



**Assessment & Learning  
in Practice Settings**

**ALPS Research Capacity Final Report  
(1 of 3)**

**Mobile Enabled Disabled Students  
(MEDS)**

*An investigation into the benefits, barriers and essential specifications of mobile devices used for learning and assessment purposes with disabled students*

**Dr Christine Dearnley** Senior Lecturer, Project Lead, University of Bradford  
[c.a.dearnley1@bradford.ac.uk](mailto:c.a.dearnley1@bradford.ac.uk)

**Stuart Walker** IT Officer for Disabled People, University of Bradford  
**John Fairhall** Mobile Technology Adviser, University of Bradford  
**Jak Radice** Learning Technology Adviser, University of Bradford  
**Carol Higgison** Senior Adviser on e-Learning, University of Bradford

In 2007 ALPS awarded funding to three projects which were designed to advance the goals of the ALPS programme and build additional research capacity within the partnership, to further the cross-institutional goals of ALPS

## Mobile Enabled Disabled Students (MEDS)

Dr Christine Dearnley	Senior Lecturer, Project Lead <a href="mailto:c.a.dearnley1@bradford.ac.uk">c.a.dearnley1@bradford.ac.uk</a>
Stuart Walker	I.T. Officer for Disabled People, University of Bradford
John Fairhall	Mobile Technology Adviser, University of Bradford
Jak Radice	Learning Technology Adviser, University of Bradford
Carol Higgison	Senior Adviser on e-Learning, University of Bradford

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## Summary

This project aimed to inform the ongoing work and development of ALPS in relation to the specific needs of disabled students when using mobile technologies for learning and assessment in practice settings. Specific objectives were:

1. To investigate the range of impairments that affect health and social care students This can be used to form guidance for “reasonable expectations”
2. To establish what works well for disabled students who currently use mobile devices and take part in this study
3. To identify the challenges that mobile technologies present to disabled students
4. To trial the use of new assessment methods as they are agreed by the ALPS tools group, among disabled users to assess their impact and identify changes that need to be made for disabled users
5. To test the accessibility of the learning objects that we can expect from the IT specification and which are currently being developed by York St John & Leeds Met, in addition to any others that may be produced by ALPS, and to propose equivalents where necessary (e.g. transcripts for an audio file or complex visual learning object)

The project has achieved this aim and these objectives and has contributed significantly to the development of the ALPS assessment software in addition to providing an insight into the general use of mobile devices among disabled people.

The study adopted qualitative and quantitative methods of data collection and analysis. These included a preliminary analysis of statistical data held on the University of Bradford IT systems, focus group interviews, blogs/diaries (which participants were able to maintain on their mobile devices) and the Microsoft Desirability Toolkit (Benedek and Miner 2002). Exploring the use of new approaches to data collection was an interesting element of this study and is further elucidated elsewhere (Dearnley & Walker 2009). There were several functions of the device that we immediately began to see as exciting opportunities for the qualitative researcher. For example, in its most simple form, the device allowed for reflective note taking anytime, anywhere; participants could potentially take a little time out of a daily routine to jot down a few reminders of what they were experiencing (the researched phenomenon). They could then add to this if they wished at a later time or on a larger keyboard if they synchronized the device with a home or university PC. The Microsoft Desirability Toolkit (Benedek and Miner 2002) was selected because it does not rely on memory, a questionnaire or rating scales which participants may have had difficulties with. Participants did not have to generate words themselves, but selected from those provided the ones they felt best reflected their experiences of using the device and tools. We adapted the process and were impressed by the usability of the method.

This project has highlighted key issues related to the use of mobile devices *in general* to support learning and assessment for disabled students and disabled mentors. Specifically, dyslexic people often struggle with organisation, memory and spelling. The calendar function with reminder system, spell check and audio facilities of mobile devices appear to support all of these issues and thereby support dyslexic people in both learning and practice settings. There is also an indication that non-disabled students are observing disabled students using such devices to support learning and trying them for themselves, e.g. recording lectures/tutorials to play back at a later date.

It is worth noting that whilst every effort has been made to focus the outcomes of this study on the needs of disabled students, there is very much a blurring of edges. Participants were first and foremost students and they provided general feedback on their experiences of using the devices and tools in addition to issues that related specifically to their disability. We have tried to separate the two throughout this study to the extent that this was possible. However, whilst

this was a small pilot study specifically looking at the experience of disabled people, it has also allowed us to gain an early insight into how the ALPS mobile assessment tools are perceived *generally* by students and assessors.

Further evaluation of the tools is ongoing as part of the ALPS core work, however, at this stage we are able to say that in addition to the benefits of the mobile device as discussed above, this group of student participants liked the organisation of the assessment tools, suggested that it made them think more about what they were doing in practice, for example when communicating with a service user, and also thought that they would encourage a more interactive assessment process between the student and their practice educator/mentor. Recommendations include ways in which the assessment tools might be improved for all students and emphasise the importance of student preparation and training before taking the device into practice settings, where they will be required to teach their mentors how to use them. Continuing, active support needs to be ongoing until each individual student has become proficient in device and tool management.

The project team are able to recommend, as a result of this study that ALPS adopts the TechDis (2007) "accessibility passport." The project team will use the ALPS Wiki to create instructions for the process of creating learning objects and an accompanying accessibility passport. An exemplar accessibility passport will be created for one of the York St John learning objects if required.

Accounts of how the participants of this study engaged with the mobile devices and ALPS mobile assessment processes provide an insight into other potential areas of learning and support for disabled people. In addition we have collected a significant amount of feedback on the ALPS mobile devices, and a wish list of how the participants would like to see them developed. We would be happy to share this with T-Mobile in future developments.

## Background

The Disability Rights Commission (DRC) is currently reviewing the legislation, regulations and statutory guidance within professional occupations. This legal review is being carried out as part of the DRC's formal investigation into fitness standards in teaching nursing and social work. The focus of the formal investigation is on the professions of teaching, nursing and social work. However for the purposes of this legal review the net has been cast wider – to also include medicine, dentistry, and the health professions falling within the scope of the Health Professions Council.

The investigation is taking place from May 2006 to Summer 2007 and consists of a legal review, two research projects, a call for evidence and an Inquiry Panel. It is more than possible that the DRC will make recommendations to ensure that increasing numbers of disabled people are allowed to both study and practice within medicine and related disciplines. If this is the case accessibility will need to be ensured for all forms of teaching.

It is generally accepted that it is both easier and good practice to build accessibility at the point of design, rather than have to add this at some point in the future. Moreover, the principles of the Special Educational Needs and Disability Act SENDA (2001), directly apply to the provision of education services. The Act makes it an offence to discriminate against a disabled person by treating him or her less favourably than others for a reason relating to their disability. Education services are deemed to include the provision of e-learning materials.

It would therefore seem reasonable to expect VLE's to be within this grouping. However, accessibility for disabled people is often overlooked. Dunn (2003) noted that inaccessible elements were both within the VLE software itself, and within the content the institutions put into the VLEs. Moreover, the lack of accessibility appeared to stem from a lack of knowledge about designing VLE systems that were accessible by disabled people. Pearson (2006) states:

“Online learning can be an enabling experience for disabled students, giving opportunities for learning and participation that they might not otherwise have had”

However this is tempered by Papadopoulos and Pearson (2007) who argue:

“...this can only happen if the learning activities and resources are designed to be accessible”

It is therefore essential that the needs of disabled people are taken into account in order to improve equality and reduce the risk of possible litigation. New technologies i.e. mobile communications will, in all probability, be covered by the act; as institutions are frequently using these as additional services to improve access and study facilities for students.

The barriers and potential benefits that such technologies offer must be investigated to ensure that disabled people are enabled by these tools and not disabled by them. It appears an opportune moment to embed such research and subsequent findings within the ALPS project.

## **Aims and objectives**

### **Project aim**

To inform the ongoing work and development of ALPS in relation to the specific needs of disabled students when using mobile technologies for learning and assessment in practice settings.

### **Objectives**

1. To investigate the range of impairments that affect health and social care students. This can be used to form guidance for “reasonable expectations”
2. To establish what works well for disabled students who currently use mobile devices and take part in this study
3. To identify the challenges that mobile technologies present to disabled students
4. To trial the use of new assessment methods as they are agreed by the ALPS tools group, among disabled users to assess their impact and identify changes that need to be made for disabled users
5. To test the accessibility of the learning objects that we can expect from the IT specification and which are currently being developed by York St John & Leeds Met, in addition to any others that may be produced by ALPS, and to propose equivalents where necessary (e.g. transcripts for an audio file or complex visual learning object)
6. To work with T Mobile to explore what devices they are proposing and what future developments may be available and to evaluate these in relation to useful functionality for disabled users with a view to influencing technological advancement

(For some disabled users the choice of mobile device may differ from the typical PDA/Smartphone expected).

Objectives 1-4 are fairly self explanatory and their achievement clearly visible in the outcomes of the project. Objective 5 has been achieved in the recommendation that ALPS adopts an “accessibility passport” for all learning materials based on the work of TechDis.

Objective 6 was part of the initial bidding process when a larger study was proposed. We kept this objective when the project was revised because it was something the team would like to have been able to develop. However, within the timescale and budget of the smaller study, this desire was not realistic. Working with T-Mobile more closely to start reviewing other handsets would have taken up far too much time. However, we can provide a lot of feedback on devices, and a wish list of how disabled participants would like them to be developed. We would be happy to share this with T-Mobile should ALPS so wish.

## Methodology

In order to achieve its aims, MEDS considered a range of exploratory methodologies as a detailed project proposal was developed. An eclectic approach was agreed within the phenomenological paradigm embracing a philosophy of collaboration based on feminist ontology (Letherby 2003). A feminist ontology was appropriate to this study because it acknowledges the complexity and diversity of societal structures and the people within those structures.

The study reflected the philosophy and structure of collaborative action research (AR) supporting the notions of Abbott and Sapsford (1998) that AR “*arises out of practice and feeds back into practice*”. AR is cyclical; this study comprised of two distinct stages or cycles. The range of methods used reflected the nature of the study and the philosophy of ALPS in that electronic devices were included to create innovative and powerful ranges of data.

## Methods of Data Collection

### Stage 1

- **Quantitative Data from central database**
  - The University of Bradford is similar to many other HEIs in that their information is recorded on a central database. Data was generated from the database to offer the study an overview of the frequency of impairments across the University and within the School of Health Studies
- **Focus group to ascertain perceived benefits and barriers to learning & assessment of using mobile devices among disabled students**
  - Attended by 12 disabled student participants with a wide range of disabilities and with experience of using mobile devices *in some form* and representatives from ALPS partner software developers (Questions in appendix 1)

### Stage 2

- **Blogs/diaries**
  - Eight disabled students were given an ALPS mobile device and asked to keep a blog (or electronic diary) of how they used it generally and how it supported their learning. At a later date the ALPS assessment tools were uploaded to the devices and participants were again encouraged to record their experiences and thoughts about using the tool on the devices
- **Focus group to ascertain the accessibility issues related to the ALPS mobile assessment tools**
  - Attended by five participants who had used the devices and ALPS assessment tools (Questions in appendix 2)
  - Microsoft Desirability Toolkit (Benedek and Miner 2002). This is a process in which participants are supplied with a list of key words and asked to rank 5-10 of them in order of importance to them (List of words in appendix 3)
    - This technique does not rely on memory, a questionnaire or rating scales and users do not have to generate words themselves
    - We adapted the process and were impressed by the usability of the method for disabled participants
    - Participants were given the option to add brief notes on why they had made the choices they had

## Sample

- Participants for stage one were recruited from across the University of Bradford as a whole to obtain a wider picture of disabled students in one HEI and to ensure a maximum range of disabilities were captured within the enquiry

- Participants for stage two were recruited from Health and Social Care students at the University of Bradford, so that they could engage in realistic use of the ALPS assessment tools

## **Data Analysis**

At the University of Bradford when a disabled person declares they have impairment, the details are recorded on a central database. It is categorised according to a UCAS classification which lists impairments from 0 to 9, where 0 is not an impairment. The database holds a large amount of information on each student regarding: course, personal details etc. All information is strictly controlled in accordance with the UK data protection act. However, we were able to gain access to anonymised statistical information, in the form of frequency of impairment.

Initially, the study examined the frequency of impairments of all disabled students who studied at the School of Health Studies 2007/8. The second stage was to examine statistical information on the frequency of impairment for all disabled students at the University of Bradford for 2007/8 and for comparisons to be made.

Data from the focus groups was transcribed and entered into NVivo computer software for initial open coding and the development of emerging categories that elucidated participant experiences and perceptions of using a range of mobile devices and the ALPS mobile assessment tools. Data from the electronic blogs and desirability tool kit was added to the stage 2 categories, thereby increasing their depth and reliability of outcomes. Words selected by participants using the Microsoft desirability toolkit were used to generate word clouds that provide a visual overview of participant reactions to both the mobile devices and the ALPS mobile assessment tools.



## Implementation

A steering committee was convened and met three times throughout the duration of the one year project. The committee was made up of the project team, the Professor of Education Development, the ALPS mobile technologies project manager, a representative of TechDis, and a disabled student. This worked well and enabled the sharing of ideas, injection of new ideas and maintained momentum of the work. In addition to this, core members of the project team met on a regular basis to plan the day to day activities.

The focus groups presented few challenges other than student availability to attend. On both occasions lunch was provided. Providing students with the mobile devices for stage 2 of the study however, proved more difficult as these participants were all health and social care students and many of them were out on placement at this stage. It was not possible to find a convenient time and date to get them all together for the training in device management and diary/blog keeping that was required. This was unfortunate as the opportunity for them to bond as a group/cohort was lost. However, the alternative, which was for all participants to have individual training with a member of the project team, meant that a supportive relationship could be established between researchers and participants and we hoped this would be reflected in the data yield. If participants had a problem with the technology or the assessment tool they had a named member of the team to contact in addition to the ALPS helpdesk. We anticipated that the blogs/diaries would supply us with 'live data,' capturing the real essence of the lived experience and increasing authenticity as the participants reflected 'in action' rather than 'on action' (Schon 1983) with its resulting reliance on recall. In this case we wanted to capture their experiences of using an assessment document on a mobile device or accessing a web-based document to support learning whilst in a practice/work based setting. A diary guide was produced initially so that all students would have the same guidance as to what was required of them (appendix 4). A second guide was provided when the ALPS tools became available (appendix 5).

In order to allow participants to comment on both the ALPS device and software it was decided to use PebblePAD. This is a proprietary Macromedia Flash web-based Personal Learning Environment & EPortfolio system. PebblePAD provides a customisable graphic user environment to allow recordings of experiences, reflections, learning etc. It was anticipated that a mobile device would allow participants to record their thoughts and feelings as they experience particular phenomena. It would also offer great flexibility and accessibility to disabled people who may find traditional paper-based diary keeping a barrier to participation.

Extensive testing of webcams and PebblePAD occurred. It was initially intended for students to be able to record 'talking head' type data, which can be an extremely powerful dissemination tool. However, it soon became clear that whilst technically possible, the amount of training required for participants to make use of the technology was unreasonable within the time scales of the project. There were also unresolved ethical issues related to video images of disabled students. To this end it was reluctantly abandoned.

All research must be set within an ethical framework. Gilbert (2001) suggests that ethics is a matter of principled sensitivity to the rights of others. This is a very broad definition posing a wide range of considerations and potential barriers to research. Yet it accurately portrays the difficulties of research into the area of mobile technologies. In particular, research such as MEDS, which explores issues of human computer interaction in 'real world' settings. In its most simple form, the device allowed for reflective note taking anytime, anywhere; participants could potentially take a little time out of a daily routine to jot down a few reminders of what they were experiencing (the researched phenomenon). They could then add to this if they wished at a later time or on a larger keyboard if they synchronized the device with a home or university PC.

In order to ensure the ethical integrity of the study a further safeguard was developed. PebblePAD allows the creation of gateways, or shared areas. The project created a gateway which participants had to actively choose to send data to; it was not an automated process. Moreover, whilst subjects were able to see their own contributions they did not have access to others.

## Outputs and results

### Stage One

This data can be seen in percentages, for comparative purposes in Table 1 below::

<u>Impairment</u>	<u>Percentage (School of Health)</u>	<u>Percentage (General University)</u>
Dyslexia	57.9	50.4
Visual Impairment	2.1	3.0
Hearing Impairment / Deaf	9.7	5.7
Mobility Impairment	0.7	3.0
Mental Health	2.1	5.3
Unseen Disability	20.0	14.8
Other Disability	7.6	13.2
Multiple Impairments	0.0	3.4
Autistic spectrum / Asperger's	0.0	1.3

Clearly Dyslexia is by far the largest group of impairments within the population of disabled students, both within the general University and the School of Health Studies. We expected this as it is generally understood that Dyslexia accounts for between 60 – 70+ % of disabled students at HEIs.

There are other interesting differences. There are larger percentages of the groups: Hearing Impairment / Deaf & Unseen Disability. However, we feel that we should be careful with any speculation as this data was only intended as a general overview. It is also important to note that data collection occurred at the start of an academic year where many students, from the previous year had left, and many new students were still to declare their impairment.

### Qualitative Outcomes and findings

For stage one of the study, twelve student participants from across the university attended the focus group to discuss their experience of using mobile devices. The participants had a range of impairments, which included Dyslexia, Hearing, Mobility, Mental Health and Unseen impairments and had been invited because they had experience of using a mobile device of some form. Software developers who were working with ALPS also attending this group and were able to gain feedback first hand, which was subsequently built into the ALPS assessment software.

Firstly, however, we explored the types and functions of these devices. Two participants had used a PDA (personal digital assistant) with a full range of functions in the past. One participant was a mature part time student who worked as a nurse and had used a PDA since she had commenced her nursing career six years previously. The second participant used a wide variety of the PDA functions and interestingly the built in camera function to store images of diagrams, lecture slides etc for later use. The cost of such devices appeared to be prohibitive for other students. However, they were using a range of other mobile devices and their experiences of these were equally valuable to this study. These included laptops, hearing devices, audio recording devices, dictaphones, MP3 players, mobile phones (with cameras), calculators and scanner pens.

The disabled student participants who took part in this focus group reported a number of uses, benefits and difficulties that they had experienced whilst using mobile devices. For them the key benefit was to aid memory function and for this purpose they relied on diaries, alarm

systems, audio and camera functions. The spell check was also crucial as was the calculator for some.

For example:

*“Yeah and I also take it if I’ve got a meeting with the doctor or something like that. Err for any particular reason [because I have]... .. problem remembering what they were saying to me.”*

And:

*“I have short term memory and I’d be lost without my device.”*

They liked the mobility and size of the laptop around the home, but found these generally too heavy for taking to lectures on a daily basis and therefore relied on a number of other more mobile devices, which often did not have the functionality they required.

For example:

*“I’ve got a heart condition and so I’m not supposed to carry heavy things like a laptop”*

And:

*“I’ve been on and off crutches nearly the whole of the summer and trying to carry a backpack with a laptop in its crippling me it’s got to the point where I just don’t bring the laptop in I’m just shoving everything on data sticks”*

Lightweight laptops and advanced mobile devices were generally out of budget. Whilst the participants were enthused by the capabilities of the mobile devices that were exhibited on the day, some were concerned about the size of the screen and the buttons and others thought it might be too complicated to use. Whilst enthusiasm for potential use in this group of disabled participants appears higher than in other groups of students it is interesting to note that these concerns are not just the concerns of disabled people. Other studies with student health care practitioners using mobile devices have shown the same concerns (Haigh et al 2008, Dearnley et al 2008).

There was a general consensus that the PDA offered many potential benefits to the disabled user. We asked them therefore to describe their ideal device. We would argue that many of these requirements are no different to those that all users, regardless of impairment would request and as such we became interested in theories of total inclusivity, in particular the notion of universal design.

Some of the principles of universal design are useful when designing accessible resources. Accessible resources are more usable for all people, regardless of their impairment. Within the concept of universal design, ‘accessible’ refers to technical aspects and ‘usable’ to experiential aspects of website design and testing. ‘Usability’ is a quality attribute that assesses how easy user interfaces are to use. The word ‘usability’ also refers to methods for improving ease-of-use during the design process. Nielsen (2003) proposed that usability has five quality components:

- Learnability: How easy is it for users to accomplish basic tasks the first time?
- Efficiency: How quickly can users perform tasks when they have learned the design?
- Memorability: How easily can they re-establish proficiency after a period of not using it?
- Errors: How many, how severe and how easily can users recover from errors?
- Satisfaction: How pleasant is it to use the design?

Anders and Fechtner (1992) describe the key features of universal design as being that the design:

- Accommodates a wide range of individual preferences
- Communicates information effectively, regardless of ambient conditions or the user's sensory abilities
- Can be used efficiently and comfortably, and with a minimum of fatigue
- Allows for appropriate reach, manipulation and use regardless of user's body size, posture or mobility

Thus, the intention is that products are designed for people. Furthermore, it is recognised that individuals have a wide range of characteristics, be they height, age, race, gender or impairment.

Another model of accessible design is that of the holistic approach. Whilst this was developed with internet accessibility in mind, it could also offer interesting insight when designing for mobile devices. Kelly, Phipps and Howell (2005) argue that staff new to education development or to technology can find the application of the Web Content Accessibility Guidelines (WCAG) to be discouraging. This can prevent or discourage staff engaging with technology in education. They suggest that learning is holistic and takes place not just in the lecture theatre but throughout the whole student experience.

In practice, educators need to take into account an individual's experience in terms of local, political, social and cultural factors. The premise of Kelly, Phipps and Howell's (2005) assertion is that accessibility is predominantly about people, not technology. However, such a theory does not necessarily negate some notion of universality. One can clearly see that in order to address the needs of many, systems need to be flexible, if only in part. The requirements of the individual became very apparent from the focus group. Participants came up with a range of suggestions which indicated that what these users really want is something simple with extensive functionality.

Here are some of the suggestions:

*"I'd want it to have some substance in size ..."*

*"Small but big ..."*

*"A big screen to help ..."*

*"I like the touch screen"*

*"so long as it's got wireless"*

*"Well I'd like it to be in my phone ... .. diary, internet"*

*"I just can't take it in at all so something simple and basic ..."*

## **Stage Two**

In stage two of the study, a wider range of data collection methods were employed and participants reported on their experiences of using the ALPS mobile devices and the ALPS mobile assessment tools. All participants were students studying on health and social care programmes. The following analysis presents a synthesis of data from participant blogs, focus group discussions and the Microsoft Desirability Toolkit. In the first instance the benefits and then the barriers identified by participants, relating specifically to the mobile devices, will be discussed. Many of the issues that arose during the stage one focus group emerge here too, adding to the reliability of those outcomes. We will then focus specifically on the ALPS

assessment tools, discussing the experiences and perceptions of the participants in addition to their recommendations for technological developments.

(NB: B=Blog; FG=Focus Group & AC=Accessibility Card).

### ***Benefits to disabled students in using a mobile device for assessment and learning in practice settings***

As in the stage one focus group, participants reported many benefits provided by the mobile devices for both learning and living. These included organisational aspects, support with memory and spelling difficulties, the advantageous nature of the audio function and general bonus of internet access in addition to the fun and motivational aspect of owning a mobile device. Many of the participants of this study were dyslexic. Difficulties with organisation, writing and spelling are common traits of dyslexia. These issues will now be discussed.

The organisational capacities of the mobile devices were again considered invaluable for this group of participants. The following quotes demonstrate participant views on this:

*"I have found it invaluable in relation to keeping appointments and track of my days activities"* (B1)

Another blog reported how the device became an aid memoire:

*"Overall, I am very pleased with the PDA and I feel that with continued use will prove to be invaluable to future students. It has also helped me to remember things although using the internet on the PDA was very slow, however I still found it was useful to check things that were not so urgent"* (B1)

Spell check was seen as extremely valuable by all participants. For example:

*"Having a mobile device with spell check...very helpful"* (AC1)

One participant who had used a similar device for a number of years recommended developing a *"list of regular words that can just come up for a quick check"*, as she found this extremely helpful in practice settings. Another participant had worked in operating theatres and struggled when asked to label things with unfamiliar names/words and thought using the internet to look up these words for both their meaning and how to spell them would be very helpful.

The use of the audio function was useful to this group of students as a general function of a mobile device, but will be discussed later specifically in relation to the ALPS assessment tools. One participant said that she had been surprised at how easy it was and would be likely to use it more often if she had that capacity on her own mobile phone. Nursing handovers are regularly recorded and interestingly this student had found that it helped to provide practice for audio handovers which she felt was *'quite a scary thing.'* (FG1)

Students also found access to the internet via their mobile devices generally useful. However, they found them slow to connect and this did hinder device and internet use throughout. They reported some of their frustrations and how they had been helped.

For example:

*"had some issues with the pda not performing sync fully but after speaking to helpline it's been sorted. They also helped me set the pda up so that emails come directly to it instead of having to log on via the web page - found this really useful as exams are here and there`s always last minute changes"* (B4)

There was some indication that the participants found the devices motivational and fun. For example:

*"Don't know how long it will take me to master this device. I'm sure it will be fun trying."* (B1)  
*"I felt having a mobile device that I could use on placement and be relevant to me to be an improvement in my training"* (AC1)

This participant used the accessibility cards to report that she found the device 'empowering'; she wrote:

*"I believed having the extra help from the device would give me more confidence in my work and at university"* (AC1)

Another wrote:

*"Nice and fun to use as device" and "I would be lost without this or similar device"* (AC4)

And finally, in this section:

*"so much easier than loading up a laptop"* (AC3)

The spell check, audio function and organisational aspects discussed here are specifically related to the use of a mobile device, but clearly they represent a significant added value to ALPS assessment tools for this group of participants.

### ***Barriers to disabled students in using a mobile device for assessment and learning in practice settings***

It is interesting to note that the barriers this group of disabled participants reported to their use of mobile devices were not related to their disabilities and reflected earlier ALPS work (Dearnley et al 2008, Taylor et al 2007). Barriers included problems with device functionality, e.g. it was slow when using the internet connection; lack of confidence/expertise in using the device; fear of losing it and the reaction of others whilst in professional settings. Here are some examples:

*"tried using the pda to access a wiki today to check if the rugby experience with H was still happening but couldn't get on - had to resort to the good old telephone to see what was happening!"* (B4)

*"I have been wondering over the last few weeks if i really have had much benefit from the mobile device or not? I don't tend to carry it around with me day to day as I'm worried about losing it or it being stolen. ....I'm starting to find using the internet on the mobile device is very slow."* (B2)

*"As the device at times was slow & bulky, plus I had my phone as well, that it was too much to carry around all the time. If I had both mobile device and phone in one, I think I would use it more"* (AC1)

*"I've had a day to play with this new mobile device, and still I little scared about how to use it without somehow managing to blow it up!!"* (B2)

*"While using my mobile device on placement I felt like I was doing something wrong because some of the nurses or employees looked at me as if I was using my phone and not working!"* (B2)

This issue is intricately bound to how the ALPS mobile assessment tools are received in the professional settings and will be discussed in more depth in the analysis of those tools, which follows here.

### ***ALPS Mobile assessment tools – perceptions and experiences of disabled students***

The mobile devices in themselves offered benefits to this group of students in relation to organisation, memory and spelling and this was mirrored in the ALPS assessment tools and thereby had a positive impact on the student experience.

For example:

*“Useful for memory, more than anything you could fill it in as you went along” (FG2)*

*“I found that if I could fill out the assessment straight away after the event it helped me to remember the interaction more accurately but as part of my disability relates to poor memory I found it difficult if I couldn't enter it straight away - I imagine this could be a problem when out on placements as time is limited.” (B5)*

This issue was picked up in the focus group when one participant confirmed that she liked the fact that she could fill it in immediately after an interaction because *“Otherwise I would have forgot” (FG2)*

Another participant added:

*“If you sat me down and said ‘here’s a piece of paper analyse what you have just done’ [I could not] but having the questions there that said what have you just done and how did that work, that was really helpful to me” (FG4) (others agreed)*

Another participant commented that it helped her to remember what she had done:

*“Can save thoughts etc help to remember what done” (AC2)*

When discussing the benefits of spell check one participant discussed how beneficial she had found the predictive text function and the key pad really helpful when filling in assessment documents. She said it was:

*“brilliant...it tells you if your spelling is not right... I often get letters the wrong way round, so that really helpful... it really speeded the whole process up” (FG1)*

*“Having a mix of tools for writing” (AC1)*, such as the key pad and the on screen keyboard was also found to be helpful. One of the participants only discovered the phone pad after some time using the stylus. She was frustrated by this, but this experience offers further support to the importance of thorough student training in how to use the devices.

Several participants discussed how the audio function supported the ALPS assessment tools, and this should be a key part of student preparation. For example:

*“Although I don't particularly like listening back to the audio recording I found it helpful to get all the information down without having to type it out with the keypad or the on-screen keyboard” (B5)*

And:



*“I used it quite often, If I speak I don’t lose my track as often, because if I’m typing I have to think about spelling and then I have lost what I was going to say..so I chucked it all into the audio and then I found I kept on track a little bit better” (FG4)*

When asked how she processed this information, she explained that she:

*“listened back and wrote notes about what I wanted to say on the next question that was coming up and could then answer those questions better”.*

The benefits of the audio function to these students were further supported by the desirability toolkit:

*“I like how you can enter audio as well as text – useful as I find it hard to type and remember what I want to write” (AC3)*

### **General thoughts on the ALPS assessment tools**

We have discussed how the functionality of the mobile device added to the usability of the ALPS assessment tools for disabled students. We will now discuss some of the participants’ general thoughts about the tools. They liked the structure of the tools and found the immediacy they enabled helpful.

For example:

*“I would find it hard to sit down later and carry out same task on paper” (AC3)*

And:

*“Essential with [learning difficulties] to be organised – this felt it could help” (AC4)*

They reported that the ALPS assessment tools were more in depth than normal assessments and felt that whilst other practice assessments can be as in depth as a person wants them to be, the structure made these more so.

For example:

*“Useful because it was structured. Assessments are not usually that structured in clinical practice and can vary depending on who’s assessing you, so to have that specific tool I thought was nice and prompted you to things that would probably have been missed off, so it broadened the whole experience” (FG3- an assessor who had tested it in a role play situation in outpatients)*

She added that it:

*“Prompted you to things that might have been missed off, it broadened the assessment”*

Student participants reported some interesting thoughts on how the ALPS assessment tools had supported them in their learning. For example:

*“I used the ALPS assessment software while at work over a couple of weekends. I asked 3 different members of staff to fill out the peer review section. I found the software useful to think about how I communicate with service users.”(B5)*

Participants reported how the tools helped them to think more about their practice, for example:

*"[You are] not always conscious about how you are communicating with others until it's brought forward to you so that you see it."* (FG2)

This participant added:

*"It's not until you look back on how you did it that you realise you might have done something quite wrong"* (FG2)

She went on to say that the assessment tools *"made you aware of the confidentiality issues more than anything, in relation to clients and also how you interpreted what they said, whether you could understand what they were saying"* (FG2).

Another participant liked that she could use the tools as prompts for meetings with her mentor. She said:

*"When you are with your mentor, there is so much you want to know and learn, but sometimes you get home and think 'oh I wanted to ask that but I didn't', if you've got that tool there and you look at it on your break [it's a prompt]"* (FG1)

Some participants found the assessment tools motivating; one commented that she felt it:

*"Makes you think more about how you interact with people and strive to be better"* (AC3)

It must be noted however, that not all participants felt this way. One participant entered the following on his blog:

*"ALPS Assessment software aaaarrhhhhh!!!"* [in large and coloured font]

He continued:

*"I found the ALPS assessment software to be really annoying as I could not relate to some of the questions in anyway. I was also really confused about the purpose of the software as I had thought it was there to help in practice. Clearly this was not the case. It was more like a questionnaire and I really hate questionnaires. I gritted my teeth and managed to complete the assessment... I'm glad that's over with. I hope there is no more of this type of assessment"* (B3)

These thoughts were explored during the focus group and the participant said:

*"I didn't find it useful"* and it's *"not a good idea"* and *"I found it intrusive when with patients."* (FG5)

He felt that he could not interact with his patients, maintain correct eye contact etc, if he was using his device during the therapeutic interaction. This is an interesting observation and worth exploring in more depth with ALPS students, both in relation to how they are advised to use them and how they actually use them when in practice settings. This particular participant was an optometry student, he explained that there are set competences for optometrists to achieve and felt that if the tool reflected those competences he would have found it more useful. Further exploration revealed that he could possibly have found the type of personalised feedback from mentors made possible with the ALPS assessment tool useful, but it was too different to what he was used to for him to really engage with it.

This participant had advanced technical skills and he added a long discussion to his blog on improvements he would like to see – all of which relied on advanced technology and are available elsewhere in this document.

### ***The assessor's point of view***

This category is very generic in nature as these observations are likely to reflect the ALPS student population per se. However, one participant was actually a practice assessor and was able to give a voice to the perspective of assessors both generally and those with similar disabilities. She commented that it was good to see mobile devices being used in this way as she had previously used a device of her own to support her disability. She referred to herself as formerly being a 'closet user' (AC4). She expressed the view that the tools could be "developmental for student and everybody – especially as a dyslexic mentor" (FG3). She went on to explain that current practices for assessor updates often involve being given a booklet to read. For dyslexic assessors this can clearly be problematic, however it was noted that "*the tool is much more interactive and supports mentor development*" (FG3).

Participants reported that comments from the staff who filled out the peer assessment were generally that they "*liked the software although thought some of the answer options were a bit odd (e.g. the one about are you the same profession - they thought it odd that an option was 'mostly')*". They seemed to prefer using the keypad to input written responses but found capitalisations etc hard" (B5).

It was noted however that there are time constraints in practice settings and it was problematic when the device wasn't working correctly as this confounded existing resistance to the devices. Participants reported that mentor reactions were "*very mixed*" and that "*some people dismissed it straight away*" (FG3).

They reported the following comments from some colleagues as examples:

*"oh I couldn't use that"* (FG1)

*"Intrusive" "inappropriate" "a very frosty reception" "taking it away from nursing"* (FG3)

*"Younger people are more open to it"* (FG1 and FG3)

This led to further discussions about student preparation and training. Students need to be confident in its use before they go out in practice where they will be required not only to show their mentors how the device and tools operate, but also to be champions and change agents.

For example:

*"Its difficult to show others when you are not confident yourself – doesn't portray it in its best light"* (FG3)

This was deemed as important because "*it's tricky...finding the quickest route*" (FG3)

It was agreed however, that once everyone had learned how to use the device and the tools there could be benefits. The assessor participant commented that:

*"With this tool it can be a quicker process and a discursive process"* (FG3)

A student participant added that it "*Brings the student and the mentor together a bit more*" (FG1)

She went on to explain that with the current procedures the mentor often takes the assessment book home to complete due to time constraints on the ward. This means that there is no discussion, *“but with device you have to do it together [which is] more beneficial”* (FG1).

Student participants reported that they were comfortable with the software because they already knew how to use the device and a keyboard, but this was problematic for some mentors and entering data slowed them down, so they asked students to enter the data for them. One participant added though:

*“if what they were saying was negative you wouldn’t want to write it down!!”* (FG4)

Whilst ALPS have ensured the security of the data and assessors can sign to confirm an assessment, it was noted that there was nothing on the tool to reassure mentors of the security and confidential aspects of the tool, for example that the students can’t change anything.

To summarise this category then, the participants liked the ALPS tool and found it beneficial to their learning both because of the functionality of the mobile device such as spell check, diary and audio and because of the tools themselves which were organised and acted as prompts for recall and reflection; it was also felt that they enhanced student-assessor dialogue.

The main challenges to using the tool in practice related primarily to those associated with resistance to the mode of delivery, i.e. the mobile device. Becoming familiar with the tools was easier for students once they had become familiar with the device; assessors often were new to both and this was time consuming and problematic. It is therefore crucial that students are confident in the use of both the device and the assessment tool before going out into practice. Disabled students will need someone to show them how to use it, rather than being given instructions to read.

### ***Technological developments***

An overview of technological developments for improvement of the ALPS mobile assessment tool suggested by participants can be found in the recommendations section.

There were a number of suggestions from one technologically skilled participant on the blogs, who described himself as *“bit of a computer geek”* (B3).

He wrote:

*“If I were going to design a PDA for a student I would include the following:  
A user friendly interface similar to the i-phone. This would encourage even the biggest technophobes to use such a device”* (B3).

The student clearly feels the device interface is important and the project team agree. However, we acknowledge that there is no one user interface that is most suitable, each operating system and individual model has pros and cons and ALPS should have the goal of diversifying as much as possible in order to allow users the greatest range of flexibility to suit them.

The student added:

*“University Customisation. If a university was to partner with the manufacturer and pre configure the device so that email, access to uni user area etc can already be set up on the*

handset. This would ensure that students are able to use the device out of the box without going into settings this would increase uptake of the device” (B3).

Whilst partnering with networks and manufacturers to develop customised handsets may or may not be an option, the project team suggests that devices should be as preconfigured as possible before issuing to minimize impact and stress on the student.

An overview of the words most commonly selected by the stage two participants to describe the devices and the ALPS mobile assessment tools, using the Microsoft accessibility toolkit can be found in appendix 6.

### **Specific outputs include:**

Dearnley C.A. Walker S.A. (2008) Mobile Enabled Research. In Vavoula, G. (Ed) *Researching Mobile Learning: Frameworks, Methods and Research Designs*. Peter Lang Publishing Group. Oxford.

Walker S.A. ,Dearnley C.A. Radice J., Fairhall J.(2008) *Accessibility and Mobile Learning*. Managers' Forum - Supporting users with disabilities. 21 October 2008 Aston Business School.

Walker S.A., Radice J., Dearnley C.A., Fairhall J., (2008) *Mobile Enabled Disabled Students*. ALT-C 2008: Rethinking the digital divide. Leeds, UK, 9-11 September.

Walker S.A., Dearnley C.A., Fairhall J.R., Radice J., (2007) *Mobile Enabled Disabled Students: Widening Access to Research Participation*. Research Methods in Informal and Mobile Learning Workshop. Institute of Education. London 14th December 2007.

The outcomes of this study were presented as part of the HEA Research Seminar Series; Disability Equality Partnership, Inclusive Policy and Practice on the 19<sup>th</sup> November 2008. Presentations can be found at:

[http://www.heacademy.ac.uk/events/detail/ResearchSeminar\\_19Nov08](http://www.heacademy.ac.uk/events/detail/ResearchSeminar_19Nov08)

### **Outcomes**

This project achieved its aim in that it has informed the ongoing work and development of ALPS in relation to the specific needs of disabled students when using mobile technologies for learning and assessment in practice settings throughout. An example of this is the first focus group at which the software developers were present; they presented prototypes of the ALPS mobile assessment tools and received immediate feedback which informed further development.

The first four objectives were fully achieved and outcomes discussed above. Objective five has been achieved to the extent that we are recommending the adoption of the TechDis Accessibility Passport.

Objective six ultimately was beyond the funded scope of this project. Working with T-Mobile more closely to start reviewing other handsets would have taken up too much time and we would have struggled with the logistics of getting the students together to review the devices. We are however, happy for our findings to be shared with T-mobile, this includes feedback we've had on devices, and a wish list of how we would like to develop them.

A follow-up study is currently being undertaken by the project team, funded by TechDis, in which Ultra Mobile PCs are being explored for their usability among disabled students. There is scope for further exploration with these devices and the ALPS assessment tools.

### **Unexpected outcomes**

In addition to the objectives we set out to achieve however, this project has facilitated much additional learning. We were very enthusiastic initially in the potential of the mobile device as an innovative data collection tool, with potential to allow participants to collect real time data rather than having to rely on memory and recall as in interviews etc. For this particular group of students this seemed ideal. An example of this was our proposals for participants to use their devices for maintaining blogs/diaries, in written, audio or video format. In reality, the technology could not support these ideas and we settled for written blogs, using the PebblePad e-portfolio, that could be maintained on the devices but ultimately participants chose to complete them using their home computers due to the restriction of data entry on a mobile device. The indication here is that students using mobile devices in practice are not likely to enter large amounts of written data through them. Findings of the study indicate however, that with thorough training in device and tool management, the audio function might overcome this problem.

It is worth noting that the blogs used for data collection were useful, but were also quite labour intensive in terms of preparation. It was impossible to get this group of participants together for a training session due to their commitments at this time; therefore each participant was assigned a team member for individual training on how to use the device and tool. Whilst we remain confident that ultimately mobile devices will provide researchers with an additional data collection tool, realistically we acknowledge that the technology has to improve and usability has to become more mainstream.

The Microsoft desirability toolkit was another method of data collection new to the team. We adapted the method by printing the words on sticky labels so that participants could peel off the words they chose and stick them to another sheet of paper in order of preference. This enabled us to generate word clouds that provide a visual overview of participant perceptions. There is scope to develop this methodology further and the project team will be seeking funding to support this work.

### **Conclusions**

The study has broadly and thoroughly achieved its objectives. We have identified the extent to which mobile technology can support some disabled learners generally and more specifically those with dyslexia and associated memory and organisational impairments. We have gained an early indication of how the ALPS mobile assessment tools can provide additional support for such learners because of the functions of the mobile devices; but also how the tools appear to help students generally to organise their work, reflect on their activities and engage with their learning and practice educators. We have explored the use of the mobile device and Microsoft desirability toolkit as data collection tools and increased knowledge and understanding of these processes and their functionality. A wide range of outcomes in terms of dissemination have been achieved to date and opportunities for further dissemination and further funded study are currently being explored. A small follow-up study with ultra mobile PCs is being undertaken by the project team, funded by TechDis.

The study has informed the development of the ALPS mobile assessment tools to date and further recommendations are now available. We are able to provide a list of general recommendations to arise from this study related to disabled students using the tools and also some very specific technological recommendations relating to how the tools could be

improved for easier use by all students. We would argue that many of the requirements of disabled students are no different to those of all users, regardless of impairment and as such we recommend that ALPS supports total inclusivity, in particular the notion of universal design.

## **Implications**

The work of the ALPS MEDS project has demonstrated the importance of considering the rights and needs of disabled people when developing mobile learning systems. It is clear from the MEDS study that when people face barriers, they will often use the tools at their disposal, in this case mobile technologies, in innovative and imaginative ways.

We would argue that there are both considerable dangers and opportunities when designing mobile learning systems. Underestimating users' ability can lead to lack of flexibility when designing learning environments. This in turn can lead to inflexible, inaccessible software which is both potentially exclusive and open to legal challenge.

It is vital that the needs of disabled people are included both during initial and subsequent stages of the design process. Users of all forms of information technology have a diverse range of needs and study modes. Instead of viewing disabled people as a sub-group of special interest, we would suggest that considering their needs can offer all users improved access and flexibility. Whilst we do not propose that this is an easy solution we firmly believe that this can only improve access, engagement and inclusion of all users.

## **Recommendations**

Key recommendations to emerge from this study relate to the use of the ALPS mobile devices by all students generally and to disabled students specifically. Separate technological recommendations are provided.

### ***General recommendations***

- Training for all students will be crucial to the successful adoption of the ALPS mobile assessment tools
- This includes training in using the device and all its functions in addition to using the ALPS assessment tools. As participants in this study have demonstrated, it is difficult for students to teach an assessor how to use the device and tools if they themselves are not sure how to use them
- Students with dyslexia often find the functions of the mobile device extremely supportive for their learning, assessment and general organisation
- That ALPS gives considerable consideration to adopting the TechDis Accessibility Passport (2007) to ensure the needs of disabled people are considered at the design phase of any learning object

### ***Technological recommendations***

- That devices should be as preconfigured as possible before issuing to minimize impact and stress on the student
- A note on the tool to assessors to reassure them of the security and confidential aspects of the tool, for example that the students can't change anything, would be helpful
- A front page/index so that students can go quickly straight to the page/section that they want would be helpful
- The ALPS suite should be more responsive as users currently have to tap multiple times to open the assessment
- It would be helpful for the assessment tool to stay open where users left it, or book marked, so that if they had to break off in the middle of completing an assessment (as predicted they would often have to do in practice settings) they could return straight to where they had been without having to work their way through all the pages
- Help / accessibility functions included in the ALPS suite do not include the written descriptions i.e. text and background colour cannot be customised and neither can font type. This would be helpful



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**MEDS (Stage 1) Focus group questions:**

**November 2007**

- In what ways do you use a mobile device?
  - Which functions/programmes do you use
- Which do you use most and why?
  - E.g. details such as study, leisure, social networks
- As a disabled student, how does it improve your ability to access and engage with learning
  - What barriers does it help you to overcome and in what ways?
  - Does the mobile device create any barriers that didn't exist before?
- If it was taken away from you, how would you feel, what would you miss most and why?
- Could the hardware be improved to help you more and if so in what way?
  - Could the software be improved to help you more and if so in what way?
- In an ideal world, what would you really like in a mobile device?

**MEDS (Stage 2) Focus group questions:**

**October 2008**

- We have noticed conflict in how useful you found the assessment software – can we discuss that – can you give examples
- Some of you have reported that the tool helped you to think more about your practice – e.g. how you communicate with service users – can you tell us a little bit more about this?
- Some of you have used these with other staff – what have they thought about *the tools*
- To what extent do you feel your prior experience with a mobile device – or lack of it - allowed effected your engagement with the ALPS software.
- How do you think the ALPS assessment tools compared to your previous experiences of practice assessment processes
- SWOT analysis from perspective of a student with disabilities

## Microsoft Desirability Toolkit

Selected words from the set of 118 product reaction cards

Accessible	Desirable	Gets in the way	Patronizing	Stressful
Appealing	Easy to use	Hard to use	Personal	Time-consuming
Attractive	Efficient	High quality	Predictable	Time-saving
Busy	Empowering	Inconsistent	Relevant	Too technical
Collaborative	Exciting	Intimidating	Reliable	Trustworthy
Complex	Familiar	Inviting	Rigid	Uncontrollable
Comprehensive	Fast	Motivating	Simplistic	Unconventional
Confusing	Flexible	Not valuable	Slow	Unpredictable
Connected	Fresh	Organized	Sophisticated	Usable
Consistent	Frustrating	Overbearing	Stimulating	Useful
Customizable	Fun	Overwhelming	Straight Forward	Valuable

## Mobile Enabled Disabled Students (MEDS)

### Guidelines for keeping a MEDS learning diary

Thank you for keeping a diary for this research, we very much appreciate your time and effort.

We are trying to find out how mobile devices can be used effectively to assist learning and assessment in practice settings among disabled students – so any thoughts or experiences you have to inform this will be helpful.

As the ALPS assessment documents are completed and become available on the mobile devices, we will let you know and ask you to try using them in different work based settings and record your experiences for us on the device (we will help you further with this when the documents are completed).

Here are a few questions answered to guide you in the meantime:

#### How do I keep my diary?

You have three options, these are:

- Audio recording – simply speak into your mobile device to record your experiences.
- Written notes
- Video

#### How often should I make an entry?

This is up to you but we request that you do keep entries as brief but as full as possible. We expect that there will be some times when you make more entries than other times, for example:

- when you have used the device for a specific purpose for the first time
- when you have found the device particularly useful
- when you have found specific problems or difficulties with using the device

NB: Many people find keeping a learning diary helps them to study and achieve higher grades. It might be helpful for you to use this device for that purpose – just recording, **for your own use**, a particular experience, what you have learnt from it and what you need to do to improve your performance in similar situations in future.

Please keep these recordings separate from those for the research but do let us know if you find that approach to learning helpful in a diary entry.

Any problems please contact any of the project team

Christine Dearnley	<a href="mailto:c.a.dearnley1@bradford.ac.uk">c.a.dearnley1@bradford.ac.uk</a>
Stuart Walker	<a href="mailto:s.a.walker1@bradford.ac.uk">s.a.walker1@bradford.ac.uk</a>
John Fairhall	<a href="mailto:J.r.fairhall@bradford.ac.uk">J.r.fairhall@bradford.ac.uk</a>
Jak Radice	<a href="mailto:j.radice@bradford.ac.uk">j.radice@bradford.ac.uk</a>

**Mobile Enabled Disabled Students (MEDS)  
Guidelines for keeping a MEDS learning diary  
USING ALPS ASSESSMENTS**

Thank you for keeping a diary for this research, we very much appreciate your time and effort. Over the next 2-3 week period we would like you to trial the ALPS assessment tools on your mobile device. A few steps to help you:

- We would like you to become familiar with the assessment 'pages' related to 'giving information'. These include:
  - Self assessment
  - Peer assessment
  - Mentor assessment
  - Service user assessment
- Please undertake a minimum of four 'assessments' in mock situations, e.g. where you have actually given somebody information in any daily activity.
  - These should include self assessments and peer assessments where possible and as a minimum
- You do not necessarily have to undertake any assessment in practice and it is **absolutely essential** that you do not involve actual patients/service users in this trial.
  - You might want to involve friends in 'assessing' you giving them some information
  - You might be able to involve colleagues in practice
- Please try entering data using a variety of options. Wherever possible, please try each of the following:
  - Written using the keyboard
  - Written using the onscreen keyboard
  - Written using hand writing recognition
  - Audio
- If you find other functions of the device helpful, please do use them e.g. photos/notes etc. NB please **do not** take photos of patients/ service users.
- After you have undertaken an 'assessment' please reflect on the experience in your Mobile PebblePad diary with specific reference, where possible, to your disability. We want to know if the processes involved are likely to help or hinder you in your learning. In order to capture more details we request that you complete the diary as soon after the assessment as possible.

When you feel that you have gained a good understanding of the assessment processes based on giving information, please email your research contact person. We will then look at your diary and may ask some further questions for clarity only. We will then arrange for you to hand back your mobile device and you can receive your book voucher or pen drive. Any problems please contact any of the project team

Christine Dearnley	c.a.dearnley1@bradford.ac.uk
Stuart Walker	s.a.walker1@bradford.ac.uk
John Fairhall	J.r.fairhall@bradford.ac.uk
Jak Radice	j.radice@bradford.ac.uk

Device desirability as identified by participants using Microsoft Desirability Toolkit:





ALSP Assessment Tool desirability as identified by participants using Microsoft Desirability Toolkit

