Scientific Committee for ITASD 2017

Matching technology with people: Evidence-based practice

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Matching technology with people with autism: evidence-based practice

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**Innovative Technologies for Autism Spectrum Disorder**

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Robots in the classroom? Special education teachers’ views on using humanoid robots as teaching tools for social and emotional skills

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Mr. Chris Girvan¹

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Oral
**“Infinite Stories”: Editor of Animated Social Stories**

Oral - Abstract ID: 13

**Dr. María José Rodríguez Fortiz**, **Ms. Inmaculada Garrido Jiménez**, **Mr. Manuel González González**, **Ms. Blanca Toro Ramírez**, **Dr. Àlvaro Fernández López**, **Mr. José Manuel Rabasco De Damas**, **Ms. María Visitación Hurtado Torres**


**Abstract**

**Background**

Therapists who use animated sequences with people with ASD and AS (Asperger Syndrome) can personalize them to improve the transference of the learning to real contexts, enhancing abilities in social interaction, linguistic and communication, and the understanding of modeled previous situations. A computer based tool with this proposal offers a secure environment to train social and cognitive skills. There are some apps with this aim but their learning curve is high, or their functionality is limited or generalized. We are presenting a new app called “Infinitas Historia” (Infinite Stories) funded by Orange Foundation in Spain.

**Objectives**

Design an easy tool to edit, watch and share customized and animated social stories, with alternative paths. We have classified different kind of stories to cover different social and educational objectives:

- Help to prepare stories to improve social skills, encouraging to participate in social activities.
- Improve the pragmatic of the language and training false belief.
- Requirements specification, highlighting the usability of the editor. To be easy to use and to customize are a must.
- Design of the model and user interface for: editors or users and resources; definition of sequences, backgrounds, objects and characters; organization and visualization of the story; interaction of the users; reinforcements; alternative paths in a story; measures about the user development, and sharing of stories.
- Implementation of the application in iOS and Android, providing some already created stories of each category.
- Test and trials of the prototypes with the participation of experts.
- Improve the comprehension of past and future situations to overwhelm them, helping to analyze them to prevent and solve no desired situations and conflicts.
- Training recognition and regulation of emotions.

**Method**

We are following an agile methodology, user centered, with iterations to create an incremental prototype. The steps in each interaction are:

The last prototypes will be also tested by people with ASD. A specific test will be designed to scientifically validate the tool. The final product will include the improvements after the tests and will be available in the app storages.

**Results**

The main result will be an app to edit and watch animated social stories designed to be used in mobile devices. A final app, tested with a group of final users, will show its utility and benefits. Scientific publications will also be done, as well as other dissemination activities. The app will be available from free download in the Orange Foundation web.

**Conclusions**
Software Engineers, professionals of ASD and people with ASD are participating in the development of a tool to edit and show animated social stories. We are applying good practices to develop it: agile methodology, meetings, agreements about requirements and designs, etc. The tool will be available next year for iPad and Android tablet devices. This conference will help us to show the previous implementations and prototypes and also to get feedback from the audience to improve it.
A complete digital solution to adults with ASD in residential and day care facilities

Oral - Abstract ID: 19

Mr. Mads Aarup 1
1. Central Denmark Region, Special Area Autism

Abstract

Background
It is widely believed that digitization of information and schedules have the potential to empower people with ASD by providing a more flexible, portable and interactive platform than the usual analogue media such as whiteboards and laminated visual schedules. Nevertheless, digital technologies are rarely successfully implemented in day care and residential facilities.

Objectives
Our goal was to innovate and implement a unique and coherent display- and visual schedule-solution for adults with ASD in a residential and daycare setting. We wished to create a solution that gave attention to the needs of both the people with ASD – whether low or high functioning – as well as the professional caregivers.

Methods
In collaboration with a digital solution company we developed “SharePlan”. This unique solution contains all the calendars and informational tools needed in residential care in one coherent and easy-to-use package available on both PC’s and mobile platforms:

1. Visual- or text-based calendars with audio visual guides for people with ASD. The platform can be either a smartphone, tablet or personal information display on the wall. The personal information displays in the living facilities for people with ASD combines an interactive visual schedule for each person with relevant information from the shared information displays.

2. Tools for coordinating tasks and digital to-do lists for professionals as well as relatives.

3. Information displays for people with ASD which pull data directly from calendars. This is an engaging and easy-to-learn way of communicating about group activities, work schedules, dinner menus, group messages, etc. The people with ASD can also sign up for meals and group activities directly from the information display or from their mobile devices.

The solution was implemented and tested in the facilities of 230 adults with ASD. During implementation we received ongoing feedback from both professional caregivers and the adults with ASD living in the facilities. Furthermore, we conducted a survey among the professionals before and after implementation.

Results
After many iterations, we now have a display- and schedule-solution for adults with ASD which addresses the complex needs of a residential and daycare setting. For people with ASD it opens unique opportunities for increasing control over their lives through coherent and adaptable digital communication and visual schedules. And for the professionals, it improves collaboration and saves time for more structured teaching with people with ASD.

The survey revealed an increased awareness of the daily schedules by both professionals and people with ASD. The solution is very popular among people with ASD and the digital nature of the solution is seen as less stigmatizing.

Conclusions
With the implementation of a digital platform that is adapted to fit our residential and daycare setting for people with ASD we also have a platform that makes it easier for us to take advantage of new technologies in our teaching in the years to come. In the pipeline, there are still needs to be addressed and potentials to be fulfilled.
A feasibility study of child-robot interaction during an emotion-recognition training in the UK and Serbia

Oral - Abstract ID: 42

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Abstract

Background
Autistic children often have difficulty recognising emotions and facial expressions relative to typically developing children. Several existing projects have shown promise in using robot-assisted interventions for social and academic skills teaching with autistic children, including emotion recognition. Robots can be more predictable and less complex than interaction with humans, and may be more “comfortable” for autistic children. Little is known, however, about the levels of language, cognitive skill, or sensory tolerance that are necessary or desirable for robot-assisted interventions to be implemented effectively for autistic children.

Objectives
This project tested the feasibility of an emotion-recognition training programme in developing the potential of robot-assisted interventions for autistic children in Serbia and in England.

Methods
Eighty-four autistic children, aged between 5 and 12 years, have been assessed thus far (42 Serbia, 42 UK; testing is ongoing), including 44 children (7 girls) [AA2] in the robot-assisted training condition and 40 children (7 girls) in the researcher-only comparison condition. The majority of children have additional intellectual disabilities and limited spoken communication. In both conditions and over a number of sessions, we implemented steps 1-4 of the emotion training programme, “Teaching Children with Autism to Mind Read” (Howlin, Baron-Cohen, & Hadwin, 1999), which is designed to teach recognition of photographic and schematic faces, and identifying emotions in stories. Critically, in the robot-assisted condition, a Robokind R25 humanoid robot (“Zeno”) with realistic facial expressions helped to deliver the programme (controlled covertly by the adult). All sessions were recorded by audio, video, and depth sensors (Kinect).

Results
In each condition, children took between 1 and 8 sessions to complete the training steps, or reach a ceiling: 37 children completed all steps, 17 were unable to complete any steps, and 30 reached an intermediate step. Three of 44 children in the robot-assisted condition were unable to engage with the activity due to sensory sensitivity. The UK data collection was based in schools, and adapting the task instructions to reflect each school’s customary language or instruction formats (e.g. asking children to “find the same” versus “match” emotion pictures) was an important tool for supporting more children to participate in and progress through the programme. At the Serbia site, strategic incorporation of breaks and children’s special interests (e.g. toys, characters) was particularly important for helping children to engage with the programme and continue over multiple sessions. Overall, task scores and researchers’ qualitative reports suggest that while many participating children gained knowledge of emotions, the current task is too complex and language-focused for a sizeable minority. Almost all children interacted successfully and positively with the robot, irrespective of their task completion. Analysis is ongoing, with more detailed data to be presented at ITASD.

Conclusion
A humanoid robot can be a feasible, meaningful, and engaging tool in an emotion-recognition teaching programme for autistic children. Indeed, more children successfully engaged with the robot and the tasks than was initially predicted by researchers, teachers, and parents. However, the number of children not completing any steps—or quickly completing all steps—suggests that the training programme should be redesigned later in the project, to accommodate a wider range of abilities. This study was the first phase of data collection for this large-scale project, with further feasibility studies running in Serbia and the UK. The resulting data will form part of a large “benchmark” annotated dataset of behaviour, gestures, and speech of autistic children, which will be made available to the wider research community. Future analyses will also compare the effectiveness of robot- and researcher-assisted training on teaching emotional and social skills.
A randomized-controlled trial of open-sourced software for teaching social and communication skills in autism spectrum disorder

Oral - Abstract ID: 40

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Abstract

Background

Established treatments for individuals with developmental disabilities and autism spectrum disorders have traditionally used low-tech approaches. The Picture Exchange Communication System (PECS) enjoys extensive support as a framework for teaching social and communicative behavior, using only laminated picture cards. On-going advances in technology have yielded high-tech alternatives (i.e., tablet applications) to low-tech approaches, though these high-tech replacements have been evaluated much less rigorously. While many teachers and families have been earlier adopters of these newer approaches, there are few established guidelines for how to use tablet-based treatments. To date, very few studies have systematically compared these high- and low-tech approaches and it is unclear as to whether certain individuals may be better suited to a specific approach.

Objectives

The present systematically compared high-tech (i.e., tablet-based treatment) and low-tech (i.e., PECS) communication treatments for autism spectrum disorders. This study aimed to answer the following questions: 1) does a high-tech approach to teaching communication skills produce improvements in AAC consistent or equal to established low-tech approaches and 2) does a high-tech approach to teaching communication skills produce improvements in total language (AAC and vocal) consistent or equal to established low-tech approaches.

Methods

Children aged 5-14 with an ASD were randomized assigned to one of two types of communication-based treatments (high-tech, n = 18; low-tech, n = 18). An open-sourced mobile application (iOS, Android, Windows) was developed by study authors to allow for a comparison of outcomes when children used either high-tech (e.g., touchscreen) or low-tech (e.g., picture card) to communicate. All images and displays were constructed to be as similar as possible, with both approaches using the same images and assets. Participants were described by caregivers and teachers as having have little-to-no spontaneous, unprompted communication and needing of communication training. All procedures and training sessions were provided in the schools of participants and treatments were delivered by trained clinicians.

Results

A repeated measures analysis of variance was performed to compared pre- and post-treatment levels of communication (e.g., AAC, vocal language). Levene’s test for homogeneity of variance was non-significant for AAC, vocal language language and total language. The results of a repeated measures analysis of variance revealed statistically significant increases in both AAC and total communication (AAC + vocal) in both treatment conditions.

Conclusions
The results of initial comparisons between high- and low-tech communication training approaches indicated that newer and more advanced methods of communication training were as effective as older and more established low-tech methods. The results from this study add to the existing literature supporting the continued development and evaluation of high-tech intervention approaches. Despite encouraging results, additional research is warranted to explore the relative efficacy of high-tech approaches with children who may have multiple, or more substantial, levels of impairment and in the development of more advanced, social behavior.
Autism in sync - Interactive Technology in support of ASD children

Ms. Grazia Ragone 1
1. University of Sussex

Abstract

Background
The system is designed to support the child/adult with ASD and another (peer, therapist, parent). The system is also designed to be non-intrusive. Algorithms for fine motion tracking are coupled with synthetic, interactive sound models which provide continuous expressive feedback. The system is versatile, giving the opportunity to develop either play- or task-oriented interactions with peers or adults. Several studies showed how the motor synchrony to music may promote the very early development of altruistic behaviour. Also, interactional, coordinated movement forms an important base for the development of empathy and prosocial behaviour.

The system:
1. Tracks and distinguish human figures
2. Generates sound in real-time following the gestures detected
3. Provides statistical analysis of log data.

The REActivity user-interface (Fig.1) can be divided into three components, the first one, on the top left, is about motion capture and reports the human figures who is interacting in the setting. The second, on the top right, regards the log data collected in real time and the last section, at the bottom, regulates all the sounds’ features such as the kind of musical scale, tune, volume and the kind of instrument chosen to be linked to the child’s body part.

The REActivity system is usually installed within schools or research labs’ setting.

Objectives
The aim is to investigate how it may be used as a treatment with music. We aim to investigate the potential for cognitive, behavioural, social and communicative change. This hypothesis is supported by evidence from Feldman (2007) where synchrony is viewed as a formative experience for the maturation of the social brain and impact the development of self-regulation, symbol use, and empathy across childhood and adolescence.

Methods
The software captures the movements of the child, and extracts 2D movement coordinates from the video. It links these mathematical vectors to sound production. The child can thus generate music by moving freely or being guided in different harmonious ways. The study design consists in a sample of 10 ASD children, Boys N = 8, Girls N = 2, 1 session (50 minute length), 1 age group (6-10 years old).

Results
Observation suggests that 10 case studies, some of them exhibited very anxious and resentful children unfold and respond to adults and peers. A qualitative observation of the case studies displayed an increase over the session in eye contact, attention sharing and taking turns. We discuss (in discussion section) if the system might improve social behaviours. Various videos display that, the child synchronizes the output sounds with their own body movement, giving the impression of increase self-confidence, interaction and gaze in a controlled environment. The pleasure derived...
Innovative Technologies for Autism Spectrum Disorder

from the interactive setting makes the treatment fun for the child and keeps the child highly motivated. Also the frequency chart (Fig.2) display an high rate of Acceptance by the child to the facilitator proposal in comparison to when the child ignores or refuses such proposals. (figure 2)

Conclusions

The combination of cognitive – developmental theory with technology opens to new perspectives where interactive, coordinated movement in synchrony with sounds form an important base for the development of sociability and motor skills in ASD children. Improving interpersonal synchrony in children with autism might also improve other related abilities such as social and communication skills. The versatility of our system helps to facilitate the relation and contingency between other children as well as with therapists or parents. The system shows, either with structured or free play, the child can become more aware of his/her movements, synchronising with others and with themselves.
Abstract

Background
Participation by autistic children is considered very positive and desirable, even required, in technology design and evaluation. Similarly, work conducted in autism education settings is also highly valued. In addition to arguments that the community should have a voice in what is designed and how, participation can demonstrably produce more feasible technologies that better meet participant needs. However, technological goals and practices around participation do not exist in a vacuum. In the larger autism research landscape, many projects and disciplines (psychology, HCI, education, etc.) are in active competition to access autistic participants and settings. While schools and parents generally “gate-keep” for child research participation, this role greatly increases in burden and complexity where there are many and repeated requests for access from different sources. The gatekeepers’ choice is not only whether children participate in research, but which project(s) to support. Particularly in smaller cities or those with many universities, the result has been an unsustainably high level of demand on “scarce” participant resources. Schools anecdotally report turning away more participation requests than they approve, and having a strong preference for working with familiar individuals and groups because they “know what they are getting”. This preference may ultimately damage the health of ITASD research as a field: new researchers may struggle to attain any access, and schools may consistently green-light the same teams, rather than supporting the best-planned or most potentially impactful requests.

Objective
To encourage ITASD researchers to consider their requests for child, school, and family participation as part of a larger set of demands on the autism community, and take action to mitigate their impact.

Methods
This talk will give an illustrative example of a UK city with unsustainably high research demands on a small participant pool. It will also present examples of possible strategies from current projects and groups that seek to manage their impact on the autism community. These include improving co-ordination with other researchers to temporally or geographically “spread out” demands and reduce duplication of work (e.g. pooling standardised questionnaire data), as well as alternatives to participation such as re-using participatory design data/artefacts across projects, or working with typically developing children at some project stages.

Results
These strategies are possible templates for other ITASD researchers and projects to begin to reflect on their work, how it makes demands on “scarce” participation resources, and how to work more ethically in the future. Ethical working is likely to mean researchers reducing their total participation demands, maximising the value and gained through participation where it occurs, and seeking creative alternatives.

Conclusions
Conducting ethical ITASD research requires looking beyond a single research group or project, and increasingly require researchers to try new ways of working, to reflect on their methods, and share their lessons learned. There is also a need to collect systematic data about research demands in autism education contexts, to augment anecdotal information from schools. Understanding the scale of this issue—and how it may vary nationally or regionally—is vital context for researcher decision-making.
Innovative Technologies for Autism Spectrum Disorder

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Computational Linguistics applied to Autism

Dr. Fernando Martínez Santiago 1, Dr. Arturo Montejo Ráez 1, Dr. Miguel Ángel García Cumbreras 1
1. University of Jaén

Abstract

Background
Computational Linguistics (CL) is an interdisciplinary field concerned with the statistical or rule-based modeling of natural language from a computational perspective. CL applications most often lead to the development of systems capable of recognizing speech and performing some tasks based on that speech. Examples include speech recognition, spell-checking, speech synthesis or machine translation, among others.

Social communication is one of the three main areas of difficulty shared by all people with autism. It regards with processing language, understanding figures of speech or metaphors, following long or complicated sentences or explaining your own needs and feelings.

Therefore, both CL and Autism research focus on human language. For this reason, over the course of the last years, CL has became a valuable field for palliative and therapeutic treatment of language impairment regarding autism.

Objectives
In this text, we describe some of the most outstanding results that have been obtained by means of the promising intersection of these two research areas: Computational Linguistics and the treatment of language impairments regarding autism.

Results

Alternative and Augmentative Communication (AAC)
Much of Alternative and Augmentative Communication (AAC) technology is supported by means of CL-related tools. The most frequent example is Text-To-Speech software found in many VOCAs (Voice Output Communication Aids). There are other remarkable scenarios:

- Feedback from the system output to the symbol selection process: properly analyzed, a partially composed message may give information on which letters/words are likely to come next. Word prediction techniques in the Illico system (Pasero and Sabatier, 1997) is an example of use of syntactic and semantic information.

- It is frequent to obtain a kind of “telegraphic sentence” as a result of the composition of the message. Compansion system translates lists of noninflected words into English sentences (Jones et al. 1991; Demasco and McCoy 1992). A different approach is followed by (Netzer & Elhadad, 2006). They propose an authoring tool that works during the process of composing the input sequence, and thus can provide early feedback (in the form of display composition and partial text feedback), thus preventing the need of parsing a telegraphic sequence. Other systems based on this principle have been designed for French (Sahara, Mutavox), or for Swedish, English and French (Blisstalk). They all adopt the syntax of the target language as the input syntax of the symbol sequences.

Improving readability

OpenBook (Pavlov, 2014) is a tool to assist people with autism spectrum disorders to adapt written documents into a format easier to read and understand. This process includes replacement of long complex sentences with several short, simple sentences; long / technical words with short, simple words; non-literal language with literal translations, addition of concise summaries and so on.
Innovative Technologies for Autism Spectrum Disorder

Language Software for Semantics Grammar, Pragmatics Training
Pictogrammar (Martinez-Santiago et al. 2015), as example of CL applied to severe language impairments. It is a VOCA device based on pictograms, and it is based on a formal description of the incipient language of beginner communicators so the tool can predict the next pictogram considering not only syntax but semantics and pragmatic level of meaning. Moreover, the application of formal computational models of the language enables Pictogrammar to translate the “telegraphic sentence” to a more natural, well-formed sentence. Motor planning, minimal distractions and other design principles have been followed in the development of Pictogrammar.

GrammarTrainer program (Beals & Hurewitz, 2009) uses linguistic knowledge to teach grammar through text and pictures, a multi-year curriculum covering all the basic sentence structures of English.

Conclusion
As a conclusion, CL applied to ASD is a broad field with the potential to modify the way that we develop software

Bibliography
Abstract

Background
Recent transformations spurred Dutch healthcare institutions to search for new, empowering methods and tools for enabling their clients to cope more independently (van den Bor, 2014). This present study focuses on adults on the autism spectrum, with a mild intellectual impairment to normal intelligence, who live independently, yet under supervision, in a so-called ‘assisted living facility’. People in this group often struggle with situations that lack a clear structure, such as mundane household activities. They tend to have troubles focusing their attention on a particular task, and at other times might become preoccupied to it, with the effect that tasks remain unfinished or even end in chaos. Assistive Technologies (ATs) seem promising as an empowering tool. While traditional ATs can help someone to perform certain activities without human assistance, we hold that, from a design-theoretical perspective, such technologies often fail to empower in a deeper sense. Most technologies are designed with the aim to support clients’ independence in terms of self-sufficiency, while insufficiently addressing the point of view of the disabled people, who understand independence as being in control of their life.

Objective
We propose that embodied interaction could help designing an interactive assistive device that augments, rather than replaces, human agency and thereby adds to a persons’ empowerment in daily life settings.

Method
Inspired by (Zimmerman, 2007), we adopted a Research-through-Design approach. This included conducting a case study of designing to support independent living people with ASD with structuring their daily activities and reflecting on the resulting concept in order to formulate our design vision. The case study was based on a wicked problem (Rittel & Webber, 1973), with an indefinite design challenge. Therefore we took an iterative approach, in which we interlaced studies about embodiment and empowerment theory, insights about future users, and design action in order to formulate an ever more refined problem definition. In line with embodiment and empowerment theory, it was essential to ground the concept in the actual lifeworld and needs of the futures users. In this regard, we see the future user as the true expert (Sanders & Stappers, 2012), and therefore actively involved clients and health care professionals in our design research process, throughout our iterations. For details about the participants, see figure 1.

Results
Over the course of the project relevant theoretical principles of embodiment and empowerment theory together with user-insights, informed our design decisions. This resulted in the new MyDayLight design (figure 2), a system of wireless light units that users can program as a reminder for intended activities, but also to record and reflect on their actions. Intermediate feedback and an evaluation of the final concept with future users indicated empowering potential in the new design. For instance, reflecting on activities in retrospect could make clients more aware of their actions and could result in deeper self-knowledge. Reflecting on the project revealed that the issue of handling daily activities is multidimensional. Not having the ability to self-manage one's daily life has major effects on the relationship with professional caregivers, has immense consequences on one's self-image, and is likely to be reflected in a disorganized physical environment that in turn further undermines self-management. MyDayLight is our designerly attempt to turn this complex system of psychological, social
and material factors in a positive direction, with the client in the driver’s seat. Apart from the practical design, this project resulted in a set of four design principles (figure 3): Enabling ‘reflection-in-action’; making information ‘publicly available’ in order to enable co-reflection and social coupling; enabling the implementation of shared reflections into an ‘endurable-external feedback loop’ embedded in the persons familiar ‘lifeworld’; and nudging situated actions with self-created action-affordances. These may serve as a starting point for AT designers to create truly empowering interactive products.

Conclusion

The iterative process of this project helped to gradually refine our understanding of what it concretely means for a technology to empower a person in daily life. In essence, our design and design principles aim for the self-development of a suitable routine, or ‘situated practice’, by building on a growing shared insight of what works for the person. In a set of follow-up projects, both the MyDayLight design and the principles will be further refined.
Effectiveness and usability of technology-based interventions for children and adolescents with ASD: A Systematic review of reliability, consistency, generalization and durability related to the effects of intervention

Oral - Abstract ID: 36

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Abstract

Background
In recent decades, a growing number of studies investigated the Technology-Based Intervention (TBI) (computer, phone, tablet, virtual reality, robot) for supporting children and teenagers with ASD in their daily life, notably in school settings. Previous systematic reviews indicated that these studies are methodologically too weak for any conclusive claim: TBIs are at best promising practices for ASD interventions (e.g., Grynszpan, et al., 2014; Odom, et al., 2015).

Objectives
Our purpose was threefold: 1) to update the previous systematic reviews of TBI studies for ASD with a focus on clinical-quality studies; 2) to examine reliability, consistency, durability and generalization of study measurements; and 3) to compare the methodology of two cores of studies according to two dimensions: Therapeutic Effectiveness (TE) and Technology Usability (TU).

Methods
Following the PICO method, a systematic literature search was conducted using 9 online databases from 2000 to 2016 with keywords related to autism, TE and TU. Resulting studies were selected using acknowledged quality criteria (SIGN, JADAD). Studies were then analyzed according to the following methodological dimensions: reliability (standardized- vs. non-standardized scales, objective vs. subjective measures), consistency (internal vs. external measurement of TBI’s target), durability (near/far effect) and generalization (transfer or ecological value). From this stage, TE and TU studies were compared, and those addressing both dimensions were examined separately.

Results
From the 917 search results, 31 studies were selected, including 22 on TE, 6 on TU and 3 addressing both dimensions (TE-TU).

Overall, TE studies were found more rigorous than TU studies with respect to study design, sample size and ASD-related inclusion/exclusion criteria. The majority of TE studies were RCT (14), with sufficiently large groups, deeply described. In contrast, TU studies involved small groups in controlled trials, and did not always provide a clinical description of their samples.

Regarding reliability of TBI effect, TE studies employed more standardized measurements than TU studies. Objective measurements were used in most studies. Regarding consistency of TBI effect, internal validity was respected in both TE and TU studies, whereas external validity was not. When considering studies’ results, interestingly, the more the study design was robust, the more the consistency of results dropped: RCT with reliable measurement obtained less clear-cut evidence than controlled trials with less reliable measurement. Generalization measures were included in a only 8 TE studies, and absent in TU studies. Results showed mixed evidence for the generalization of TBI effects. Durability of TBI effect was mostly occulted. Only two TE studies examined post-intervention, near/far effects and reported that TBI effects were maintained over time.

Finally, the three TE-TU studies were less rigorous than most TE studies. Both standardized or objective measures were used, showing the willing to observe methodological standards. Furthermore, they addressed inter-
nal validity, but not external validity, durability and generalization. Results were fully positive, but limited by studies' weaknesses in terms of external validity, generalization and durability.

**Conclusions**

Regardless of the dimension (TE, TU), very few TBI studies for ASD reached the standards of evidence-based practices (reliability, consistency, durability, generalization). Further rigorous studies are, therefore, needed for considering TBI as effective practices with children and adolescents with ASD. Nevertheless, TE studies provided more evidence of their reliability by using more standardized measures, particularly for TBI including computer software, which address emotional and social skills. Also, some TE studies took account of generalization and durability of TBI effects, while it was never the case for TU studies. The examination of reliability, consistency, generalization and durability supports therefore the distinction between TE and TU studies as two separate areas of TBI investigation.

However, TE-TU studies represent an emerging research approach, which deserves to be explored. Moreover, TE-TU studies demonstrated real efforts for meeting methodological standards, but without actual reaching minimal clinical standards of TBI evaluation. Nevertheless, this type of studies remains promising, as TBI usability is a prerequisite to TBI clinical effects. In other words, the clinical benefits of TBI necessitate usability, supporting the importance of considering the two dimensions in TBI validation studies. This situation calls for interdisciplinary development efforts of TBI for ASD, combining expertise in human-computer interaction and clinical research.
Elisa’s journey, co-designed serious game for increasing ASD awareness in schools.

Oral - Abstract ID: 31

Mr. Miguel Lancho¹, Ms. María Merino¹
1. Autismo Burgos

Abstract

Background
For many years, our team has been involved in school awareness of Autism Spectrum Disorders (ASD). These awareness actions have consisted of workshops and talks in which are explained to the students the characteristics of their classmates with ASD.

In this project we wanted to explore the possibilities offered by videogames for educational purposes, serious games, in order to raise awareness among the general population and the students of 1st and 2nd year of ESO, in particular on ASD.
This work involves the participatory design of a videogame framed within the Serious Games genre, which aim to raise awareness of the characteristics and needs of people with Autism / Asperger Syndrome to first cycle students of ESO.
The design process was carried out with the contribution, both in the script and graphic design, of young people with ASD / AS, who have provided their personal experiences on living in education. They have also contributed with many ideas on design and mechanics as video game players.

Objectives
● Encourage an empathic understanding of people with Asperger Syndrome.
● Understand the difficulties these people may have in their interactions with others
● Encourage attitudes of tolerance and respect towards students with Asperger's Syndrome.
● Achieving a reduction in harassment behavior resulting from ignorance and misunderstanding.

Methods
The Videogame is accompanied by five didactic units in which is treated different content on social skills combined with the characteristics and difficulties of people with SA. The units have been designed with the collaboration of secondary school teachers and they collect the experience of the various workshops.
Both the game and the teaching units have been tested in an educational centre with the recipient students of educational material designed.
With this material, we provide an educational resource to schools in order to implement strategies Game Based Learning in class with useful educational content on education for diversity, values education, education, social skills, education for tolerance, etc.

Results
With this work we have managed to involve a group of people with TEA, mostly young, in the conception and design of the video game. This has allowed the participants to reflect on themselves, their status as people with ASD and what they believe it is necessary to pass on to others about their personal characteristics and their needs to achieve adequate social inclusion.

Conclusions
A project like the one that we present needs a long period of time of implementation in the educational centers in order to arrive at sufficiently contrasted conclusions.
In this project we wanted to explore the possibilities offered by videogames for educational purposes, serious games, in order to raise awareness among the general population and the students of 1st and 2nd year of
Secondary Education, in particular on ASD.
A project like the one that we present needs a long period of time of implementation in the educational centers in order to arrive at sufficiently contrasted conclusions.
We have been able to verify that the presentation of this educational material in videogame format initially supposes a greater attraction on the part of the students of the educational centers. Analyzing the data obtained in the assessment of knowledge made at the end of the sessions with each group, it is demonstrated that the acquisition of theoretical knowledge is in line with the objectives set.
Enhancing a better matching between communication needs and available tech for people with ASD.

Oral - Abstract ID: 39

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1. Fundación AUCAVI

Abstract

Background
Following with the extensive comparative assessment of the different comm apps available at our APP Markets presented at ITASD 2012, and the best practice guide developed for the implementation process of a communicator presented at ITASD 2014, the Communicators work group from Fundación AUCAVI has gone on working with the intention of providing resources to improve the matching between the communication needs of the person with ASD and the technology available from the communicators in the markets.

Objectives
With this work we propose a procedure to structure the matching of the critical communication assessment features with the key features of comm apps, taking into account also some key environmental factors.
1- A step by step guide to perform a communication / AAC assessment, involving various tools, that will result in a statement that represents the communication needs of the person as well as his strengths and abilities involved in tech usage.
2- A featured assessment of communication apps. Reviewed analysis of a broad range of communication APPS related to key communication features.
3- Environmental factors, like tech knowledge, AAC knowledge, resources available, etc.

Methods
Among the tools supporting this procedure we are currently using to achieve our three main figures and the matching of the first two with the considerations of the third are the following:
1. AAC/communication assessment: COMFOR, AAC Genie, plus different figures from a qualitative assessment from the SLP.
2. AAC APPS. The structured analysis tac profile developed in previous works developed by this research/work group.
3. Context assessment. SMART-ASD as a reference for some critical factors as: environment’s knowledge and usage of technology, Performance and skills of the user with ASD of basic features (test results).

This procedure involves these three topics and the connection of all three, trying to produce a improved person-technology match in the communication field related to personal portable device implementation for people with ASD, based on the experience acquired in everyday practice of a specialized entity, and paper research.

Results and conclusions
Currently we are testing functional algorithms for each topic that allows to perform accurate and supported matchable figures. We hope to have a solid result for the Congress.
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Aactech-person matching1.jpeg  Aactech-personmatching2.jpeg
Guide to WhastApp. An outcome and content in educational settings for learners with ASD. A positive approach on how to make the best of this tool.

Oral - Abstract ID: 50

Mrs. Laura Saez Puchol, Mr. Luis Pérez de la Maza, Mr. Equipo Aucavi

1. Fundación AUCAVI

Abstract

Background

WhatsApp is a very well known App for the vast majority of the users of smart phones, more than 1 billion people in over 180 countries are currently using it. Social networks are currently a reality that is unavoidable to face and teach/learn for people with ASD.

Objectives

What percentage of people with ASD, are currently using it? What are the problems that people with ASD encounter as users? What can we do in the teaching process in early school ages to prevent future risks?

We should increase our knowledge on these questions. Surely we need to reflect on this context and provide an appropriate support for people with ASD. This approach starts by considering their reality, needs, difficulties and their opinions on the possibilities and their experience on the use of WhatsApp.

In this proposal we try to respond to some key questions, like:

• Why should we introduce Whastapp to our learners?
• How can we use this App to engage people with ASD and cognitive impairment in a social framework?
• What are the main risks people with ASD and cognitive impairment on a social network like Whatsapp?
• How can we anticipate, prevent and help the person to build strategies to manage and enjoy safely a social network?

Methods and results

• Present the results from perception surveys performed among families and professionals currently using WhatsApp.
• Present the results of interviews with learners with ASD and cognitive impairment in relation of their use of WhatsApp.
• Analyze the positive impact of WhatsApp for improving self-esteem of users with ASD and cognitive impairment.
• Setting the device and the App accordingly to the person’s needs as a starting point to address before exposing the person to the challenge of the social environment.
• Present a “developmental” proposal to introduce this App in stages, in order to facilitate the best possible usage of this resource by reducing the possible risks that arise from exposing people with ASD and cognitive impairment to a social network.
• Present the conclusions of the risks assessed, risk management and prevention in WhatsApp use for people with ASD and cognitive impairment. Bullying is a mayor concern in mainstream settings for learners with ASD and cognitive impairment, minimizing the risks related to social network use is a task to be performed.

Conclusions
This work tries to summarize assets, risks and concerns related to social network use by people with ASD and cognitive impairment. As well as to provide strategies to face this content with defined outcomes and with appropriate supports.
Lands of Fog: a full-body interaction co-located environment for children with autism to practice social and collaborative behaviors

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Abstract

Background

The use of computer-based tools for learning and intervention for children with ASD has significantly increased in recent years. The success of such technological tools has been tightly coupled with their capacity to motivate the users, due to the affinity that ASD children show towards technological devices. One approach to increase the engagement and positive learning and intervention outcomes for these tools is to adopt game design strategies. These design principles include positive reinforcement feedback, a certain degree of challenge through clear and attainable goals, and a balance between sense of control, the chance to create strategies, and the search for new information.

Objectives

The “Lands of Fog” interactive system was developed through participatory design with children with ASD, resulting in a novel full-body interaction co-located environment developed for helping children learn and put into practice social and collaborative behaviors. The system is based on a large floor-projected surface (6 meters in diameter) where a child enters into a magic virtual world covered by a mysterious fog. Two users collaborate with the environment through lit butterfly nets, revealing parts of the world which lie below the fog. As children explore, they will discover unique creatures and items through encouraged collaboration.

Methods

The system was tested through a series of experimental trials in Barcelona and London. The sample included a total of 38 children between 10 and 15 years old with an ASD diagnosis defined by ADOS Model 3 diagnostic tool.

The first study was in a controlled laboratory setting and was based on a repeated measures design with randomized couples. Over the course of one month, each child with Autism participated in 3 playing sessions of 15 minutes. In the second study the system was installed in an integrated elementary school with a Special Educational Needs program. Over the course of one week, 20 children with ASD played in the system.

Three data gathering methods were used to evaluate the system: administering questionnaires, coding video recordings of the sessions, and gathering activity data through tracking system logs.

Results

In the laboratory setting, the number of collaborative interactions such as manipulating virtual elements increased significantly through the three sessions (ANOVA: F(2,9)=22.9, p<.05). In the same laboratory setting, parents responded through post-session questionnaires that the activity level of their children increased significantly through the sessions (ANOVA: F(2,9)=9.559, p<.05). Multimodal data analysis revealed that in the school setting 95% of children with ASD felt more comfortable interacting with their partner in the game setting than in physical education class, and a 65% of typically developing children reported an increased willingness to get to know better their ASD partner after playing the game together.

Conclusions

Lands of Fog demonstrates the potential of full-body interaction co-located technology to design playful and motivating intervention tools for therapy. Developing tools through game design principles which are geared towards user’s leisure can increase the positive outcomes of computer-based interventions.
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Moving from PECS to a SGD

Oral - Abstract ID: 45

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Abstract

Background
PECS® is an evidence-based AAC system that teaches users to initiate communication within a social context and to build sentences for a variety of functions. This workshop discusses prerequisites for transitioning from PECS to SGD and using the PECS protocol to teach meaningful SGD use.

Objectives
Speech generating devices (SGDs) and AAC tablet apps frequently are selected as an initial communication strategy for children with Autism Spectrum Disorder (SGD). While protocols exist for matching SGD or app features to specific learners, few protocols exist to teach successful device use. The Picture Exchange Communication System (PECS) offers an evidence-based protocol for systematically teaching functional communication based on procedures empirically validated in the field of applied behavior analysis. PECS is the most commonly used treatment protocol for young children with ASD (Stahmer, Collings & Palinkas, 2005). As a low-tech method, PECS uniquely requires interacting with a communicative partner via the exchange of a picture. Within the first four Phases of the six-phase PECS protocol, users learn to initiate a communicative interaction, be persistent across communicative breakdowns, discriminate among a variety of symbols, and build picture sentences of increasing complexity in a highly motivating and interactive communicative context.

Method
This workshop describes using PECS as an initial AAC strategy for children with ASD until the students have mastered Phase IV of the protocol.

Conclusions
Once a student has mastered Phase IV of the PECS protocol, we collect and analyze a PECS language sample in order to summarize vocabulary size, discrimination array size, range of communicative functions, MLU and the use of any speech or vocalizations. We use this assessment to match a learner’s current communication skills to features available on an SGD or tablet with app. We then create a systematic plan for transferring PECS skills to an SGD using training strategies from the PECS protocol.
Navigating the Digital Wild West of Apps: How Can Teachers and Parents Find Suitable Apps for their Children with Autism to Improve their Social Communication Skills?

Abstract

Background

Since the launch of the iPad in 2010, schools have been increasingly using the devices and their associated applications for teaching children with developmental disabilities (Kagohara et al. 2013). In addition, 54% of households in the UK have a tablet computer and 61% use their mobile phone to access the Internet (Ofcom 2015). The Apple app store provides over 75,000 educational mobile applications (Apple 2016) with over 345 apps specifically for individuals with autism (Fletcher-Watson 2014). Looking for appropriate applications can often be a daunting experience for parents and teachers. There is a lack of standardisation to signal which apps are truly educational on the market, therefore new apps are daily released that are unregulated and untested (Kim 2017).

Objectives

This study aims to provide a state of the art review of mobile applications for iOS and Android tablets for children aged 4 to 11 years old that can foster the development of social communication skills. The app reviews aim to help teachers and parents choose the most appropriate applications for their children and to offer recommendations to app developers when deciding to design educational apps for children with autism to target social communication skills.

Methods:

Semi structured interviews and focus groups with parents, teachers, children and academics were conducted that led to the development of guidelines and a list of questions on how to use the tablets and choose appropriate apps for social communication purposes (Mangafa et al. 2016). In this study, particular apps are reviewed against this list of questions in order to be used by children with autism and their teachers or parents/carers to support the development of skills, such as turn-taking, sharing, verbal and non-verbal communication and empathy. The app reviews are based on the UDL framework (CAST 2011), Bloom’s Revised Taxonomy and SAMR model. The selection criteria were apps that a) can be used by children aged 4-11, b) cost less than £10, c) are popular among UK special and mainstream schools, d) are research informed or have received awards and good parent/teacher reviews and e) can be used to foster social communication and shared engagement.

Results

The app reviews (n=60) are reviewed under the broad categories of education, fun, social skills and emotions. The education category includes applications that are designed to teach academic skills. The fun category includes applications that are primarily games, which provide enjoyment and sensory stimulation. In the social skills category, the applications aim to help children practice social skills, such as sharing, waiting for a turn, sustaining a conversation, joint attention and attending to people. In the emotions category, the applications mentioned teach about emotion recognition and facial expressions.

Conclusions

Parents, teachers and app developers should consider that the content of the app should be developmentally appropriate, customisable, engaging, and linked to school curriculum and prior knowledge. The app should be based on research evidence, designed in consultation with end users and researchers and be rigorously evaluated. It is recommended that schools should collaborate with parents to evaluate and recommend mobile applications that they have been using with the children, as this can also contribute to stronger links between...
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school and home.
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App selection questions page 2.jpg
Outcomes of a large study to develop new labour training models for youth with ASD

Oral - Abstract ID: 60

Mr. Jose Segundo¹, Ms. Francesc Sistach¹
1. Specialisterne

Abstract

Background
According to studies by Autism Speaks and Autism Europe, around 85% of adults with ASD are unemployed, despite their capabilities and because of their difficulties. In different countries, many initiatives have arisen with the aim of promoting employment for people with ASD in various sectors and with different targets (individuals with ASD addressed). Among them, Specialisterne has been able to generate jobs for more than 1,000 individuals in 15 countries since it started in Denmark in 2004. Specialisterne has been initially focused on providing training on technical and social skills for adults with ASD, for five months, so they can work later on tasks such as software testing and other IT tasks. Their attention to details, perseverance, and visual competences, among other capabilities, have been valued as an advantage (“the autism advantage”). While these people are working, or at least during the first months or years, Specialisterne also provides on-the-job support.

Objectives
For the last years, Specialisterne has evaluated its results and has tried to expand the variety and length of their training courses and the range of tasks, trying to generate jobs for different profiles of individuals with ASD.

Methods
For one extreme of the spectrum, we have developed shorter courses and a ‘light’ on-the-job support model, even with the assistance of the employer. By doing this, we can offer jobs for people with ASD in many different roles at a lower cost and with a high level of acceptance and success.

On the other side, thinking on young adults with medium-to-high intellectual capabilities but strong social difficulties at the same time, we have conducted a study on new, different options. First, we have analyzed the non-successful cases of students of our current courses, trying to derive the most important social and technical skills that need more improvement.

Then, we have gathered information on dozens of international centers and some methods that are aimed to improve the working skills of young adults with ASD. We have then visited 14 of these centers in Europe and the US. And we have conducted a survey in Spain on the interests of these individuals, their families and the professionals that help these people.

Results
Combining all these information, we have generated a meta-model of different approaches to putting young adults and adults with ASD to work in different sectors (or even to study in regular colleges). And we have defined a model more focused on young adults with medium-to-high intellectual capabilities but strong social difficulties at the same time that we plan to implement in Spain in the near future, focused on IT and clerical job roles.

We have gathered information on dozens of international centers and some methods that are aimed to improve the working skills of young adults with ASD. We have then visited 14 of these centers in Europe and the US. And we have conducted a survey in Spain on the interests of these individuals, their families and the professionals that help these people.

Conclusions
We will present here our conclusions on the most important social skills that an individual with ASD needs to improve, the meta-model, the main results of our survey and the new model of training that we want to create shortly.
PleaseApp: App for the assessment and training of social communication skills of children with ASD

Oral - Abstract ID: 43

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Abstract

Background
Children with Autistic Spectrum Disorders (ASD) have different social communication (SC) problems (Chevallier, Wilson, Happé and Noveck, 2010), which are essential to initiate and maintain quality relationships with peers during the school period. However, SC difficulties are usually assessed and trained in a partial way (Adams, 2002), because existent tools tend to focus on partial aspects of SC, and they do not cover other aspects strongly related to structural language and Theory of Mind (e.g. referring expressions).

Moreover, apps with educational purposes offer some advantages over traditional methods (Andrés-Roqueta, Bresó and Ramos, 2015; Cheng and Ye, 2010): first, educational professionals need materials with easy access to be used in schools (e.g. app for tablets or digital boards); second, practitioners need quick and efficient assessments to plan interventions (e.g. automatic re-count of items, data saved for future assessments, etc.); and finally, given the characteristics of children with ASD, apps supply children's attention, working memory and receptive difficulties, and they are also a more motivating environment.

Objectives
The aim of the present study is to test a novel app named Pleaseapp (webapp and native app) as a potential tool for assessment and training of SC skills in children with ASD at school period.

Methods
A group of children with ASD and a group of children with typical development (TD) were assessed with some levels of Pleaseapp.

Pleaseapp is based on empirical studies about SC development in TD children, and also SC difficulties observed in ASD and other neurodevelopmental disorders (Matthews, 2014). It contains ten blocks corresponding to different aspects of SC: multimodal gesture-speech integration, politeness, mental inferences, non-literal language, linguistic implicatures, referring expressions, narrative, speech acts, humour, and meta-pragmatics. Before the child starts playing, the adult will select between two routes: assessment, that will give a re-count of number of correct child responses at the end of the game; or intervention, that will give feedback to the child on correct/incorrect responses (visual, verbal or both).

For the individual assessment, an adult from the research group was needed to give the instructions to each child. Through each screen, the child had to select one option out of three that corresponds best with the situation.

Results
Between-group comparisons revealed interesting differences between ASD and TD groups across the different items and levels. These preliminary results are also analysed in order to improve the app for the intervention route.

Conclusions
We conclude that Pleaseapp helps to clarify which SC problems have children with ASD, which is important to plan later interventions according to the level of the child and the kind of pragmatic problems.

Also, it is concluded that Pleaseapp provides a multimodal environment for assessment in each screen/item (vi-
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sual presentation, written language and audio) that helps children with ASD to cope with language and memory loads.

The effectiveness of the app as an educational method is going to be validated with more representative sample of children with typical and atypical development. After that, the app will be shared with the interested sectors (school psychology services, special needs educational centres, ASD associations, etc.), and translated into different languages. In sum, research and psych-educational community will have an app to assess and train widely of SC with a scientific guarantee.

Authors want to thank support from Grant GV/2015/092 by Conselleria de Educación, Cultura y Deporte of Generalitat Valenciana (Spain), and Grant UJI-A2016-12 funded by Universitat Jaume I de Castelló.

References
Repurposing everyday technologies to provide just-in-time supports to children with ASD: The Apple Watch

Abstract

Background

Everyday technologies (e.g., the iPad) can be successfully repurposed to meet the needs of children with autism spectrum disorders (ASD). In this presentation, we explore the feasibility of the Apple Watch as a wearable, non-stigmatizing, and unobtrusive technology to provide just-in-time (JIT) visual supports to children with ASD.

Objectives

Study 1 (O'Brien et al., 2016).

- To explore whether JIT-delivered photos and video clips via the Apple Watch enable children with ASD to carry out directives they could not with speech alone
- To test the feasibility of the Apple Watch to deliver JIT visual supports to children with autism with a focus on display size.

Study 2 (Schlosser et al., in press)

Study 1 was replicated with children who have a dual diagnosis of ASD and intellectual disability

Study 3 (new data)

- To explore instructional methods to teach children with ASD to wear the Apple Watch
- To determine whether the vibro-tactile signal emitted by the Apple Watch when receiving a wireless transmission is a sufficient cue for children with autism to look at the watch
- To explore whether JIT-delivered photos via the Apple Watch enable children with autism to carry out directives they were unable to implement with speech alone
- To explore the informativeness of the parent-completed Touch Sensitivity Questionnaire toward success with watch wearing

Methods

Each study used a case series design. Studies 1-3 included five children with autism (8-13 years), five children with autism and intellectual disabilities (9-13 years), and five children with autism (7–17 years), respectively. All participants were minimally verbal. Materials varied somewhat across studies, but included an iPad, the Apple Watch Sport2, objects and photos for the screening task, spoken directives involving prepositional or action phrases and their corresponding scene cues (e.g., “dog on block”), and objects and figurines.

Results

Studies 1 & 2: Results indicated that the hierarchical JIT supports enabled five children with autism and five children with autism and an intellectual disability to carry out most of the directives. Hence, the relatively small display size of the Apple Watch does not seem to hinder children with autism to glean critical information from visual supports.

Study 3: Use of social stories with embedded video modeling facilitated wearing of the watch, when spoken instructions alone were insufficient. Children required additional gestural and spoken prompting upon receiving a wireless transmission to view their watch. Children independently followed scene cues presented on the watch and implemented directives with figurines on the table top. Parent responses to the Touch Sensitivity
Questionnaire were not indicative of watch wearing success, although this could be due to the small sample size.

**Conclusions**
The three studies provide preliminary empirical support that the Apple Watch is viable wearable technology for the delivery of visual supports in a JIT manner for children with ASD. Next steps include the refinement of an instructional approach whose effectiveness is then tested with an experimental design.
Taimun Watch: A smartwatch-based system to help individuals with Autism Spectrum Disorders self-regulate their emotions.

Oral - Abstract ID: 29

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1. Universidad Autónoma de Madrid, 2. Alenta

Abstract

Background
Self-determination is the main goal of the education of individuals with Autism Spectrum Disorders (Nota & Ferrari, 2007). It involves long-life coping with behavioral issues that are tightly related to emotional dysregulation (Mazefsky, Herrington, & Siegel, 2013). Intervention strategies for these purposes usually involve the use of pictograms, photos and evidence-based instructions (Charlo-Christy & Carpenter, 2002; Machalicek & O'Reilly, 2007; Simpson, 2005).

Objectives
At the Ambient Intelligence laboratory of the Universidad Autónoma de Madrid we have developed a smartwatch system that measures the individual’s heart rate throughout the day, and displays an emotional self-regulation strategy on its screen when a stress episode is detected. These strategies are sequences of multimodal instructions that are created and curated by their family and teachers by means of an authoring smartphone tool. We have also carried out a study to measure the effectiveness of the system on individuals with Autism Spectrum Disorders. Commercial smartwatches were selected instead of specifically crafted ones in order to avoid the risk of stigmatization associated to individuals that use devices that differentiate them within a group.

Methods
For the study two users wore the smartwatches in their whole scholar time during three weeks, so that we collected a considerable amount of usability and performance information. Teachers designed specific emotional self-regulation strategies for them with the smartphone tool. Evaluators observed the users’ behavior during the experiment in terms of interaction with the device and strategy performance. Data from the smartwatch sensors and interaction logs were retrieved, collected and analyzed quantitatively and qualitatively.

Results
The individuals benefited from the system effectively. After a previous learning stage, they followed the emotional self-regulation strategies every time they were able to interact with the smartwatch (i.e.: not being in a middle of a physical activity or with their hands free to interact with the device). After each completed strategy, the users’ heart rate lowered significantly, and their behavior improved so they could continue their classroom activities normally. The system is also available for public use, so that we will be able to get a wider set of experiences that will help us to confirm its effectiveness and keep improving it.

Conclusions
The proposed system is able to help individuals with Autism Spectrum Disorders manage their emotions during mild temper tantrums and outbursts. The support is created in a feasible and straightforward way with smartphones. Emotional self-regulation throughout their lives using this system will help these individuals prevent some long-term issues related to stress and anxiety.
Innovative Technologies for Autism Spectrum Disorder

TAIKUN watch

This mobile system assists individuals with autism spectrum disorders with self-management of behaviors. It consists of a smartwatch and a smartphone

The application on the watch features two small square icons in order to display graphics and message

The smartphone allows users to create, edit, and manage self-monitoring by teams of an intuitive visual interface

Diptico interior recortado eng.jpg
Use of a humanoid robot as a support for the learning of communicative skills in children with autistic spectrum disorders: a pilot study

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Abstract

Background

The present study applies human-robot system interaction for the development of communication skills in children with ASD. It aims to integrate knowledge in robotics for assistance with experience in the theory and therapeutic practice, so that therapy benefits from it. A clinical scenario within the natural environment was developed, with real intervention at Child Neurorehabilitation Unit of Manises Hospital (Valencia). The robot acts as an intermediary and support for the therapist.

The communicative and social interaction difficulties are the most notable characteristics among the children diagnosed within the Autism spectrum disorder (ASD). In many cases, they do not look at the face, have not communicative intention, do not present joint attention, present problems to discriminate non-verbal communication and have problems when developing language. All these aspects result in serious difficulties to initiate and maintain an adequate communication, to develop an appropriate social interaction, to imitate and to act cooperatively with their peers.

Those impairments are explained by the following features: a prominent visual processing and a weak auditory processing. This characteristic way of processing the information makes children with ASD show biggest interest in images and everything in relationship with new technologies, which has led to the development of new proposals for intervention in this field. As is the case of the use of humanoids robots to support the intervention of the therapist, due to it can be a useful and effective tool in the treatment and development of communicative and social skills of the children with ASD, besides of being a complement to the normative therapeutic interventions in this kind of disorder.

Objectives

To develop an ecologically valid scenario and analyze the effectiveness of robot assisted autistic children between 3-5 years, in a real environment through learning of semantic fields (clothing, transportation, colors and animals), not acquired by any of the children.

Methods

Ø These randomised clinical trial lasted since July 2015- January 2017
Ø The sample were 14 children with ASD (5 control group and 9 intervention), between 3 and 5 years, similar level of cognitive development, diagnosed with ASD (by DSM 5 and ADOS- G scale criteria) and absence of language. The type of intervention that led during the study was similar in all cases (speech therapy and occupational therapy), with the same number of sessions.

Intervention Design:
1. An intervention scenario was created for the robot group within the usual session of speech therapy, where a structured intervention is performed divided into two 15-minute blocks (expressive and comprehensive respectively) in which four different semantic fields are worked: colors, type of transport, clothing and
animals.
2. The control group’s intervention was equal to the robot group but without its support, using standard methodology.
3. The selection of subjects in one group or another was random.
4. The real duration of the intervention lasted 10 months and measurements were made at different times.
5. The group intervention sessions with both robot and control group lasted 30 minutes.
6. Continuous measurements were performed and analyzed data through the R program.
7. Intragroup and intergroup analysis were performed and compared over time.
8. The variables were measured in an observational way, through recording and registration by two experienced professionals: looking, pointing, vocalizations and imitation.

Results
Ø Results indicate significant differences in the look between the control group and robot group and although they remain, these differences diminish over time.
Ø Robot assisted children group look more to the robot than to the therapist (stays in time) and vocalize more to the robot than to the therapist.
Ø Sensorial processing problems influence on children, making them to watch less.
Ø Behavioral problems that parents refer do not seem to influence in the results.

Conclusions
Ø The use of interactive robot to assist in the therapy of young children with autism without language, favour these because they are more observant that the control group and therefore favours the attention.
Ø The results are preliminary and it is required to carry out more studies with larger population to confirm the results obtained.

Acknowledgments
Technology research for this paper has been carried out at the Robotic Intelligence Laboratory. Support for this laboratory is provided in part by Ministerio de Economia y Competitividad (DPI2015-69041-R), by Generalitat Valenciana (PROMETEOII/2014/028) and by Universitat Jaume I (P1-1B2014-52).

Bibliography
A mobile application for teaching facial expression recognition and production skills to children with autism spectrum disorders

Poster - Abstract ID: 34

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Abstract

Background

Common issues for different methods of a technology-enhanced intervention in the domain of emotion recognition are skills' stability and generalization. One way to approach them is to combine emotion recognition and production skills in one training tool.

Objectives

In present study a mobile application for teaching facial expression recognition and production skills to children with autism spectrum disorders was developed and experimentally tested.

Method

One part of the developed application teaches a strategy based on a successive perception of significant for emotion recognition regions of a face. In the production part of the tool, a child has to copy an example of expression and take a photo of themselves. The application processes an image and corrects the user with animated contour if needed. For this purpose, a computer vision algorithm for facial expression analysis was developed. PC application also includes several training games.

The formative experiment had an input-process-output design where the “process” stage was a training phase consisted of 12 individual sessions lasting 35 to 45 minutes. Classes were held three times a week. Nineteen children with ASD from age 6 to 12, 17 boys and 2 girls participated in the study.

Input and output sessions were designed to estimate emotion recognition and facial expression production skills. Tasks with an alternative stimulus material, unfamiliar to children, were included in output to verify a generalization of emotion recognition skills.

Subjects were separated into two groups that differed in the type of intervention. The first group (n=13) participated in the training with the tablet PC. They were separated too into two groups accordingly to the level of development of mental functions. The second group (n=6) participated in the study without any devices. The purpose of separation was to estimate the difference in PC-based and conventional interventions. Six months after completion of the experiment children were tested again to check skills preservation.

Results

Analysis of input and output data on emotion recognition skills showed there was a significant difference (Wilcoxon-test, p≤0,01). Emotion estimation showed improvement in anger, fear, surprise, disgust, but not in sadness and happiness. The alternative test proved the skill generalization (Wilcoxon-test, p≤0,01). There were not significant differences between the three groups, participated in the study (Kruskal-Wallis test, p≥0,05).

The analysis of the input and output data on the facial expressions production skill showed the effectiveness of the training (Wilcoxon-test, p≤0,05). There was a significant advantage of the group participated in the training with the tablet PC over the second group (Mann-Whitney test, p≤0,05).

The data analysis of the delayed test showed that facial expression recognition and production skills were stable and transferable (Wilcoxon-test, p≥0,01).

Conclusions

Developed mobile tutoring system helps to teach emotion recognition and production skills that are stable and can be generalized. The use of the tablet PC application gives an advantage in the development of the facial
expression production skill in children with ASD and has equal effectiveness with conventional training method in the development of emotion recognition skills.

Fig1.png

Fig1: The part of the tool that teaches facial expression production requires a child to copy an example of one of them and take a photo. Computer vision algorithm performs detailed analysis of the image and corrects the user with animated contours if needed.

Fig2.png

Fig2: One part of the application teaches an emotion recognition strategy based on a successive perception. It includes a set of images that discrete user’s prior to register at a face and shape of features that relate the emotion recognition. There is also aatyking ture to achieve a conversation between the image and a sign.
Applications for mobiles and tablets focused on Autism Spectrum Disorder (ASD): current situation in the Spanish-speaking environment

Poster - Abstract ID: 16

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Abstract

Background
ASD is a condition that affects a large number of people and whose incidence has increased considerably in recent years. It manifests around 3 years of age and typically includes problems of social interaction, communication and imagination. For ASD people, support and direct use of ICT is becoming more common, considering the increasing incidence of these technological tools in daily life. The benefits of ICT are enhanced given the characteristics they present in relation to the conditions of individuals with autism, which have a remarkable visuospatial and, in many cases, also sensory capacity.

Objectives

General
To determine the current situation of apps focused on ASD for personal devices within the Spanish-speaking environment.

Specific
- To establish the existing offer and availability of such apps.
- To know the main utilities that offer these apps.
- To determine the level of scientific validation of such apps.

Methods
A catalog of diverse apps in the digital market focused on ASD was made, through search in different specialized and general portals (such as happyautism, autismspeaks, bridgingapps, itunes, amazon apps, among others) and on recommendation of professionals in the field (therapists, educators, pediatricians), resulting in a catalog of 701 apps. This catalog was categorized according to the approach of each app, the platform for which it is developed, the languages, its price, the age of use, and existence or not of scientific evidence. In addition, a brief description of each application and its web page is included.

Results
Only 32% are free apps, the rest vary in price from $ 0.89 to $ 1300. Eight percent of apps are only developed for Android, 53% only for Apple, 8% for computer use only (windows, linux, macOS), the rest of apps are multiplatform. Two percent of apps are for adults and young (less than 1% just for adults specifically), 26% are focused on young and children, and remaining percentage is multipurpose. The app approach is divided into 6 broad categories: communication, learning, leisure, supportive tools, emotions and social behavior, and resources for parents and professionals. 44% of apps have more than one approach, however, learning is what is most addressed (35%) and leisure what less (6%). Regarding of language, 45% of apps has a Spanish version; the predominant language is English (93%). Only 4% of apps reviewed have scientific evidence to back them up.

Conclusions
Almost half apps seek to encompass several approaches that contribute to the daily life of ASD people; however, this may cause them to be generalized without considering that ASD is a spectrum with marked particularities in each individual with said condition. The solution can be found in the development of very specific apps or,
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conversely, fully customizable. On the other hand, apps for an adult with ASD should be further developed, as they need support tools to enhance their acquired skills. Less than half of apps analyzed have a Spanish version, and most are developed for Anglo-Saxon market; in this sense, it is necessary to find out what percentage of apps are developed in the United States, since methods for treatment of ASD (and hence its focus on apps) can vary considerably between the US and Spanish-speaking countries. In addition, the dominance of Apple's iOS system on apps for ASD should be taken into account given that in both Spain and Latin America the predominant operating system (with a marked difference) for mobile devices is Android. Finally, there is a considerable gap between existing apps in the market and scientific validation of them, which suggests that mostly parents or relatives, amateurs or commercial companies develop them; this could result in an empiricism that does not reflect greater results and generate distrust in the use of apps focused on ASD.
DictaPicto App, translating the voice into visual language

Poster - Abstract ID: 30

Ms. Mari Luz Juan Belso, Ms. Ana De Ramón Bellver, Mr. Borja Romero

1. Doble Equipo, 2. Bj- adaptaciones

Abstract

Background
The application allows to convert in real time, and in a delocalized way, the oral language, the voice, in visual information.
The App is designed to anticipate and sequence activities of daily living flexibly and in different moments; Facilitating the participation and interaction of people with ASD or communication problems with their environment.
In addition, it’s presented as a simple and practical tool to prepare in an agile way basic materials for, for example, the preparation of norms or simple social histories.
App for Android developed in the framework of the Call for Technology Solutions for people with autism of Fundación Orange in 2015. The application is completely free for the user.

Objectives
Improve access to information for people with ASD and facilitate the understanding of the environment regardless of whether their family (parents, neighborhood neighbors, etc.) knows about augmentative and alternative communication systems or not.
Obtaining the following benefits:

Rapidity to report a situation of change or unforeseen daily life (“it is raining and I must go home”)
Greater anticipation on the part of adults (relatives, caregivers ...) for the person with ASD or other difficulties in communication. By being quicker and more comfortable make more use so the child receives more information of what happens.

Methods

Translation of voice to pictograms: The translation is produced automatically from a spoken phrase of the user; Converting it initially into text and, from there, in the pictograms / images that represent the words

Translation management: When the translated sentence is presented, the user has several options. In case the word is represented by different images, archive the phrase to facilitate its later use and even to label the phrase to facilitate these arches.

Translation file: This tool consists of a translation file, with default examples. This file is editable and the user can delete or add new translations. These translations can be labeled.

Vocabulary management: The application includes a vocabulary corpus based on the ARASAAC pictograms. This can be extended and / or updated, editing or deleting the terms included in it.

Customization: It is possible to change the display of visual information so that it is represented only with images, or with images and text having the possibility to modify the size of the text.

Results and conclusions
Dictapicto is a simple free tool that translates written texts or voice in pictographic language at the moment. Designed to be used by family members, caregivers and therapists of people with ASD, Dictapicto has had other benefits such as;

→ Improve articulation in speech.
→ Migrant families with difficulties to use in the Spanish language.
→ Facilitate the learning of words as independent units.
→ Facilitate the creation of concepts from a written or spoken word.
Innovative Technologies for Autism Spectrum Disorder
Everyone can learn by playing video games. Using video games to teach social skills to children and youth with autism and cognitive disabilities

Poster - Abstract ID: 49

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1. fundacion Integrar

Abstract

Background
The inspiration for this article came about in part by findings made in other studies that show how children and youth with autism enjoy playing videogames just as their neurotypical peers do, which in turn becomes a high-interest activity. As a result, the following question came to us: Is it possible for children and youth on the autism spectrum and with a cognitive disability to have the same opportunities to access and use a videogame console, taking into consideration that both conditions restrict interests and that the level of inflexibility is higher? Finding an answer was possible if we considered from the start that they enjoy playing videogames.

Objectives
Following this, a study was carried out where we were able to observe how a group of twelve children and youths between the ages of ten and sixteen with a diagnosis of Autism Spectrum Disorder (ASD) and cognitive disability improved their skills in social communication and flexibility as a result of the new learning experiences they had while engaging in the diverse and motivating strategies they used while playing videogames, always being provided the necessary supports they required in order to successfully play the games.

The following objectives were established for this study: the first was to increase social communication skills and flexibility in behaviours and interests in the subjects with autism through interactive video games; and the second consisted in integrating technology as a strategy for teaching social communication skills and behaviour flexibility that have not been generalised across other areas.

Methods
The quantitative research methodology employed in this study aimed to measure increases in certain specific behaviours related with social communication skills, flexibility, and the lack of varied interests in youths with ASD and cognitive disabilities through their playing video games.

Results
At the start of the study, the children and youths presented significant difficulties in social communication and flexibility. These difficulties were evidenced, for example, in: taking turns, problem solving, following complex instructions, tolerating changes, and employing self-regulation strategies with the help of a facilitator. After having been exposed to interactive video games using visual cues supports and the necessary behavioural analysis principles, improvements in these skills were noted. These improvements were specifically seen in the following ways: a 70% improvement in the group's tolerance of activities with multiple participants; a 68% improvement in comprehension of the beginning and ending of activities; a 45% improvement in the ability to accept change within an activity with prior notification; and in comprehending and following complex instructions. At this time, a 68% improvement in the use of self-control strategies is seen in the participants of this study.

Conclusions
It is rather significant to discover that children and youth with ASD and cognitive disabilities can use commercial video games, and that only with some environmental accommodations and providing some specific supports, they can not only use them but participate in an activity as any other child can and, as a result, increase their quality of life and inclusion.
Innovative Technologies for Autism Spectrum Disorder

Graphics.jpg

Picture.jpg
Generating Behavioral, Data-analytical, and Neurophysiological Evidence for Mobile Technologies in Autism Treatment

Poster - Abstract ID: 53

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Abstract

Background
The proliferation of inexpensive mobile technology has made a strong impact on behavioral interventions for individuals with autism. Mobile computing devices have never been more user-friendly, cheaper, or universally available. Mobile technology interventions can target academic areas, social skills, speech and language therapy, and functional life skills among others.

Because of increasing popularity, mobile technologies are rapidly brought to market, often without any empirical support to document effectiveness and meet the service delivery paradigm of evidence-based practice. Using the example of mobile technology development in augmentative and alternative communication (AAC), this poster presentation will discuss three major approaches to evidence generation. Applied researchers can use these methodologies to validate intervention effects when designing mobile technology solutions.

Objectives
A mobile AAC application was developed to carry out AAC intervention for learners with severe autism. The app aims to move the beginning communicator from prelinguistic behaviors (e.g., grabbing/reaching for items) to a level of symbolic and functional communication (e.g., forming simple sentences for indicating wants and needs, commenting, and labeling). Clinical validation sought to generate:

- Behavioral evidence to document intervention effects on acquisition of functional communication skills and natural speech production.
- Data-analytical evidence for the communication activities performed by the population using the app. Such proof shows delivery of the technology is accepted in the larger community.
- Neurophysiological evidence to document overall benefits of a package combining behavioral instruction and mobile application.

Methods
Evidence generation involved the following:
1. Single-subject Experimental Designs represent a rigorous approach to evaluating treatment efficacy through repeated measurement of behavior and replicating effects across or within participants. Estimates of treatment effect can be obtained through non-parametric statistics such as the Non-overlap of All Pairs (NAP, range 0-100%).
2. Integration of Google Analytics allows the collection of usage patterns from a large population of users, which is distinct from the assessment of individual effectiveness during therapy sessions.
3. A quantitative electroencephalogram (qEEG) provides valuable information about brain functioning including states of neural activity, event-related potentials, and coherence, a measure of functional connectivity. In a clinical context, it can pinpoint anomalies in brain functioning and help monitoring response to intervention.

Results
Single-subject data were collected for a total of \(N=16\) participants with severe, non-verbal autism, ranging in age from 6-23 years. Treatment and generalization effects for functional communication and speech production
measures were replicated across and within participants. The example in Figure 1 shows successful replication of treatment effect with the AAC app resulting in effect sizes of NAP=100%.

Google analytics data revealed intensity of usage across the user population as documented by the length of messages produced, vocabulary growth within users, and frequency and timespan of user interaction with the AAC.

Neurophysiological data were obtained for four participants and indicate resolving anomalies of electrical brain activity and increased connectivity as shown in Figure 2.

**Conclusions**

The comprehensive approach to evidence-generation facilitated adoption of the AAC application in the clinical field. It allowed fine-tuning the design by identifying critical app features that enhance skill acquisition such as randomization of graphic stimuli, a lock function to prevent self-stimulating behaviors, or different access modes for motor control difficulties. Evidence-generation differentiated this application from other offerings while creating a research-based solution appealing to practitioners.
Leo con Lula iOS app

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¹. Alenta, 2. APNABA, 3. C.P.A., 4. Universidad Autónoma de Madrid

Abstract

Background

Leo con Lula is a method of global reading’s learning, initially developed to be used through digital interactive blackboard. Now, we have an application for iOS system that offers many more possibilities of personalization and use. Android app is being developed too.

Generally, people with Autism Spectrum Disorders show difficulties in reading skills acquisition with syllabic methods used in ordinary schools, so that specific learning methodologies are needed. Usually we found the global methods very useful cause of the good visual competencies of the person with ASD.

Leo con Lula offers a Global Reading Method which start of the specific interest of each user, and uses specific methodological approach in the interaction whith the device.

Objectives

The principal objective is offer to the student a tool for reading learning based on methodological approach specific in ASD: visual supports, centers of interest, learning without error, gradual decrease of help level and promotion of autonomy.

We want to offer a motivational activity, easy to use and understand, intuitive, customizable and useful for facilitating access to education syllabus.

Leo con Lula is distributed for free because our goal is to bring this tool to as many children as possible.

Methods

The method of learning is the Global Reading. We show different activities that combine words for a previously selected repertoire based on personal interest. The order of presentation of words is randomized and applies criteria for the fade of the supports.

Phases one and two requires the pairing of a word with a image (with different difficult levels and various activities types in each phase) while phase three is focuses on the syllabic descomposition of previously learned words.

The app can generate statistics of use for each user.

We also have been introduced the option to use tangible cards (generated and exported from the own app) for the interaction between the user and the device.

Results

The result of a few months of hard work is a careful application avaible for iOS system since April 2nd of this year, that has direct access to the ARASAAC database which facilitate the selection of personalized vocabulary. App for Android System is actually being developed and we hope we can launch it very soon.

Conclusions

Leo con Lula is an specifical tool designed for been used in the specific educational intervention with ASD students. It will be very positive for this students and provide them an interesting opportunity to access to literacy. Maby childrens of differsents countries have learn to read with Lula in the Digital Blackboard and we hope this number will be increased by the use of the iOS application that we will happy to show in the ITASD.
Listening to the user’s voice: Co-Designing a museum application for children with autism

Poster - Abstract ID: 21

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Abstract

Background

With a range of interactive technologies being applied in the field of autism, applications for tablets and mobile phones have received considerable attention (Kagohara et al. 2013). In some cases technologies have become an important part in the lives of people with autism as a therapeutic and entertaining platform (Murdock et al. 2013). So far, some studies have reported the value of iPad applications as a means of augmenting functional independence for autistic groups on a daily basis (Clark et al. 2014; Fletcher-Watson et al. 2015). Due to the potential benefits of technology such as predictability, customization, and accessibility (Murdock et al. 2013) over the last seven years, there has been a rise in the number of applications for multi-touch surfaces such as tablets and mobile devices (Fletcher-Watson et al. 2015).

In order to design an accessible and engaging technology program, it is necessary to understand the autistic users’ preferences and needs. One way to approach this is through a Participatory Design (PD) methodology. Past studies (Makhaeva et al. 2016; Frauenberger et al. 2013) have implemented this approach to ensure users are involved in the design process to help design technology that is most suitable for autistic groups to use.

Objectives

This study seeks to understand the design requirements reported by two autistic groups by co-designing an ‘app’ with the aim of delivering a meaningful museum experience. The objective of engaging an autistic group in the co-design is due to a lack of literature in the field exploring the preferences of interface design used by this group.

Methods

The study undertook a series of co-design sessions involving two groups of children diagnosed with autism (aged between 11 and 15) in the hope of interpreting their special interests. The iterative process of using different PD techniques such as PowerPoint slides, storyboards, drawings and low-tech prototypes contributed to actively involving the users within the design procedure. This was to enable feedback from the group of children and to listen to their voice in the process.

Results

Data from this study revealed the design preferences that could be considered as novel insights coming directly from the children with autism. The results have shown that the children had a considerable role in the decision-making process, whilst the researcher gained valuable insights into how children enjoy experiencing the interface of a museum app. Results from this study are still being collected and will be fully communicated in the poster.

Conclusion

In summary, this study explored the potential to involve end-users into the design methodology for the development of a museum application. The use of different participatory design techniques proved to be successful to enable the participants to express their own preferences. The data helped to identify potential gaps and issues that would not have arisen without engaging the users in this study. It is hoped that these data and poster will help to inform future scholars and practitioners in designing apps for similar autistic groups.
Innovative Technologies for Autism Spectrum Disorder

Moving towards Inclusive digital research: developmental Disabilities and Quality of Life

Poster - Abstract ID: 56

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1. Pontificia Universidad Católica de Valparaíso

Abstract

Background
Quality of life has become an articulating axis of the different policies addressed for the collective of people with developmental disabilities. However, many of the instruments designed to measure quality of life are supplemented by hetero-informers and do not necessarily reflect the reality perceived by disabled people themselves. This research attempts to broaden the classic model of questionnaire towards the expressive field of the digital-supported game from the co-design of a technological application that allows people with developmental disabilities to explore the various dimensions of the concept of quality of life.

Objectives
To evince the phases of the co-design of a technological application that simplify the exploration of quality of life for people with developmental disabilities, and at the same time eases the identification of priority needs areas from which to plan personalized support systems that result in effective inclusion.

Methods
This study presumes a methodological process based on the paradigm of “inclusive research” where people with developmental disabilities play the role of co-researchers. The co-design process has involved four researchers from different disciplines and an advisory group of ten adults with developmental disabilities. The co-design process consisted of five phases: 1) the opportunity for a joint decision-making process that allowed the establishment of the starting point related to sequential planning for the prototype’s design; 2) brainstorming on the preliminary features of the prototype; 3) the first outline of the main features of the prototype; 4) focus groups regarding the prototype and its design proposal; y 5) analysis of the obtained outcomes.

Results
Custom AVATARS have been designed to identify needs in relation to the design of the tool: to enable communication and contact with other people; to be able to exercise the mind and keep it active; to learn something new or improve existing knowledge (training) and to develop competencies that enhances their employability. Regarding the cognitive requirements of the interface design, it is determined that the interactions must be very targeted and sequential without providing options, building a dialog rather than a space open to possibilities, which will later determine the type of game to be designed.

Conclusions
Although this project is in a preliminary stage, the design of this prototype has allowed to approach topics that are relevant to people, in addition to near technology to this population. Likewise, actions oriented by future users have been generated, which is an advantage when it comes to the final design of the application.
Abstract

Background

A core characteristic of autism is difficulty with social communication and interaction, particularly initiating new communications. This research uses touch-screen games (*Andy’s Garden*) as a means to motivate practice of spontaneous initiations. The current games deliberately create situations that children perceive as subjectively novel or surprising (i.e. *discrepant*, differing from their current knowledge and expectations), and that are “worth communicating about” to others. In a previous project (the ECHOES virtual environment), autistic children were observed frequently and spontaneously initiating about events of this type. ECHOES deliberately included novelty (e.g. new digital objects), however, intermittent software errors also caused unintentional surprises, such as the character making “mistakes” in an activity he had previously demonstrated correctly. The new designs deliberately alter a game environment and introduce new elements, trying to re-create and extend the type of spontaneous initiations fortuitously present in ECHOES.

Objectives

This poster presents a proof-of-concept scale evaluation study of work that was presented at ITASD 2014 as a discussion and demonstration of in-progress game designs. It evaluates a final version of the *Andy’s Garden* games, aiming to determine whether deliberate inclusion of novel and surprising elements can motivate spontaneous, positive initiations about game content, similar to the interactions seen in ECHOES. The current study is not an intervention; it aims to motivate communication during adult-supervised game play rather than to create behaviour change.

Methods

Three new games were developed, based on the simple, exploratory, cause-and-effect play in the original ECHOES environment. In one, children sorted apples by colour; two centred on growing flowers or carrots by shaking a magic cloud. Each game had a “baseline” and a “discrepant” version. After the baseline versions were familiar to children (session 1), additional objects and properties were introduced to create “discrepant” versions with novel and surprising elements (sessions 2-3). Surprises included altered object appearances, sound effects, and timings between events. A character also made occasional “mistakes” with his actions and utterances. These things were predicted to interest children and pose opportunities for them to spontaneously initiate communication. A proof-of-concept scale school study in the UK (10 autistic children age 5-11 years, 2 female, phrase language use) evaluated the new games’ effectiveness at motivating communication with an adult social partner. Children played the games individually, over 3 short sessions (mean 48 minutes total play /child).

Results

In 580 min of gameplay video, there were 409 spontaneous initiations to the adult researcher or game character, related to discrepancies (range 11-79 initiations, mean = 40.9/child). In an additional 241 instances, children reacted to discrepancies in a non-socially-directed way. 46% of discrepancy-related initiations were about the deliberately designed novel or surprising game elements. Children also initiated about “non-designed” discrepancies: genuine system errors, and subjectively perceived changes or differences. Across all children, there were very few instances of negative affect. The games appeared to both successfully motivate children to communicate during play, and to be emotionally manageable.
Conclusions
The current strategy of including novel and surprising game elements appears to have been successful in motivating spontaneous social communication for a diverse group of autistic children. This design strategy merits further investigation with a wider age/ability range, and with other types of technology. These findings are the first step towards determining whether this strategy may contribute to a future technology-based intervention for autism, capable of changing children’s initiation behaviour over time, rather than only eliciting it in a particular context.
Robots in the classroom? Special education teachers’ views on using humanoid robots as teaching tools for social and emotional skills

Poster - Abstract ID: 18

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1. UCL Institute of Education, Centre for Research in Autism and Education, 2. UCL Institute of Education & Turney School, 3. University of Bath

Abstract

Background

Autistic children often have difficulty recognising emotions and facial expressions relative to typically developing children. Several existing projects have shown promise in using robot-assisted interventions for teaching social and academic skills to autistic children, including emotion recognition. The DE-ENIGMA project seeks to develop emotion-recognition activities for autistic children (age 5-12) with a humanoid robot, “Zeno”. Zeno’s intended use is in schools, as a teaching tool. Little is known, however, about autism educators’ views on robots in school, and whether or how they might wish to use them. This absence of knowledge means that it is currently difficult to design a future programme of robot-based activities that could meet the needs of educators in their school contexts.

Objectives

To understand current social and emotional skills teaching, and generate input into the design of DE-ENIGMA project activities and robot behaviours, through semi-structured interviews with autism educators.

Methods

This study is ongoing. So far, 20 autism educators (teachers, teaching assistants, administrators, and subject specialists) in the UK have participated in 40-60 minute semi-structured individual interviews or small focus groups. These examined a range of current social and emotional skills-teaching practices before discussing humanoid robots and their potential for educational use. Interviewees were introduced to photo examples of humanoid robots, then asked about the concept of such robots as teaching tools for autism. They were also asked how their students might react to robots, how they would introduce robots to students, and to describe specific examples of their possible educational use.

Results

Interviewees reported that, currently, teaching social and emotional skills was rarely done by rote or in isolation but instead was largely integrated into other topics and activities. When emotions were addressed explicitly, this tended to be in reaction to class events, and focused on cause-and-effect (e.g. what caused an emotion, how it affected others). The educators showed remarkable agreement in their openness to using robots in schools and manner of suggested robot use, though usability and physical durability of robots were cited as major concerns. Example uses generally presented robot-focused activities as integrated with human interaction and existing supports, as a “middle” step between adult-led preparation (e.g. social stories about robot use), and skills practice with other people. Specific activity suggestions included robots modelling social skills, role-play around emotional situations and awareness of others’ feelings, or robot partners scaffolding turn-taking and cooperative play. Interestingly, several teachers stressed that while others might find it unethical to use robots to teach social and emotional skills, they personally supported robot use because it was potentially positive and helpful. A full thematic analysis of this data is currently underway.

Conclusion
Thus far, educators’ attitudes and examples of pedagogical use suggest that robot-based emotion-teaching could be feasible, and positively received within a UK autism education context, if it is developed as part of a multi-step “package” of educational activity that includes a substantial human interaction component. Existing teaching practices indicate the high importance of addressing emotional information in students’ daily life contexts, and further suggest specific roles that humanoid robots could play and the value they could add (e.g. assistants who can repeatedly model a behaviour, “peers” whose feelings can’t be hurt).
Innovative Technologies for Autism Spectrum Disorder

Schedule Organizer on Interactive Digital Blackboard

Poster - Abstract ID: 63

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¹ University of Granada, ² CEIP Victoria Eugenia, Granada

Abstract

Background
The world of education is progressing greatly thanks to multimedia resources. In the last years a didactic resource has come up, which collects all the requirements to be directly employed in teaching, the interactive digital whiteboard. This board consists of a computer connected to a video projector, which projects the image from the screen on to a surface, from which we control the computer with a stylus. Our contribution is an application developed in Java to be used through a new interactive blackboard in a specific ASD classroom. An expert in autism has designed the tool and we have developed a prototype, which is been tested in a School.

Objectives
The general objective of the application is providing a tool to organize time and activities of students in class, easy to configure and personalize.

The tutor can timetable weekly or daily activities, which can be different for each student in the class. Students are moved from house to school when they arrive to class. When a student is selected in the class, its personal activity schedule is shown. The food of the student for each day can also be planned by the tutor on the fly, and then the student can choose when it is the time to eat.

Method
The followed methodology is agile, centered on the user and based on evolutionary prototyping. A specialist in ASD is collaborating in the design and testing of the prototypes. The steps of each iteration are: (1) Specification of requirements, carried out thanks to the sharing of ideas by the tutor and the software engineer. (2) Design and implementation in Java of a main interface as welcome screen and the different interfaces that are derived from it with multiples functionalities. (3) Link a database created in mySQL to collect the different users, images and files created from the program. (4) Verification and validation tests by different expert teachers.

Results
The main result will be a specific application to be used by an interactive whiteboard. This application acts as a welcome screen programmed by the teacher and later used by children with ASD, where they can view, manage and edit images and texts related to their daily activities in class. As we are using standards, it could be used by any tutor in his/her classroom with digital whiteboard.

Conclusions
This project is being carried out as the Final Degree Project of a student at the Higher Technical School of Computer Engineering. In addition, it includes the participation of a supervising teacher and an expert in treatment of children with TEA. We are all collaborating in the development of a didactic tool to enhance the teaching of these children. We are applying good practices to develop it: agile methodology, meetings, agreements on requirements and designs, etc. The tool will be available for July this year to be used on an interactive whiteboard. This conference will help us to improve, it will also be a strong motivation to keep working.
Innovative Technologies for Autism Spectrum Disorder
The service provider perspective: developing and using remote services for individuals with autism in tandem with regular coaching

Poster - Abstract ID: 44

Mrs. Sanna Kara 1, Mr. Marko Lahti 1, Mrs. Ritva Ulander 1, Dr. Vesa Korhonen 1

1. Autism foundation

Abstract

Background

Autism foundation Finland has taken steps toward utilising remote technologies in our services, for example, during our collaboration with a government agency developing the concept of neuropsychiatric services in Finland.

Objectives

The aim was to develop user determined service by directly applying the technology with the service users in vocational coaching, living/accommodation services, and in different rehabilitative services.

Methods

A commercial remotetechnology was used that allows individualised support services, using a computer or a handheld device. It consists of communication (video/written) with a personal coach and doing practical exercises privately – both of which can be timed with reminder notifications. The technology had premade and individualised exercises that were targeting executive functioning, self-knowledge, self-reflection and observation, relaxation, and stress control. The exercises used were targeted where it can benefit the user, for example, in between face-to-face coaching sessions to support continuance and the flow of the service. Work and education related concrete plans can be made, for example, on weekly basis. To support these goals and to boost the feeling of being in control, and chunking the goals, a daily based exercises were created. The exercises can have material as articles, video, picture, or in audio form. The service has been designed with security and privacy in mind, and hence the service provider and user can use it safely.

Results

The core findings were that service users were active with the technology and that they were using it to attain their personalised goals (GAS, goal attainment scale). An important factor was also the personalised exercises for each individual. The exercises were used to integrate the learnt skills from the coaching sessions to everyday lives. The remote method has also enabled support after the frequent face-to-face sessions and provided extra help to attain the set goals.

Conclusions

It can be inferred that service users benefit from remote technologies if planned the individual person in mind. The service is best used using exercises to support individuals with autism to utilise and to transfer the learnt skills to everyday contexts and to support their adaptive functioning. We wish to emphasise that remote services should be user based and look at the individuals personal needs, and that the remote service is not a tool that is for everyone but can bring great benefits when the person using it is motivated and the exercises planned for the specific individual. Based on our experience we are now more able to plan more of our services, in collaboration with the individuals with autism, in which remote technologies may bring benefits for the individuals with autism.
Abstract

Background
As far back as 2004, mobile learning was described as being at the point where mobile computing could enhance children's learning experiences. Recently, tablet technologies (tablets) have become an important part of education with research suggesting they provide additional support for children in Special Educational Needs and Disabilities (SEND) schools. Specifically, the ubiquitous nature of tablets lends itself to the attentional process in children with an Autistic Spectrum Condition (ASC) by offering alternative forms of communication and learning. Nevertheless, SEND teaching staff need assistance in creating strategies to assist children in academic and social learning. Consequently, teachers' attitudes and abilities towards tablets in SEND schools need to be further understood.

Objectives

• To ascertain how teachers' attitudes and abilities using tablets may be understood in a way that assists and informs teaching in SEND classrooms

• Understand the feasibility of tablets in SEND classrooms as an additional tool for ASC children.

Method

Head teachers, teachers and teaching assistants (n = 62) from 7 SEND schools were invited to participate in focus groups (FG) within their schools. All schools were designated by the Local Authority as: Complex Needs (CN), Profound and Multiple Learning Difficulties (PMLD) and Moderate Learning difficulties (MLD). FG were conducted using a set of semi-structured questions designed to stimulate discussions. These were recorded, transcribed (64,345 words) and transferred onto NVivo 10 software to be coded at a later date. The codes consisted of comments reflecting teacher attitudes, self-efficacy and ASC themes from a positive or negative perspective towards tablets.

Results

Participants indicated that tablets in SEND classroom were a useful resource and regarded their own abilities in using them more confidently than was initially expected. Moreover, they went on to suggest ASC pupils use of tablets had a progressive impact on pupil learning. Participants from CN schools generated more positive response with regard to tablets than those from MLD and PMLD schools. However, both the other schools expressed more positive than negative responses also.

Finally, data indicated that ASC children improve their learning using tablets due to: availability of applications (apps); as a tool to assist in communication; collaboration and language skills; ease of use and being motivated to use them.

Conclusions

These findings show that tablets are already embedded in teaching within SEND classrooms. Participants were positive and confident about their own use of them and how to use them in school. Moreover, they demonstrated an awareness of the impact tablets have for ASC children across all three school types. Motivation, usability and communication were cited as the main benefits tablets bring to ASC children in the classroom. Concerns were raised that training, policy and programmes in education are not up-to-date in reflecting the use of tablets. Future research should seek to reflect these concerns and assist staff in understanding the relationship children in SEND education have with these types of technology.
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