RESEARCH INTO TELECOMMUNICATIONS OPTIONS FOR PEOPLE WITH PHYSICAL DISABILITIES

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Introduction

Accessing telecommunication technology and the broad range of services behind it has been an ongoing challenge for people with disabilities. With technology continually changing and mobile phones shrinking in size, the gap between people with disabilities and telecommunication technology has grown. This research trialed and evaluated new configurable ‘off-the-shelf’ technological options that can improve the lifestyle, independence, security and social interaction of people with physical disabilities. The trials involved ten participants, drawn from the 1300 children and adults for whom The Crippled Children’s Association of SA, Inc (CCA) provides a service. The trial group included people with mild, moderate and severe physical disabilities affecting movement and speech. The trials tested the ability of the participants to make and receive calls and, for those participants that can use the Short Message Service (SMS), to create and send text messages efficiently.

Project Background

The aim of this research was to trial and evaluate new technological options that can improve the lifestyle, independence, and social interaction of people with physical disabilities through the use of telecommunications. This work is the continuation of research conducted by Regency Park Rehabilitation Engineering (RPRE), a division

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Preliminary research through a focus group session [2] and the “Mobile and Home Needs Analysis Survey” questionnaires [1,3] carried out by RPRE and Flinders University, in May 2002, has shown that people with disabilities within the community are able to use, and want to have access to, mobile telecommunications. It has also highlighted that most people with a disability are not aware of the available technology and, if they are, do not use it to its fullest extent. Fewer respondents were actually using the available or add-on mobile phone technology. Of the forty seven respondents, modest numbers expressed interest using available add-on technology or mobile phone features available on more advanced models such as a cordless headset (32%), personal hands-free (32%), speakerphone function (28%), speed dialling (27%) and voice recognition (23%).

This research looked at alternative solutions (such as car kits, voice recognition and hands-free technology, and network features such as voice mail) to improve the awareness and the telecommunications experience of people with physical disabilities. It aimed to enable these members of the community to participate and experience telecommunications technology to the same extent as able-bodied people currently do. The research hypothesis was “that through the use of wireless mobile phone technology, people with disabilities will become more active and participating members of the community, leading to an increased sense of social inclusion, independence, and security”.
Research Methods and Procedures

A broad range of participants representing a spectrum of age, disability, gender, and telecommunications experience with telecommunications equipment was sourced. Participants were chosen for the trial based on their needs and the available telecommunications equipment at the time of the trial. This was carried out through an initial assessment of “matching the participant with the available technology”. This assessment identified the participants’ communication needs and accessibility problems. A priority scale was implemented to measure the “Importance” and “Needs” of the participants, while a rating scale was used to measure the “Performance” and “Frustration” when accessing telecommunications equipment. All participants were subjected to the same questions to guide the researcher to match the participants’ needs with the appropriate available solution.

Following the selection of ten participants from the initial assessment, each participant was able to trial the technology that was assessed as being most suitable for them for three weeks. Prior to the trial, each participant received training in the use of the provided technology, whereby all the features and associated applications of the technology were explained in detail. This was a standard protocol for all participants. Re-training was an ongoing process throughout the trial when required by the participants. Due to the nature of the participants involved and the possible problems that may occur due to the technology, some trials ran in parallel depending on the uniqueness of the individual’s needs, while other trials ran one after another for those with similar solutions.

An “ABA” style approach was implemented throughout the trial period:

A – Before intervention: without equipment (prior to the trial);
B – During intervention: with equipment (end of the trial);
A – After intervention: when equipment had been withdrawn for two weeks or more.

This process involved a measure of the participant’s performance and satisfaction relating to the problem areas identified by the participant. At each stage during the trial an assessment was carried out, through the use of a customised Canadian Occupational Performance Measure (COPM) questionnaire [4]. COPM is a standardised outcome measure tool designed to detect change in a participant’s self-perception of occupational performance over time. It was used throughout the trial to measure the performance and satisfaction of the broader issues, concerns and problems that a participant had with phone technologies to evaluate the research aim and hypothesis.

The performance indicators (where applicable) for the trial involved the use and/or access to the following features:

- Voice calls (through various methods such as speed dialling, voice dialling or other methods);
- Text messaging (SMS) and/or email (open, create & send);
- Voicemail (retrieve as well as use);
- Access to the information services (weather, news, sports, lotto numbers etc…) via WAP (Wireless Application Protocol);
- Browsing the Internet (website specified); and
- Other features on the phone (Extras – voice memo or commands plus any other features, depending on the product).

Participants that took part in this trial included those with mild physical disability with limited mobility and restricted movement, reduced strength or muscular dystrophy, to
those with severe Athetoid Cerebral Palsy. Their ages ranged from fourteen to eighty, with some participants having no previous exposure to telecommunication technology. Details are shown in Table 1.

Table 1: The trial participants, their previous telecommunications experience, and the technology that was provided to them.

<table>
<thead>
<tr>
<th>PARTICIPANTS</th>
<th>AGE</th>
<th>DIAGNOSIS/Clinical condition</th>
<th>Previous telecommunications exposure with mobile phones</th>
<th>Technology provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17</td>
<td>Cerebral Palsy (CP), limited mobility (walking aid &amp; wheelchair)</td>
<td>Nokia 5110</td>
<td>Panasonic GD95</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
<td>Restricted to wheelchair (mobility), hearing aid user</td>
<td>Some exposure, from a family member’s handset</td>
<td>Kyocera QCP 3035</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
<td>Muscular Dystrophy (Duchenne’s)</td>
<td>Panasonic GD75</td>
<td>O2XDA</td>
</tr>
<tr>
<td>4</td>
<td>53</td>
<td>CP mild</td>
<td>Ericsson A2618</td>
<td>Panasonic GD95</td>
</tr>
<tr>
<td>5</td>
<td>23</td>
<td>Restricted to wheelchairs (limited movement) and reduced strength</td>
<td>None</td>
<td>Bluetooth Car Kit</td>
</tr>
<tr>
<td>6</td>
<td>39</td>
<td>Limited mobility and restricted movement</td>
<td>None</td>
<td>Advanced Car kit</td>
</tr>
<tr>
<td>7</td>
<td>18</td>
<td>Muscular Dystrophy</td>
<td>Motorola Talkabout</td>
<td>Kyocera QCP 3035</td>
</tr>
<tr>
<td>8</td>
<td>14</td>
<td>CP – cognitively more than physically</td>
<td>Philips Savvy</td>
<td>Panasonic GD95</td>
</tr>
<tr>
<td>9</td>
<td>16</td>
<td>Athetoid CP (severe)</td>
<td>None</td>
<td>RehaPhone</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
<td>CP (severe)</td>
<td>Nokia 3310</td>
<td>Advanced Car kit</td>
</tr>
</tbody>
</table>

A review of the initial assessment results concluded that the ten participants could be classified into three distinct groups:

**GROUP 1**: Participants with mild physical disabilities that prevent them from using standard telecommunications equipment effectively and efficiently. Typical problems are associated with small keys and displays and difficulties related to lifting or holding the phone for the duration of the call. Three participants belong to this group.
GROUP 2: Participants with moderate physical disabilities (eg. Cerebral Palsy) that typically restrict them to the use of one mode of communication such as text or voice and/or limited use of both. Four participants belong to this group.

GROUP 3: Participants with severe physical disabilities (eg. severe Cerebral Palsy). Two individuals use switches to operate an Augmentative and Alternative Communication (AAC) device. A carer normally operates the phone on behalf of these participants. Three participants belong to this group. Finding an off-the-shelf solution for these participants proved difficult at first. It required a combination of technologies, innovative thinking and various trials to find the right technologies to operate the mobile phone. Significant time and effort was spent for this group.

Results
Initial interviews with the ten participants revealed that voice calls and text messaging were the most important communication needs. Mobile communication solutions that the majority of participants identified to be essential and/or important include:

- Speakerphone capability;
- Voice dialling and speed dialling;
- Predictive text (word prediction) for faster text messaging;
- Voicemail; and
- Larger display.

Other mobile phone solutions that were considered useful by participants included the control of a mobile phone via a computer; and an attachable computer keyboard for the phone. Those mobile phone technologies that were considered “not required”
by many participants included headsets (cord and cordless) and attachable keypads for a mobile phone.

Figures 1 and 2 below show the overall performance and satisfaction results of all of the participants that took part in the trial.

**Figure 1:** Average performances of the 10 participants throughout the trial

**Figure 2:** Average satisfaction of the 10 participants throughout the trial

**Note:** Group1, 2, 3 (x) – where x is the actual participant

Nine of the ten participants showed high to very high outcomes. One participant from Group 3 showed only slight improvement in performance and experienced reduced satisfaction with the solution provided. This was due to a technical problem...
experienced with the telecommunications equipment during the trial period and caused by the erratic behaviour of the mobile phone voice control system, which did not function as technically specified. Efforts were made to correct this malfunction through software upgrades and hardware replacement, to no avail. Although the trial was not as successful as anticipated, the indications were that a total hands-free solution would have been significant for this participant.

The use of car kits that incorporated speakerphone, with voice and speed dialling such as that from SonyEricsson and Nokia, when installed on wheelchairs proved successful for three participants of the trial. For these participants, the privacy of a conversation was not an issue and the concept of installing a car kit onto a wheelchair was unknown to them. For two of these participants, the increase in performance and satisfaction was significant. Therefore, having speakerphone capability and reduced effort to control the phone through voice and/or speed dialling with the car kit was a very effective solution. The provision of the car kit and elimination of any effort required to control the phone benefited one participant from Group 3 immensely, since prior to the trial the participant had no form of independent access to the mobile telecommunications network. The car kit system also has great potential for improving the telecommunications needs of people with disabilities that fit into Group 2 and 3 categories of the trial, and requires promotion by telecommunications provider to further publicise these options.

Discussion

This research and clinical trial was able to demonstrate that current, off-the-shelf telecommunications equipment can enable people with disabilities, even severe physical disabilities, to access the telecommunications network. Prior to the trial, the
researchers were confident that existing solutions did exist for people with mild to moderate physical disabilities, and were satisfied with the results in these areas.

However, even the researchers involved in this work, who have extensive experience in the disability sector, were surprised when off-the-shelf solutions were found for the participants with severe physical limitations. It was expected that it would be very difficult to find a satisfactory match for these clients, yet a solution was found, and they can now access the telecommunications network. This was a profound outcome of the trial.

Pivotal to the success of these trials was an in-depth knowledge of existing mobile phone technology options and features, a clear understanding of the client's telecommunication needs and abilities, and the matching of appropriate technology to an individual. This matching has led to 4 of the 10 participants purchasing the solution that was tailored for them.

Another important outcome from this research was the discovery that most trial participants were not aware of the full capabilities of their current mobile phone (if they had one), and hence education played a big factor in improving the way they now use their phone.

**Conclusions**

With the right policies, processes and support (appropriate user skill and equipment matching, education, training and delivery) in place, solutions can be found. This research and trial was able to demonstrate that current off-the-shelf solutions can help alleviate problems and improve the lifestyle, social interaction, security and independence of many people with physical disabilities in terms of telecommunications access.
The trial results showed that:

- There is no insurmountable barrier to the use of phone technology by people with a disability. Features of existing technologies offer affordable solutions to problems of accessibility previously considered unsolvable;
- Mobile telephone technologies can provide improved access, functionality, social interaction, independence, safety and security. These are all areas of high priority for people with a disability;
- Nine out of ten participants showed high to very high results in terms of their overall performance and satisfaction with the use of the telecommunication equipment provided (a technical difficulty prevented an effective evaluation of the 10th participant);
- Participants that had an inadequate solution are now aware of an adequate solution (or alternative solution) to access telecommunication equipment and services. The provision of hands-free features such as speakerphone and voice and speed dialling on phones proved to be essential. Mobile phone car kits also proved to be a practical solution for participants restricted to wheelchairs. Voicemail and text messaging was also important;
- Participants that had no independent access to telecommunication equipment can now access the phone network successfully.

The provision of an effective telecommunications solution for a person with a disability can be achieved within an overall total of half a working day, even for the more challenging situations. Even more substantial is the increased independence each participant gained through an appropriate equipment match, and hence a decreased reliance on a third party to perform a previously impossible task.
Through this research it was concluded that people with a range of physical disabilities can use and should have equal access to telecommunications equipment and services. With the right policies, processes and support (equipment matching, education, training and delivery) in place, current off-the-shelf solutions can help alleviate problems and improve the lifestyle, social interaction, security and independence of many people with physical disabilities.

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References

