This category of *design processes* has shown us several strategies that can be used as designers and researchers to develop *useful* technologies that are *used* by teachers with their students. As a designer in this context it is often necessary to make use of an intermediary in order to develop a mutually understandable dialogue between designer and teacher. In this study the curriculum access coordinator worked with both the interaction designer and class teachers to ensure that the designer understood the needs of the teachers and their students and conversely that teachers understood the abilities and needs of the designer and their work. This speaks to Wright and McCarthy's call for interaction design research and participants to have 'emotional and meaningful' encounters that facilitates a mutual understanding that grounds designs in the lived experiences of both designers and participants and in this case was enabled by an intermediary; the curriculum access coordinator. (Wright & McCarthy, 2010)

The study has shown that another strategy for developing useful design was the need to provide training for teachers. As Florin argues, the benefits for teachers and students comes from the skilled application of technologies rather than from the qualities of the technology itself. (Reed, Hyman, & Hirst, 2011) By incorporating training for teachers into our design strategies we can ensure that those designs will compliment and extend teacher's practices. As seen in the Scandinavian inception of participatory design (Asaro, 2000; Bjerknes & Ehn, 1987) teachers need to not only learn how to use the functions of a particular artefact but also how to express themselves publicly, to evaluate their own and other's decisions, and to absorb information as a means to develop strong participatory structures. This then results in technologies that are not only *useful* but are also *used* by teachers in their everyday practice.

4.5 **Personas**

The category *design processes* has resulted in unique insights into the perspectives of and challenges for staff involved in the design and use of interactive technologies in a SEN school. In this section I present three personas based on the embedded and inductive research processes conducted in this study that led to this category; the special educational needs teacher, special educational needs teaching assistant and curriculum access coordinator. These personas have been created in order to support those in the interaction design community working in this context by providing an overview of staff roles that designers and researchers are likely to encounter in this context. The personas provide an overview of each staff member's role in the school, their role in the interaction design processes, their priorities for interactive resources

and the challenges they face in those processes. The personas presented are based on this case study and should be not be seen as providing statements of fact. Rather it is the reader's responsibility to consider how the insights inform and apply to the particular context in which they are working. These personas make up one of the main contribution of this study.

4.5.1 Special Educational Needs Teacher

Role in the School

Special educational needs teachers are concerned with the educational, social and emotional development of the children they teach. There is a wide variation in the ages, abilities and needs of the students they may teach and in the practices and tools that they use. There is no single approach to teaching in a SEN context, and how teachers work with students will be dependent on their professional experience, their approach to pedagogy and the students and institutional context in which they are working. There are however common responsibilities and concerns which they will share and it is important that designers and researchers take these into account when developing technology for use in SEN classrooms.

SEN teachers work with class sizes that are typically smaller than their mainstream counterparts. It is their responsibility to prepare lessons and resources for students, develop and adapt teaching methods and resources to suit the varying needs of their students and to maintain records of student progress. Teachers have to ensure they consider the individual needs of students within the wider group dynamics of a classroom context and to develop activities and resources that can be used flexibly to differentiate between the various levels of ability. They must also manage student behaviour in order to provide a safe, fun and engaging environment. It is their responsibility to choose, develop and adapt equipment and facilities, including interactive technology, to provide engaging ways for their students to learn. They will also coordinate learning activities outside the classroom such as field trips, sports events and outings.

In addition to teaching they are also involved with students' pastoral care which can be far more complex than that of their mainstream counterparts. They will attend and contribute to student's annual reviews and other related reviews including Heath and Care plans. It is their responsibility to liaise with a range of professionals, including educational psychologist, speech and language therapists and physiotherapists and to

work with parents, guardians and the students themselves to ensure that they receive the support they need.

SEN teachers must be able to respond to the needs of their students by adapting and changing their teaching activities and resources in response to the ever changing demands of a SEN classroom context. They are accountable to parents, the school management and the educational authority. They must ensure that they demonstrate through evaluation and constant oversight that their teaching practices conform to school policy and government legislation. The job requires patience, skill, empathy and the ability to work within a challenging but ultimately rewarding setting.

Priorities for the design and use of interactive technology

The first priority for SEN teachers is their students' educational, social and emotional development. Their priority for the design and use of interactive technologies in their classroom is for tools that support their teaching practice. There is a wide range of areas of teachers' practice that technology can potentially support and the priorities for different teachers will depend on the particular context in which they work. There are a number of important qualities however that are likely to be shared by the majority of SEN teachers.

Teachers work in time and resource limited settings where they must balance behavioural management with their teaching practices. Working with a class of children all with individual needs and abilities requires resources that complement and extend teacher's existing classroom work rather than disrupting and negatively impacting those practices. SEN teachers require interactive resources that are reliable and robust enough to be used in the strenuous environment of a SEN classroom.

It is the small pragmatic details that become a priority for teachers such as the amount of time it takes to set up and develop content for a particular interactive resource, and ensuring they can focus on the classroom activity at hand rather than troubleshooting with the equipment. Individuals and small groups of students in a class need to be engaged in different ways to suit their learning styles and needs. The dynamics in a classroom between students, teachers and the space they work in are always changing. Ensuring technologies are flexible enough to meet the demands of such a fluid environment is a priority for teachers in a SEN classroom, and therefore for designers.

Another important priority for teachers and their students is the use of digital tools and media for documenting and sharing student's achievements and the teaching practices used to support them.

Role in the interaction design process

SEN teachers offer the interaction designer intimate knowledge of their students, the classroom dynamics and of their own teaching practice. When designing for a SEN classroom context it is not only children that you are designing for but a complex set of social actions that occur between teachers, students and the institution. Teachers will ultimately decide whether technologies introduced into the classroom are used, who they are used with and for how long. As interaction designers developing tools for the classroom it is not our job to replace teachers and their professional practice with the tools we create but rather to compliment, extend and offer new possibilities for teachers and their students.

Working with students every day for extended periods enables teacher to provide essential insights into the impact of design interventions on student learning, social skills and classroom behaviour. They can also be an important guide in negotiating the political structures and alliances that exist between members of staff at the school.

Challenges for designers and researchers

Teachers all have different teaching styles, experiences and levels of ability. Their engagement with and understanding of the use of technology in their teaching will also vary between teachers. Many teachers will see the value of and be engaged with the possibilities of designing and researching the use of technology in their classroom. It is likely however that they will be cautious when approached to participate in or have their classroom used as a site for interaction design research. SEN teachers work in pressured environments where time and resources are limited. They are under constant pressure to conform to ever changing school and government policy.

If you are asking to observe and participate in a classroom, teachers may be understandably wary. They will be cautious in order to protect their students but also to protect their professional standing. If you plan to make observations or record their teaching and interaction with students, then they may be cautious of how their work will being evaluated and disseminated. They may also be concerned about the impact your work will have on their time and energy and how it will affect the behaviour of their students. When working in a classroom environment it is imperative that you

negotiate with the class teacher from the start of the project and update them on the progress of the research as it develops. You should negotiate what resources will be needed, who will be involved, how you will maintain contact and to be clear on what the outcomes will be for the research and the participants. Ensuring that you are realistic about the contribution your work will make to teachers and students will help you to maintain a productive relationship and ensure continued access to the classroom environment.

Projects change and develop as they progress. Maintaining clear communication and negotiating any changes with teachers helps to manage expectations and provides a means to check in about insights and designs you are developing with an expert participant. When working with teachers and students for extended periods there will inevitably be times when timetables and meetings are changed at short or no notice, students and staff who are key to your studies may be absent and rooms made unavailable. This is all part of working in schools and interaction designers should be patient and understanding and ensure they have contingency plans for issues that arise at the last minute.

As an interaction designer you do not know more about their classroom, students or teaching than teachers. You need to respect their work and understand that your research will be for them only one of a number of competing demands. You can offer an outside perspective on their work and offer new tools and approaches to compliment and extend their teaching but it is not your job to replace them or their professional practice.

The interaction designer involved in these studies discussed two different techniques for working with teachers to develop interactive resources for their teaching; visualising uses for technology and demonstrating use for technology. There is a balance to be found between being too prescriptive about how technologies are to be used and offering so many options that a teacher becomes overwhelmed. Finding this balance is difficult and requires the interaction designer to spend time working with, observing and discussing teachers' practice in the classroom. The interaction designer and teachers must find a shared language that allows the teacher to understand and inform the design of technology and at the same time enable the interaction designer to understand the nuances of their teaching practice, the students they work with and the classroom setting which they work within. In order to do this designers and researchers must take time to get to know the environment they are working within,

understand the existing collaborative and professional practices that occur. Include time to teach and learn from teachers through informal conversations and allow yourself and the teacher to observe and discuss each other's work. By doing this it is possible to develop designs and conduct research that is rooted in a shared understanding of the existing and potential impact of introducing technologies into a special educational needs classroom.

This study highlighted the different approaches teachers take when using interactive resources in their teaching; passive and proactive. The passive approach is where teachers rely on the interaction between the resource and the student with little or no intervention needed by the teacher. A more proactive approach is where the teacher uses the resource as part of a wider multiple modal approach to actively engage students with the subject, each other and the teacher. Every teacher will have their own approach to using interactive resources in their work. Where possible, interaction designers in this context should try to find ways to support and encourage teachers to use interactive resources as part of their wider practice rather than as a substitute for teaching. In order to do this designers must again understand the nuances of the people and setting they are designing for. Interaction designers should plan for and deliver training and example content for the resources they design, at the end and throughout the design process.

4.5.2 Curriculum Access Coordinator

Role in the school

Students in a special educational needs schools present a vast range of mental, physical and economic needs all of which must be considered when managing issues that affect their learning. Each SEN school in the UK has a team of health and educational specialists that will include experts on mobility, communication, mental health and multi-sensory teaching. It is the job of the curriculum access coordinator, also known as the special educational needs coordinator, to manage those staff. They will work with teachers, students and parents to ensure that every student in the school has access to an education that is appropriate to their abilities and needs. They will also be in charge of purchasing and commissioning equipment for students. They must take a strategic overview of all the forms of support available and consider the needs of individual students within the competing needs of the school as a whole.

Their work for students might include coordinating physiotherapy sessions, ensuring that they are provided with teaching resources that fit their particular needs, ensuring that parents are supported and must fit this within the class and timetabling structures of the school. They work directly with teachers to ensure that they adapt their planning and delivery of activities for the differing abilities of individuals and groups of students in the classes. In order to do this the curriculum access coordinator must have a clear understanding of the health, social and educational issues that affect their students. They also require an intimate knowledge of individual students, their carers and the staff that support them.

Priorities for the design and use of interactive technology

The main role of the curriculum access coordinator is to ensure that students are provided with access to an education that is appropriate for their abilities and needs. In order to do this, they must coordinate the use of a range of tools including people, equipment and training. Their priority for the design and use of technology in the school then is focused on technologies as tools that can help to remove barriers to students' access to learning, be they physical, mental or social. Whilst they are concerned to find technologies that suit individual needs they must also be strategic. SEN schools have limited budgets and resources. The technologies purchased or commissioned by the school need to be adaptable for the needs of multiple students and cohorts to ensure they present good value.

It is also the job of the curriculum access coordinator to ensure staff are trained to choose and use technologies that are appropriate for the students and the context they are working in. If a technology that is introduced to the school cannot be used by teachers in the correct context, then from their perspective that technology has no value.

They are also concerned with technologies that can support the coordination, monitoring and evaluation of the multiple professionals and tools that are needed to support each student in the school.

Role in the interaction design process

The curriculum access coordinator provides the interaction designer or researcher with an intimate knowledge of the school setting they are working within. They work with the majority of staff and students within the school and will have a wide understanding of issues that can affect students with SEN including health, mobility,

communication, child protection and sensory needs. They can also introduce the designer to different professionals in the school and provide opportunities to work with them.

Staff in this role have the potential to act as an intermediary between the designer and class teacher in the design process. With their strategic overview of the different forms of support that students and teachers require, they can offer the interaction designer insights into the ways their designs will fit within the existing resources and teaching practices in the school. They may suggest ways to adapt and redesign technologies to match individual student's needs whilst simultaneously considering how they can be used with a range of students in mixed ability classroom contexts. Importantly they understand the pragmatic issues that teachers must deal with in a classroom and can help designers to develop technologies that fit within and extend existing teaching practices. Conversely they can work with teachers to train and help them understand how new technologies can support their teaching.

Curriculum access coordinators are responsible for monitoring and evaluating the success of different teaching and support strategies in the school. This includes organising, implementing and evaluating the annual educational reviews of individual students. They can therefore offer designers useful evaluation techniques for evaluating the effectiveness of technology based interventions in the school.

Challenges for designers and researchers

A curriculum access coordinator's main priority is to protect and provide value for the school's staff and students. They will have worked with a range of suppliers, companies and organisations in their work and will be cautious when being approached by a researcher or designer even if they have been sanctioned by school management. From the accounts of participants in this study it is clear that designers and researchers who work with SEN schools often over promise and under deliver on technology projects. As an interaction researcher or designer working with a curriculum access coordinator you must ensure that you are realistic in the aims of your project, that they can see the value for the school and students and in the work that you want to carry out and that you are working in consultation with them rather than imposing what you consider to be the correct design process and solution. Staff in SEN schools work hard with limited resources in a sensitive and pressured environment. If you are asking for support from a number of professionals and students in the school, the curriculum access

coordinator is going to be justifiably concerned with the impact your work will have on their team and the students they support.

As a designer and or researcher you must also consider that the curriculum access coordinator's view of the school's staff and students may provide insights into a wide range of activities and practices but in doing so may miss the fine grain understanding of classroom behaviours of people such as teachers and teaching assistants. Whilst they work with a majority of staff and students in their role, curriculum access coordinators do not spend every day working with the same group of students in the way that teachers do. Also part of their role is outward facing. It is their responsibility to present what can be an idealised picture of the school to outside organisations. It is therefore important to spend time developing a relationship and shared language with them, understand the limitations of their view of the school and to work with others in the school to ensure that you gain a nuanced understanding of the school from multiple perspectives.

4.5.3 SEN Teaching Assistant

Role in the School

The role SEN teaching assistants have in a school is dependent on the needs and abilities of the children they work with and their level of experience and training. They may support a single student in a class or work with groups of students. As with SEN teachers, SEN teaching assistants are concerned with the educational, social and emotional development of the children they work with but under the supervision of the class teacher. They have less responsibility than SEN teachers and are not expected to plan and develop teaching materials or liaise with parents, guardians and other professionals. Their main responsibility is to help children understand instructions, carry out aspects of children's care plans (social, educational, personal), document student's work and classroom activities, support students during social and extracurricular activities, help prepare learning resources for the class teacher and help keep records for student evaluations. SEN teaching assistants may also have specialist communication skills to support students including sign language, deafblind communication and other forms of accessible communication.

Priorities for the design and use of interactive technology

The main priority for special educational needs teaching assistants are their students and the teaching practices and resources they use to support them. They require interactive resources that compliment and offer new opportunities for supporting their students. SEN teaching assistants are low paid and often paid hourly. They are likely to be asked to set up resources before and during classroom sessions at short notice. They have little time allocated for learning how to use and maintain digital resources and so require technologies that are simple and quick to set up and require only a short amount of training to get started with them. Teaching assistants are often asked by class teachers to document class activities and student work using digital cameras and video. Developing technologies that support the documentation, editing and display of content will directly support SEN teaching assistants. Designing technologies that support SEN teaching assistants to monitor and record information about students educational and behavioural development is another priority for interaction designers developing technologies for SEN classrooms.

Role in the interaction design process

SEN teaching assistants offer a number of potential contributions to an interaction design process. They work closely with individuals and groups of students and can provide detailed insights into students' needs, behaviours and the impact of design interventions on their work. Where SEN teaching assistants work with individuals with severe or complex needs they can help to communicate between the designer and student and in some cases act as a proxy for their voice. They also work closely with class teachers and so offer an alternative perspective on the teacher's approach to teaching, their use of resources and relationship with students.

When working with students in a classroom setting SEN teaching assistants can provide practical support in setting up classroom furniture and other resources, communicating and supporting students in tasks and recording activities using video and stills cameras. As a researcher or designer it is also a role that you can take on as a means to get to know students, teachers and the classroom setting. It is a job that although demanding is also accessible for designers with only a small amount of experience of working with children and in education.

Challenges for designers and researchers

As previously noted SEN teaching assistants work for low pay and are often paid hourly. This means it may be difficult to arrange to have SEN teaching assistants participate outside of their designated classroom hours. Working with teachers and management staff to ensure they are compensated for their time is one way to ensure they are able to engage with the project. SEN teaching assistants may also be cautious of discussing the work of other staff. As with SEN teachers they are concerned with protecting their students and their professional standing in the school. This means it is important to discuss with them how any information they provide will be recorded and used. Another issue for designers and researchers to be aware of is that SEN teaching assistants are not always assigned to a specific class and may change from session to session during a project. This means they may be unaware of who you are and the work that you are doing in the class. Ensuring SEN teaching assistants are given at least an overview of your project at the start of a session can mean they are more willing to help and discuss their work with you. As with any staff member or student you are working with never assume that you know more than they do about their teaching practice, the environment they work in and the students they work with.

4.5.4 Summary

This section has presented three detailed personas of key staff members that those in the interaction designer community working in the context of a special educational needs school are likely to encounter. These personas provide pragmatic advice on three staff member's roles in the school, their potential role in an interaction design process, their priorities for interactive technologies and the challenges that researchers and designers may face when working with them. These personas also offer an overview of the staff who are participants in this and the other three studies in this thesis. There are a number of insights and suggestions in this section for working with these staff members. The key points are that it is essential to spend time with staff in the context they work, to respect their professional practice and to find a shared language to discuss and develop interactive technologies with and for their work with students.