Designing Digital Aids for Children with Autism in Pakistan: Challenges and Possibilities

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Abstract
In this paper we briefly discuss our work in progress, where we aim to design an application that assists autistic children in Pakistan to be better able to learn their native language i.e. Urdu. We interviewed parents and instructors of autistic children and also consulted speech therapists. These sets of users were then frequently consulted for the design of our final prototype. After we have completed the design and development of the application, we will move towards performing evaluations of our targeted user groups. In this paper, we particularly reflect on the possibilities as well as different challenges faced while designing technologies for children with autism in a developing country.

Author Keywords
Autism; Pakistan; applications; language; HCI4D

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction
Autism is a complex neuro-developmental disorder that is manifested in children from 18 months to 3 years of age. It affects a child’s communication, socialization, cognition and social interaction. High-functioning autism (HFA) is at one end of the ASD spectrum.
It is estimated that 350,000 children in Pakistan suffer from autism [1] and this number is increasing day by day. Teaching and training of these children requires thorough professionals and specialized equipment. Unfortunately there is very little awareness about autism in Pakistan. There are very few places where these children can be managed and all prior work done on language development for autistic children has been in the English language [2] and almost no work has been done in Urdu language, the native language of Pakistan. Once these children come in the main stream, it is absolutely essential for them to know how to communicate in Urdu because it is the most widely spoken language throughout Pakistan. Inability to speak in Urdu would lead to huge communication gaps between them and society. In the current project, our focus would be on HFA children in Pakistan who have underdeveloped language skills.

While designing technologies for such children, it is also important to keep in mind the social and cultural implications of autism in Pakistan. The backlash of the ignorance of many people towards autism leads to the child being shunned, and the parents often become discouraged that their child is nothing more than an embarrassment to society. Moreover, very often autism is wrongly diagnosed and Pakistani parent usually label their kids as shy, less talkative and are in state of denial that their child is autistic [6]. Finally, parents, especially with low income and less educated backgrounds, are not ready to accept autism as a disorder and aim at more short-term solutions for improving the socio-emotional behavior and communication skills of their children with autism.

Our project aims to take these cultural implications into account and show parents and teachers alike that language development is the key for many children to become part of the society once again, through technology. Many families of the children have weaker socio-economic backgrounds and so it is essential that we make this project an output that is both friendly and accessible to all.

Although the number of research papers that focus on language aids for autistic children [3][4] are of a significant number in the western world, however, other than a few exceptions [5][6], not much has been done for Pakistani autistic children and especially to help them with their native language through computer interaction. Therefore, our aim is to provide children and parents an interactive tool that allows them to overcome social hindrances and have an opportunity to allow the children to enter mainstream society again by communication in Urdu and education in relation to the Pakistani culture.

In the next section we briefly identify the key issues we identified during our first round of research and reflect on the challenges faced while working with autistic children.

**User Research**

The main users for this application are the children on the high functioning end of the autistic spectrum with language impairments. Keeping a variation of users (mental vs. biological) in mind, the users were divided into the following main categories:

1. Verbal Receptive: Those children who are able to understand simple sentences with ease.

2. Verbal Non-Receptive: Those children who may be able to understand simple sentences but are unable to give a reply.
3. Verbal – Single word: Those who understand and are able to reply back in one or very few words.

4. Verbal – Inconsistent: Those that may seem fully verbal yet engage in repetitive phrases or sentences (echolalia).

5. Non-Verbal: Those children who have difficulty with understanding and speaking.

The main methods used were a set of interviews with therapists, psychologists and parents, questionnaires, two months long observational (with/between therapist and child) and co-discovery sessions. In these sessions we also used existing manual and digital tools. We partnered with two schools, who offered exclusive services to autistic children, and conducted all of our research in their premises.

**Challenges**

1. Teaching Methods Available: The most common method was the incorporation of Information Carrying Words (ICW’s) alongside with visuals and animations. The main problem was that the usage of this method was mostly in English with no standard approach or set curriculum. Sometimes the Urdu alternative for the word, if it seemed more familiar, would be used.

Since the structures for the two languages are so drastically different, it would be too much to expect from the children to learn both at the same time. Apart from this, the teaching methods varied from teacher to teacher which could be a potential source of confusion for the children’s learning capabilities and is something we would have to take into account during our own implementation of the solution.

2. Limitation of resources and funds: Firstly the resources available to teach these children were very limited. There were only a few, and mostly outdated set of picture cards that the children could use. Alongside this, the opportunities to use new methods were very few in Pakistan.

Another problem regarding autism that exists in Pakistan is that the staff or the therapists that deal with the autistic kids are not well trained. We took a specialized therapist along with us on every visit to these schools, where she pointed out many flaws in the way the therapy sessions were conducted with these children. The main reason for this is the lack of funding. The institutes hire low wage workers who are not well qualified or trained to perform their tasks.

3. Expectations: One difficulty that we faced was the lack of parent teacher coordination. Both the parent and teacher agreed, in a co design session, that there needed to be some sort of a system to bridge the communication gap between home and school for the children. Parents have absolutely no clue of how to deal with behavioral issues of their autistic kids at home nor do they know how to help the children revise what they were taught at school, partly because they are unaware of the curriculum being followed at school and also because they lack the proper training required to deal with autistic kids.

4. Use of Technology: The use of technology by these schools was completely random. The lack of an organized approach towards technology as a teaching tool often led the children to not take any activities seriously and realize its full potential. There is no procedure to see if
the selected digital method had an effect on the performance and such digital interventions were not systematically integrated with manual intervention.

**Possibilities**

The challenges mentioned above highlight the urgency for designing new technologies based on the needs of local users that could bridge the gaps that exist in our system.

As mentioned above, in Pakistan, negligent amount of work has been done to rehabilitate autistic children for language impairment. To help solve this issue we are developing an interactive tangible application for supporting our target groups i.e. parents, teachers and children. Through our application, teachers and parents alike can be engaged with the child to make learning more possible. We understand the need to train teachers in Pakistan and also to guide parents from all sorts of backgrounds, literate or illiterate, to help their autistic children develop improved language skills. Therefore, our application would not only teach students but would also instruct therapists and parents to use the right methodology.

To achieve our goals of integrating these children back into society we need to bring about a form of education that incorporates the new and old with the help of interactive technologies specified for children with autism. We want that this application be as widespread and easily accessible to children with autism in Pakistan. Over all, we want to bring to light the plight of autism and spread awareness and hope for those families who feel their child has no future. We aim to integrate these children more cohesively into the Pakistani society by teaching Urdu effectively, ultimately creating a unique experience for the children, parents and teachers. To understand the needs of autistic children in the context of a developing country, to develop technological educational aids for them, and to understand the long-term impact of new digital aids on the lives of these children in Pakistan would be what this project would aim to do, and what we hope to discuss during the workshop.

**References**


About the authors

Jehan Khattak, Maha Munawar and Umaira Sajjad are undergraduates at Lahore University of Management Sciences.

**Jehan Khattak** is from Peshawar, Pakistan. After studying HCI, she realized the importance of designing technologies for social impact. Having a family background on working with children with special needs, this project is one of great passion for her.

**Maha Munawar** is a Computer Science major and a Math minor. Having an aptitude to excel in whatever she chooses to work on, she wants to further the plight of autistic children in her country by developing a first of its kind mobile application for autism in Pakistan.

**Umaira Sajjad** loves developing interfaces that are designed for social causes. After working on developing a mobile app to facilitate pregnant women in Pakistan, she looks forward to rehabilitating autistic children in Pakistan.

**Suleman Shahid** is working as an Assistant Professor at Tilburg University and at Lahore University of Management Sciences (LUMS). He also runs a mobile UX design studio. His primary research interests are in the area of child-computer interaction, social and cultural computing, and user experience design. After joining LUMS, he got interested in the area of human computer interaction for development (HCI4D) and started a new lab where he is working on new projects in the health and education sectors. Suleman is looking forward to attending the workshop and to reflect on the possibilities as well as different challenges faced while designing technologies for children with autism in a developing country.