• LSBU
		Review of the literature (technology, inclusion, ASD, teaching and learning, teachers professional lives, school organisation, etc)	Database and library searches and consultation with experts in related fields	• LSBU- led but in collaboration with other members of the research consortium
June-Sept 2009	Interim between 1 & 2	• Preparation of questionnaire and other tools for		• LSBU led

		collecting data • Preparation of research manual (Option 2) • Teacher training*		
Autumn term 2009	2	• Teacher training (toolset and research methodology) • Schools start using the phone • Monthly monitoring questionnaire** • End of term major questionnaire • Collection of data on school vision, organisation, management, etc.	• Online questionnaires • School policy data analysis • Children's recording	• LSBU • Teachers as co-researchers
Spring term 2010	2	• Much of the same as in the Autumn term but with modifications where and when needed • Possible visit to the schools***	As above	As above
Summer term 2010	2	• As above • Formative and summative evaluation report • One (or two days) teachers' conference	As above	As above
Autumn term 2010 …	3	Methodology will be revised during the Summer vacation and accordingly modified		

*Teachers will be trained on how to use the HANDS toolset during the month of July depending on each school year calendar. Training of the use of the toolset can be postponed to September keeping in mind, though, that the beginning of the school year is always a delicate and stressful time for both teachers and students.

**This questionnaire should not be long and it should have three aims: 1. To monitor how teachers implement the use of the toolset; 2. To pick up on issues, problems and solutions when they start; 3. To maintain an ongoing relationship with the teachers and reassure them. The questionnaire should be semi-structured (quantifiable and generalisable questions, probably a Likert scale, and open ended

question), and short enough to take no more than 30 minutes to fill. The questionnaire should be done electronically and thus a dedicated space on the HANDS website should be created.

***The visit(s) to the schools can take place at any time during the Prototype 1 test phase. The length, timing and purpose of the visit should be agreed. Wherever possible virtual conferencing system should be used to minimize costs. However, it is also important for the teachers and the researcher to meet face to face.

3.0 Implementation Guide for the HANDS Toolset

This final section looks at issues related with the implementation of the HANDS toolset. It also considers issues of implementation for the use of the toolset across the school test sites and from the viewpoint of the overall evaluation framework, not just from the requirements of Applicability in the Learning Environment.
Clearly the implementation, particularly for Prototype 1, is closely linked to the evaluation framework, as a key part of the implementation includes ensuring that the staff in schools have robust and clear guidance about how to use the toolset in the context of the required evaluation. Such issues range from academic decisions on the robustness of the particular testing procedures within the overall evaluation framework, to the applicability and impact the testing and data collection have on the teachers and students. It is understood that both aspects of the evaluation are intimately connected and supportive of each other. That is to say that the requirements of both the academics and the school staff have to be taken into account to achieve a satisfactory and cooperative strategy. In seeking to implement and develop a state of the art innovative mobile solution, the HANDS project brings together the knowledge and expertise of academics in the fields of cognitive psychology, persuasive technology, education and ethics. Such knowledge is based on specific disciplines and traditions. Thus, while the integration of these diverse views is strength of the project, it can also be challenging since innovative working solutions have to be found. Likewise, although the four schools are all specialized in teaching children with ASD, cultural and historical differences with regard to inclusive and pedagogical practices can add to the innovative aspects of the research, but also give rise to possible differences in interpretation as to the how the toolset could and should be used. The objective of this section is to consider both how we can draw on these differences as a strength and include them as an important aspect of the evaluation framework, but also to make sure that we consider possible risks for the use of the tool and the evaluation framework which could arise from differences in interpretation, thus allowing for the development of strategies to minimize these risks.

Finally, the very fact that the project aims to developed a state of art new technological approach means that ad hoc and flexible solutions have to be found prior to and during the evaluation. A structured but also responsive approach to implementation is at the heart of a successful evaluation and implementation in the learning environment. This implementation section, therefore, reviews the needs and interests of all partners in order to specify a workable and successful implementation strategy.

3.1 Introducing the partner schools

There are no objective, fool proof and systematic solutions to how to include children with autism. This is not to say that there is a lack of strategies that could be argued to be effective. It means that whether a strategy works and how it

works in enabling young people with autism to be socially included depends on a number of factors. Research on both special and inclusive education have shown that the success of an intervention depends on the teachers' perception of their knowledge and expertise (Florian, 2008), and on the way in which the school organization supports them (Carrington, 1999; Hargreaves, 1994). Moreover, the development of practices aimed at integrating or including young people with learning difficulties and disabilities are based on national cultural, historical and pedagogical variations. Likewise research on the use of technology in schools and mobile technology with students with disabilities (Hartley, 2006; Hennessy, et al, 2005; Ruthven, et al., 2004; Tearle, 2003;) has pointed out that the success of the technology depends on the product, but also on teacher training and knowledge of technology, and on how the school organization is able to support the teachers. Training, already established pedagogical approaches, and the ability of the school as on organization to support the teachers are all factors that impact on the use of the technology, the outcomes of the evaluation, and the way in which the evaluation is planned and implemented.

Four schools are taking part in the research. They are;

- Helen Allinson, in the UK;
- The Autism Foundation school in Hungary;
- Egebakken, in Denmark;
- Svedenskolan, in Sweden

There now follows a short section introducing each school, based on a description of the school that they themselves have provided. The objective of this section is both to deepen understanding and promote learning across the consortium in relation to the working practices of partner institutions, as well as to set the context for considering the potential implementation issues raised above.

Helen Allison School, UK

The Helen Allison School is situated in the county of Kent, in the South-East of England. The school was founded in the 1960s and it caters for boys and girls aged 5 to 19 years with an autism spectrum disorder (ASD). It is an independent residential special school operated by The National Autistic Society (NAS) and approved by the Department for Children, Schools and Families. It consists of a primary, secondary and further education (post-compulsory school) department. The school has been accredited with Autism Accreditation, an autism-specific quality assurance programme, since 1994. It offers the following facilities:

* a primary and secondary school
* a continued education department (post-16 provision)
* residential units
* respite services.

The school primary aim is to provide a high-quality and relevant education in a structured and safe environment by developing individual education programmes

that meet each student's needs and abilities. Pupils are taught in small groups and small class sizes with the support of teachers and teaching assistants. Those students who spend the week at the residential unit are helped by dedicated care workers who plan activities and support the students' development of social and life skills. The students have a range of abilities, although many have high-functioning autism or Asperger syndrome. Some have joined the school from mainstream or special school provision where they have not settled, or have been excluded.

The school follows the English National Curriculum and the students are taught English, Mathematics, Science, Foreign Languages, History, Geography, Music, Design and Technology, Art, ICT, Religious Studies, and Physical Education. The curriculum is designed to include aspects which interest to the students and the content is delivered in a very practical and concrete manner to maximise their learning. Therefore, students are helped to develop social and communication skills and to learn how to behave appropriately in school and out in the community. Learning to behave in a socially appropriate way becomes particularly important with the onset of puberty and emphasis is placed on providing opportunities for social inclusion, leading to increased independence for adult life. The school encourages students to establish and develop skills and interests in as wide a range of areas as possible, to try new experiences and to widen their horizons.

The philosophy of the school is that education should be fun, and that it should enable students to reach their full potential! As well as providing pupils with a child-centred curriculum tailored to their specific needs, the school encourages community-based learning and other social activities. The school tries not to let the students' diagnosis of autism limit them, and thus provides leisure and other activities they can all enjoy. The ultimate goal the school pursues is to prepare students for adulthood as full and equal members of society.

The school follows the National Autistic Society SPELL framework. SPELL stands for:

* structure
* positive approaches
* empathy
* low arousal
* links.

SPELL helps to provide a structured and supportive approach for pupils with an ASD. Lesson delivery has an emphasis on a practical and visual presentation which our students find helpful, and which helps them to make progress.

The school also has a well-established partnership with parents who are considered to be partners in the education of the children with ASD. Special activities such as

- Parent lunches

- Parent and teacher consultation evenings
- Parents' and friends' association meetings.

take place throughout the school year.

The residential unit offers weekly boarding for 38 weeks of the year. The residential facilities consist of three Victorian buildings, overlooking the river Thames. There are two houses and two flats, located close to the central shopping area of Gravesend with its cinemas and social amenities. Minibuses allow our residential pupils to access the local community and surrounding areas. There are also good public transport links.

Each residential student has an individual programme appropriate for his or her specific needs, and the activities in each residence are appropriate to the age and needs of the residents.

Each property has bedrooms, bathrooms, a lounge, dining room, kitchen and a secure back garden. They are staffed by support workers and the student/staff ratio is 2:1. Each property has waking night staff and, to ensure a high standard of care and safety, the Head of Care or a senior member of staff sleeps in nightly.

Egebakken School, Denmark

Egebakken is one of Aalborg Municipality's schools for children with autism and similar profound developmental disabilities - including children with secondary psychiatric disorders. Egebakken was founded on 1st January 1996. At that time there were 14 pupils at the school. Today there are more than 70 students between primary and secondary school.

The philosophy of the school is that of building a school community with a good atmosphere, good relationships between students and staff and where there is room for everyone. The sense of being a community binds together students from different age groups and across school departments. The school fosters a sense of community through various events throughout the year. The school vision is for strong pedagogical knowledge and expertise combined with caring and acknowledgement of the humanity of students with ASD.

The staff at Egebakken work in integrated teams, which enables them to provide a highly individualised approach to teaching and learning. The close cooperation among teachers, assistants and parents, gives each student optimal conditions for development towards adult life. The school stresses independence, positivity and partial autonomy as important aspects of future quality of life for their students.

Egebakken is also a resource centre, "the Egebakken - Resources Center", whose members present at various conferences in Denmark, and who have set the agenda for development and professional excellence in Denmark. Because of this, VISO, the national knowledge and special counselling organization, has been accredited as a resource centre for agency for schools for children with autism.

The school's objectives are:

- To strengthen the students' life skills and ability to manage their own lives in order to live in harmony with oneself and others.
- Meeting the individual needs of each student by creating a structured, peaceful, predictable and highly visualised environment that facilitates learning, development and autonomy.
- Planning and developing a curriculum based on each student's strengths, opportunities and aspirations.
- To foster a person-centred approach to living and learning that stresses positive working relationship with parents and other networks.
- To prioritize professional development and training for its teachers and assistants.
- To create a work environment that provides fertile ground for cooperation, and job satisfaction.

The Autism Foundation, Hungary

The Autism Foundation - an NGO with outstanding public utility - was founded in 1989. It is situated in Budapest, but serves as a national centre for training teachers, and supporting families with children with ASD. It comprises the following: Outpatient Clinic, School, Adult Unit, Adolescent Club, "TERC" (outpatient therapeutic centre), Autism Research Group, Parent's Club, Methodological Centre, Kapocs Publishers.

Its priorities are:

- The adaptation, development and dissemination of high level evidence-based good practices that, covering the whole autism spectrum, help professional services from the diagnostic procedure to intervention during adulthood
- Working with children and their families to improve the quality of their life
- Services for parents, students and professionals
- The mediation of up-to-date information based on scientific research that contributes to a deeper understanding of the needs of people with autism.

The school comprises 5 special teachers and 3 assistants, technical and administrative staff, and the psychiatrist and psychologists working at the clinic. There are 19 students aged 8-18, in groups of 2 to 6 students. Both high and low functioning students are taught in the school. The children can be considered as falling in to three groups:

1. Pupils with non-verbal or echolalic speech and with learning difficulties
2. Two non-verbal adolescents
3. Pupils with good verbal and cognitive abilities. Some pupils go to a public school for some days of the week.

The school aims to teach the students a range of skills including:

- Social and communicative skills
- Cognitive and academic skills
- Free time skills, or knowledge of how to use leisure time
- Work skills and work behaviour
- Sensomotory skills
- The prevention and solution of behavioural problems

The teaching strategies used to achieve the above goals are:
- Individual Education Plan
- TEACCH
- AAC – PECS
- ELA

The school have also developed their own "Bean Bag" intervention, a group activity intended to develop the social and communication skills of the children.

The school is open Monday to Friday from 0730 to 1630. A typical school day could look like this:

7.30-8.30 pupils and some people from the staff arrive, each child has own daily programme (there is a daily schedule, 2 pupils go to the public school with a teacher.
8.30-9.00 breakfast as a social-communicational situation
9.00-12.00 Individual and small group sessions (academical, social-communicational goals) In this period there are 2 children 1 professional, or 1:1 ratio.
12.00-12.30 lunch as a social-communicational situation
12.30-13.00 playground
13.00-15.00 Individual and small group sessions (academical, social-communicational goals) Writting a diary about the day.
15.00- structured individual free time, structured individual learning – the pupils/teachers ratio is 3-4 pupils:1 teacher or assistant.
Weekly programs: swimming and music once a week.

Svedenskolan, Sweden

Svedenskolan is a special school for pupils with ASD or other communication difficulties (communication in the autistic spectrum). The school is situated 4 miles north of Stockholm, in the town of Solna. It is surrounded by a beautiful park, a lake, a residential estate, and near Ulriksdal castle. The students come from 12 councils in the Greater Stockholm Area, and the school offers pre-school, primary and secondary education, a special unit for students with Asperger syndrome, and after school care and short-term care. The staff comprise teachers, psychologists, assistants and health care workers.

The school values are those of supporting the students' development through safety, joy and understanding.

The school approach is described as follows:

- Small steps, clear sequences
- Interests
- Structure gives security
- Visualise
- Alternative means of communication
- Help with generalisations
- Simple language

The methods of teaching is based on Wing's triad of impairment and seeks to support the students in improving their living skills by focusing on social interactions, play, behaviour, and interests, and communication. The school philosophy also stresses the importance of imagination and creativity. Therefore it applies a holistic approach to teaching and learning that stresses the acquisition of important life skills such as:

- Communication skills;
- Everyday life skills;
- Learning skills;
- Professional skills;
- Social skills;
- Leisure skills.

At the heart of this approach is a notion of 'adaptive pedagogy', which fosters students' understanding, management of behaviour and independence. In more practical instructional terms, the school uses a variety of teaching strategies such as:

- TEEACH
- Pecs
- Music therapy
- One-to-one teaching and support
- Teaching in small groups

Finally, the school values the collaboration with parents highly. Parents are in daily contact with the teachers, they are partners in devising the student Individual Educational Plan (IEP) and the student assessment, and invited to regular meetings.

Common and diverse school practices impacting on the implementation

The overview of each school presented above indicates that there are many points of commonality between them. For example, all four schools use the same teaching methods (TEACCH, PECS, and social stories, for example), and have similar objectives. All four schools share the common feature of being leaders in the practice of teaching and caring for students with ASD. They are all special schools, two being resource centres in their respective countries, namely Denmark and Hungary. All four schools share the same mission statement and general philosophy of supporting the children to develop and become socially included adults. With regard to teaching strategies, the school share the use of similar strategies widely adopted in the teaching of children with ASD. They range from the use of visual support, to high structuring of the day. From the broad school organization perspective, all four schools employ special teachers, assistants, and educational psychologists. The ratio of adult to child is very high in all four schools, and so is the focus on individualizing the learning tasks to suit the child's needs. Finally, all four schools value the collaboration with parents.

There are, however, a number of differences, and these differences are to be valued as an important aspect of the project. This is because, differences in practice will increase the generalizability of the research findings in the use of the hand toolset to other educational environments in Europe, as well as providing the opportunity to test the toolset in challenging practical and conceptual situations. For example, the schools differ in size, student population, organizational structure, vision and goals, and teacher knowledge and experience in using technology. In particular, Egebakken and Svedenskolan have had significant prior experience in using standard mobile technology such as PDAs in the school context, and thus the staff at these schools have a greater level of technological familiarity with mobile solutions than that of the teachers in the Autism Foundation and Helen Allinson school.

Another potentially significant area of diversity, not referred to above, is that resulting from different national policy contexts. Each school's working practices to some extent derive from the cultural and political context in which the school finds itself. For example, debates about inclusion and its relation to special education, although having many common features across European Union countries, are subject to varying interpretations and understanding in different member countries. However, the sharing of different viewpoints between consortium partners is a potential strength and benefit of the project, particularly as it can also become a fruitful way to learn about and from the views and practices of culturally and historically diverse backgrounds. In addition, the existence of such differences – i.e. the fact that this is a multi test site project with test sites in four different countries, also adds considerably to the potential for generalizability of the project results.

Through the open recognition of and celebration of differences, issues of interpretation and integration can be overcome by maintaining effective and open communication between consortium partners. This will be achieved by a) continued and expanded use of the HANDS project intranet for exchange of views and ideas and of videoconferencing options, b) participation in particular of school teaching staff in project meetings, c) and further work as part of WP 2,3,4 and 6 involving partners in exchanging key information and ideas. Further, as part of WP6, more in depth research on each country's history of educational practice, in particular in relation to special educational needs, is envisaged as part of compiling the review of the literature and background knowledge.

3.2 Implementation: issues for consideration arising from consultation with teachers, parents and children

Implementing the efficient and successful use of the mobile technology requires a co-ordinated strategy that takes into account the needs, interests and expectation of all parties. In so doing, a successful implementation involves devising strategies that are common to all partners and simultaneously able to meet the needs and use the strengths of each partner school. The implementation guide proposed here is the result of consultation carried out with researchers and schools. In general, of basic importance for the successful outcome of the project is that of enabling communication between all partners. Communication, either through the HANDS project intranet, or through video conferencing or through various scheduled meetings, are vital in keeping the teams together, and ensuring the success of the project. The data reported here comes mainly from interviews with teachers, parents and children at the Helen Allinson school, with additional input from staff at other test site schools.

Teachers

The outcome of the teachers' consultation process highlighted the following issues that will need to be considered as part of the implementation process:

- Training in ICT and specifically in the use of the new handset
- Time set aside and prior to the use of Prototype 1 for teachers to become acquainted with the smatphones
- Training in carrying out research under the guidance and on behalf of the researcher teams
- Ensuring that release time is available for teachers in order to allow them to be involved in the implementation and evaluation of the toolset
- The need to define roles and responsibilities in relation to the planning and use of the phone and in maintaining communication within the research project consortium. In particular, the clear definition of roles for providing training input and guidance between the software development and academic functions will be important
- The provision of adequate technical support at each test site

- Considerations about workload and work-life balance, in particular in relation to the overall evaluation framework, it is important that this does not impose an unreasonable work load on individual teachers.

Students

Data from the students is more complex and in many cases of indirect nature. However, the outcome of interviews with the students, teachers and parents at Helen Allinson school highlighted the following issues:

- Training the students to use the phone
- Keeping the students informed about the development of the research process in ways adequate to their individual understanding
- Involving the students as much as possible in the process as active players
- Taking into account the needs of the other students and minimizing possible jealousy or rivalry. This is a potentially significant issue for schools and individual classes and needs to be addressed by individual schools, who clearly have the expertise to decide on the strategy most appropriate at local level for minimizing such potential problems. This issue is related to the level of rigour employed in relation to the guidance of the use of the toolset in relation to children in control groups, which is discussed in Section 3.4 below.
- Having the wellbeing of the children in mind at all times. In relation to this, the role of the HANDS Ethical Board will be key in ensuring that the overall implementation and evaluation framework are designed in such a way that the core principle is maintained through all aspects of the project.

Parents

Interview conducted with parents at Helen Allinson school during the requirements phase highlighted the following:

- Training in how the phone works and ongoing technical support
- Clear parental roles and responsibilities and ways in which parents can help
- Need to involve parents at all stages of the research process
- Ongoing communication and feedback

In brief, the consultation exercise shows that building a successful evaluation and implementation is dependent on building a strong, committed, knowledgeable and supportive community of researchers, practitioners and children and their families. In order to achieve this, the implementation strategy should address issues of communication, training, technical and research support, and issues related with school organization and management, besides the requirements for a comprehensive evaluation framework.

Further work on further developing a response to the key implementation issues outlined above will be undertaken as part of WP3, WP5 and WP6, as well as in parallel with WP7 in relation to ethics approval.

3.3 Issues arising from the evaluation requirements

Three strands of research – cognitive psychology, persuasive technology and applicability in the learning environment (education) will be used to develop the overall evaluation framework. This multi-perspective approach is one of the strengths of the project particularly in its combining together of quantitative and qualitative approaches, but it also challenging. Firstly, each academic partner will need to gain an understanding of the different perspectives of the other partner disciplines, and the consortium as a whole will need to recognize and value these varying perspectives, as well as dealing in a collaborative manner with conflicts that will arise. In addition, it is particularly important that practitioners in the schools develop an understanding of the ideas and concepts that the evaluation framework is based on.

Further, from the practical point of view carrying out the evaluation requires time, coordination and specialized knowledge. The workload implications of the evaluation framework need to be regulated so that they are not onerous. At the same time, it is vital that the consortium as a whole recognize the crucial importance of the evaluation function in this "proof of concept" project. In particular, the management function at individual test schools will have a crucial role in ensuring that resources are properly allocated and managed to ensure that there is an efficient implementation of the HANDS toolset and of the evaluation framework, whilst working in cooperation with academic and software development partners.

In order to consider options for the implementation strategy envisaged as potentially being best for the evaluation process, a brief summary of the evaluation requirements in each academic strand is given below in section 3.4. A significant aspect of the work in WP6 will be, based on the input from each academic partner, to develop a comprehensive evaluation framework with associated ethical approval.

3.4 Developing the Implementation and Evaluation Framework

The implementation strategy should be one that combines and integrates both the requirements for valid and reliable data, with the need of all members of the consortium to be made partners in the research process. The achievement of this collaborative and co-operative approach is possible, but a number of issues and factors should be taken into account. Each one will be discuss in detail below.

As part of the process a tri-dimensional approach to research will be adopted. In essence, a cognitive psychological, a persuasive technology and a pedagogical perspectives will be applied to the evaluation of how effective the HANDS handset is. Each academic perspective rests on particular paradigmatic principles which define the research process. The aim of the testing is that of supporting the need

for development and modification of the prototypes, based on valid, reliable and objective measures which allow for generalization across the project partners.
Of particular importance in ensuring that the consortium achieves a coherent evaluation framework is for each academic partner to ensure that the research questions relevant for their discipline in the context of the overall project objectives are clearly stated.

Individual Academic Perspectives

ELTE University is interested in undertaking efficiency cognitive psychology testing, in order to evaluate whether the use of the technology has an effect on the children's social and self-management skills. Systematic efficiency testing includes the use of internationally accepted diagnosis and assessment tools such as ADI-R and ADOS and VINELAND. The effect and efficiency of the HANDS toolset will be measured as the progress relative to an individual baseline established before the tests. In addition, ELTE University, in collaboration initially with the Autism Foundation, intend to develop some "skill level" quantitative tests that will allow a measure of the effectiveness of the toolset in helping children to develop their social skills in particular social scenarios where the toolset can provide interventions.

Aalborg University is interested in testing whether persuasive technology is a valid concept for the design and use of mobile technology for young people with ASD.
In order to evaluate the persuasive potential and effect of the tool set, AAU will consider three sets of techniques:

1. Log files harvested throughout the test period (testing of Prototype 1 and 2)
2. Qualitative approaches, in particular observations and semi-structured interviews
3. Quantitative approaches (explicitly harvested), in particular self-evaluation questionnaires

This will involve collecting data on:

1. The teachers' interaction with technology and the ways in which this affects their interaction with the students
2. The students' interaction with technology and the ways in which this affects their interaction with their world
3. The context in which the tests are carried out. This includes evaluating the actual devices and the qualities of the interaction over time.

London South Bank University is interested in evaluating the impact of technology on the learning environment. This include both the changes for individual children in their ability to deal with particular social situations in the learning context, as well as impacts that occur at the level of pedagogical and teaching strategies, the impact of the technology on teacher working practices and at the level of teacher-students relationship. The methods used will be

observations, semi-structured interviews, self-evaluation questionnaires, and possibly log diaries.
Part of the evaluation proposed by London South Bank University will include research within the aspect of the impact of the technology on teacher working practices that will form part of a doctoral dissertation by Joseph Mintz. A draft proposal for this research, which is located within the overall project objectives, has been approved by the Project Coordinator and will be presented in demarcated form as part of development of the overall evaluation framework as part of WP6.

3.5 Implementation Issues and Strategies to Address Them

Clearly, the development of a comprehensive evaluation framework based on the three academic strands presents an exciting challenge. We envisage minimizing potential problems and increasing both methodological rigour and robustness by developing the following measures in relation to the overall implementation and evaluation framework.

Training

The success of the evaluation resides in all participants sharing a common knowledge and understanding of the technical requirements. Therefore, we plan to provide, in cooperation with the software developers, teachers and parents with a manual or guidance for the use of the phone. A different and adapted manual or guidance will be provided also for the students. It is envisaged that such guidance will be produced in English, the consortium language and that local partners will then be responsible for translation needs in to Hungarian, Danish and Swedish as required.
Besides the manual or guidance, technical support is expected to be provided via a) the project technical partners and b) each school's local ICT support function. Ongoing support and training in the use of the phone will available either through consortium wide discussion for a on the HANDS project intranet and through regular meetings between academic and school teams in each country. These could include participation of parents, teachers and children. Such meetings will also be part of the evaluation process.

Because teachers, in particular, are partners in the research, it is envisaged that teachers may be involved in carrying out some research under the guidance of the researchers. Therefore, training in research will be offered either in the form of a manual, or also as purposefully organized meetings between teachers, or during the already planned meetings of all partners.

Communication

Related to training, there is also the issue of creating and sharing knowledge between all partners. We aim to make greater use of the already available project intranet and in particular we will seek to make the teachers more involved in setting up forums, and possibly social networks, where they can share their experiences and support each other. The intranet has so far proved to be a very effective system for building knowledge and consensus amongst the researchers and academics involved in the process. However, face-to-face meetings are also extremely important opportunities. Together with virtual means of communications (such as Netviewer and Polycom), the overall implementation and evaluation framework should include the opportunity for teachers to meet and share their experience.

In order to keep the teachers committed and supported throughout the evaluation, ongoing reports and/or oral feedback in the form of presentation and discussions will be available.

Level of rigour in relation to guidance

It is envisaged that for parts of the project, children will be allocated to test and control groups. As such, there is a clear expectation that children in the control group will not have access to the HANDS toolset for that part of the project. Further consideration and guidance needs to be developed by the consortium, however, as to the level of rigour of the test/control delineation. Ethical and practical issues, as considered in relation to the issue of jealousy in relation to 3.2 above, will have an influence on the extent to which a rigorous or looser implementation will be appropriate, i.e. to what extent it is possible or methodologically desirable to completely isolate children in individual classes from exposure to or interaction with the HANDS toolset. Further guidance on this will be developed as part of WP2, 3, 4 and WP6.

Conclusion

This evaluation and implementation guide set out to delineate an overall strategy for designing and implementing the evaluation of the use of the phone, its effectiveness and usability in the learning environment in relation to the fulfilment of the three main objectives of the HANDS project. In doing so, a number of aspects have been taken into consideration. While primarily focused on supporting the design of a rigorous evaluative design, we have noted that the complexity of the task, the multi-perspectival and multi-disciplinary approach, and not least the cross-national nature of the project requires both a clear and practical framework, and one that allows for the required flexibility.

Therefore, we suggested that a mixed-method, case study research design is the most suited for the evaluation. This implies the use of an array of methods suitable for collecting valid and reliable data useful for the integration of the research goals,

objective and questions of the three academic partners. The suitability of methods, their design and implementation will vary across the two main testing phases and across the four different sites. Such flexibility is required because, as noted in the report, schools share pedagogical and instructional commonalities, but also cultural, historical and practical differences.

It was also noted that in order to gather the best data available, and simultaneously devise a research design that takes into account issues of teacher workload, interest and commitment, issues of teacher training, ongoing communication and technical support should be integrated as an essential aspect of the evaluation.

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