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How the professional training of Assistive Technologists can inform a future research agenda

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Chapter 7: How has developing professional training for assistive technologists helped to inform our research agenda for assistive technology?

Rohan Slaughter, Annalu Waller, and Tom Griffiths

Abstract

This chapter discusses how the experience gained from developing training to support the professionalisation of the assistive technologist role may support and shape the assistive technology research agenda. Through exploring the approach taken in developing the unique MSc Educational Assistive Technology (MSc EduAT) the authors will describe their motivations for the curriculum design, which is founded on extensive experience of assistive technology service delivery at all levels and a significant track record of leading Assistive Technology (AT) and Augmentative and Alternative Communication (AAC) research at the University of Dundee. In order to support the development of evidence based AT policy with regards to the professionalisation of Assistive Technologists the authors propose that three particular areas of research are needed: (1) identifying the social return on investment generated by specialist AT roles; (2) AT assessment tool development and (3) development of an AT training framework and discovery tool.

Keywords: Assistive Technologists; Assistive Technology; Training; Policy; Research.

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<a> Introduction

This chapter has been written in the latter part of 2022 and in the first quarter of 2023. At the time of writing, the MSc Educational Assistive Technology (MSc EduAT) at the University of Dundee has been running for just over two years, with the first cohort about to graduate. The third cohort has completed their first core modules and the fourth cohort is being actively recruited. The course is now an established part of the Assistive Technology (AT) training landscape in the United Kingdom.

People tend to 'fall into' AT from various backgrounds, in part due to the lack of a formal route into AT roles, along with the lack of a clear definition of the AT role. There have been previous attempts to create a structured assistive technology focussed postgraduate course, and these courses are no longer offered (see for example, Seale & Turner-Smith, 2001 who describe the Kings College, London Masters in Assistive Technology). However previous efforts have concentrated on particular sectors or aspects of assistive technology and focused on AT in its broadest definition. Including technology to support people with a range of disabilities and health conditions, as well as meet the needs of an aging population, having an emphasis on health or age, as well as disability. In the United States the RESNA (Rehabilitation Engineering and Assistive Technology Society of North America) has two

qualification routes which are offered to AT professionals and specifically to rehabilitation engineers and seating and mobility specialists ^[1]. In Europe there have been a number of efforts to support teaching of assistive technology (Whitney et al.,2011). Again some of these courses are focussed on rehabilitation engineering and others support training in universal design or accessibility. As far as the authors are aware, there has not previously been a strategically informed, transdisciplinary approach to professionalising the assistive technologist role through the development of a qualification which is underpinned by research and a strong commitment to including and valuing disabled peoples' experiences.

Integrating the views of MSc EduAT students is essential, and the programme team must ensure that students are supported to collect the views of the people that they work with, who are the users of the assistive technology systems. The members of the various groups within the User Centre at the University of Dundee also inform the approach and have supported programme developments. The User Centre groups are a unique feature of the discipline of Computing at the University of Dundee and ensure that research and teaching projects across the University are scrutinised by people who are expert users of Assistive Technology ^[2]. For example, members of the user centre who are expert users of AT provide feedback to second year students presenting early-stage or planned development of their dissertation projects at the EduAT on-campus teaching and conference week.

Within the EduAT programme team there is a strong commitment to active collaboration with colleagues from across the AT sector, without which any efforts to professionalise the AT role are unlikely to succeed. To this end the EduAT programme team have taken opportunities to support and collaborate with colleagues from a range of organisations in a collegiate and open way.

The University is an active associate member of APPGAT (All Party Parliamentary Group for Assistive Technology), which has its secretariat with Policy Connect, a non-partisan think tank ^[3]. All Party Parliamentary Groups are informal cross-party groups. Whilst they do not have official status within parliament, they are useful to bring together policymakers, and experts from a variety of organisations, including academia, commercial companies and charities to support evidence-based policy making. The programme team are actively supporting the inclusive efforts of the APPGAT to develop effective, and evidence based AT policy proposals.

The programme team have the support of an advisory group. This group includes academics from other higher education organisations, service delivery professionals from the specialist and mainstream education sectors, disabled people in a variety of national policy support roles and professionals working in sector support bodies. The MSc EduAT advisory group act as 'critical friends' to the programme team to support curriculum design and delivery. The terms of reference for this group has been born out of the MSc EduAT development process and enables the group to both support and challenge the programme team in a way that enhances the course delivery.

The authors recognise that the professionalisation of an emerging professional role cannot be done by the development of a single new course, or indeed by a single entity such as a university. There are various ways of supporting the professionalisation of the AT role. It is

not thought likely that the government would legislate to create a protected title, as the sector is small. The perceived risks and benefits of such a time intensive route means it is thought to be unlikely for professionalisation to be supported in this way. It may however be possible to support the creation of a professional body for assistive technologists that could encourage the professionalisation of the role, develop CPD standards for both formative and in-service training and development requirements as well as establishing itself as a recognised authority on Assistive Technology in the UK. Recent research commissioned by the UK government's Department of Education (Edyburn, 2020) made five recommendations that align with aspects of our approach:

1. Develop Personnel Preparation Pathways that Provide General AT Knowledge
2. Develop Personnel Preparation Pathways that Develop Specialised AT Knowledge
3. Establish AT Teams
4. Standardise AT Evaluation Procedures and Protocols
5. Connect AT Devices, AT Services, with AT Outcomes.

The development of courses that can provide training for staff in both general AT as well as specialised AT support is part of the EduAT approach outlined in this chapter. We recognise the need to establish AT teams and to standardise and develop and standardise 'AT Evaluation Procedures and Protocols', we concur that there is a need to ensure that the outcomes of AT services are recorded and further researched to evidence impact of the service provided. In summary we propose that raising the quality of AT service delivery through professionalising the field is important. It is overdue for this emergent profession to ensure quality and continuous improvement of AT assessment, provisioning and ongoing support for AT delivery by implementing formalised quality assurance and quality improvement mechanisms. These mechanisms do require definition and development and are seen as a vital part of the efforts to professionalise the assistive technologist role.

This chapter explores the need and drivers behind calls to professionalise the assistive technologist role. It will include an overview of why the programme team developed the MSc EduAT, including a summary of what we have learned after two years of developing and running the programme. The chapter considers that assistive technology is in some ways in a 'golden age', with a broader range of accessible technology available than ever before as well as technology being more affordable for everyone. We consider that not all members of the AT workforce need a masters level qualification, with instead a range of courses provided at multiple levels, underpinned by a development framework. The chapter closes by defining a research agenda that has been informed by the development of the MSc EduAT and the experience and input of the staff team and the students who have pioneered this new course with the programme team.

<a> Why professionalise the assistive technologist role?

In exploring justifications for the call to professionalise the assistive technologist role, we will first define assistive technology and the assistive technologist role. We will then examine drivers for professionalisation and consider how the role integrates with other professions.

Defining assistive technology and the assistive technologist role

There currently exists no agreed definition of the Assistive Technologist role, with local definitions being highly dependent on the context in which the role holders work. Assistive Technologists are found in education, health and social care focussed roles. This variance is due in part to the fact that Assistive Technology itself has many context-dependent definitions; the World Health Organisation (WHO, 2023) definition is very broad, as it includes aids to daily living, mobility aids and other technologies that are widely available in an advanced healthcare economy such as the United Kingdom. A tighter definition to specifically address electronic assistive technology may be helpful here, in part to separate the MSc EduAT's professional development programme from existing pathways for rehabilitation engineers or healthcare and clinical scientists (for example the Rehabilitation Engineering and Assistive Technologies MSc at UCL ^[4]).

With a view to support the development of the assistive technologist role, members of the programme team worked with colleagues from The TechAbility Service at Natspec (National Specialist Colleges Association^[5]) to develop a dedicated entry in the ESCO (European Standards, Competencies and Occupations) database for the assistive technologist role:

Assistive technologists work to improve access to learning or/and improving independence and participation for individuals with disabilities. They do this through learner support and staff support with activities such as assessments, training and guidance. Assistive technologists have a good understanding of learners' needs and a wide technology knowledge relevant to learning, living or work context. The role requires knowledge of assistive technology hardware and software such as text to speech, prediction, dictation, vision and physical access tools (ESCO, 2022).

Defining the role of an Assistive Technologist who operates in contexts such as education, social care, the third sector and beyond is possible in part, by saying what it is not. The motivation for the selection of 'Educational Assistive Technology' (EduAT) for the name of the degree programme was to ensure some differentiation from existing approaches and training routes. The key point to emphasise is that the EduAT approach is not medically derived but instead reflects a more socially inclusive approach. The closest professional grouping is teaching or education, reflecting the strong 'train the trainer' emphasis placed on the EduAT definition of the assistive technologist role. Note that those who undertake the EduAT role do not have to be working in education organisations; indeed students are also drawn from various third sector, private practice, therapy, health and social care organisations. The EduAT approach is a fusion of the knowledge, skills and attributes of education and teaching roles, health or therapy roles and computing, IT and assistive technology roles. It is by nature a transdisciplinary role; the EduAT does not replace any existing role, but rather complements and supports colleagues in existing roles.

Drivers for professionalisation

Drivers for professionalisation of the AT role began with requests for AT training or courses to help develop colleagues from across the education sector and beyond. The Jisc (Joint

Information Services Committee) funded Dart Project (Slaughter & Mobbs, 2015) identified a need (and demand) for training and support for assistive technology professionals in further education organisations and beyond. The Dart Project research (Maudslay, 2015) identified that, where there were dedicated AT roles, organisations benefited from significant improvements to AT outcomes for their students. These themes have been further explored and updated in the dissertation projects of EduAT students, some of which are planned to be published during 2023.

There is a growing trend for head teachers, college leaders and others, having identified the need for an AT specialist role, to attempt to recruit to dedicated Assistive Technologist roles, with varying degrees of success. The Dart Project role profile and person specification for the AT role has been replicated in a range of organisations. As these documents were widely shared, many of the assistive technologists employed in UK based mainstream and specialist education organisations today can trace their role profile or person specifications development back to these template documents. However, even when organisations chose to implement or develop such dedicated assistive technologist roles it continued to be difficult to recruit. In some cases, there was a lack of assurance or confidence that candidates were high quality or had a broad enough experience of supporting assistive technology. This was in part perceived to be due to the lack of a protected title. Because anyone can claim the title, some leaders concluded that it would be impossible to tell if applicants were up to the task, resulting in a preference to identify a member of their existing team to develop into the AT role. This experience is directly informed by consultancy work undertaken by the EduAT programme team.

This 'grow your own' approach does have merit. Existing staff members understand their employing organisations and the client group of learners or people who use the service better than someone joining the organisation. However the lack of an obvious training and development route into the AT role was still a barrier to be overcome. The Dart projects (2010 to 2015) sought to address this lack of a formal AT training route by developing the 'Dart Curriculum', which aimed to index the few available courses that were offered by academic organisations, AT software or hardware companies, or by people in private practice. This signposting was also augmented by a series of workshops that were offered in different parts of the country, notably at Queen Alexandra College in Birmingham and at the College Development Network Headquarters in Stirling, Scotland^[6,7]. Workshop design and content was informed by the first of two research projects undertaken as part of the project.

Part of the reason for the success of the Dart projects was that training and development was offered to people who were already working to support AT, and who needed to develop their knowledge, skills and understanding. There was, and to some extent still is, a challenge in defining an expected level of AT practice. The Natspec TechAbility Standards (Natspec, 2023) were defined to support AT service improvement in specialist colleges and beyond. Defining what good AT provision looks like continues to be a challenge and is being improved by initiatives to support the understanding of regulators. There are examples where Ofsted (The Office for Standards in Education, Children's Services and Skills) has highlighted the assistive technologist role and the impact of assistive technologies such as the Assistive Technology and AAC good practice example from Royal College Manchester

(Ofsted, 2015). There are also examples where a single line in an Ofsted report calling for improved AT provision has resulted in the creation of AT posts such as the assistive technologist.

The requirement to ensure high quality service delivery continues to be a strong driver for professionalising the AT role. All education, health and social care organisations are accountable to various regulators such as CQC (Care Quality Commission) and Ofsted in England and the equivalent bodies in the other devolved nations that make up the UK ^[8,9]. Demonstrating the impact of the assistive technologist role and accounting for this through curriculum recording systems is essential to many organisations who have to provide justification for how their publicly funded budgets are spent.

How does the assistive technologist role integrate with other professions?

The perceptions of other professionals involved in the assessment, provisioning and ongoing support of AT may be unfavourable in some cases, with other professionals identifying the assistive technologist role as a 'technician grade' post. In some cases, this is due to the misguided view that this role will impinge on their own professional practice. In this way the work of the EduAT may be deprecated or even ignored by other professional colleagues. The authors have direct experience of this happening in different contexts. In addition, some EduAT students have reported such difficulties when attempting to implement methods of inter or trans-disciplinary working in their employing organisations. In the worst examples assistive technologists have chosen to leave organisations where their skills are not valued or respected. When this does happen it may highlight succession planning concerns as it is often very difficult to replace such specialist staff.

The essential skills and competencies and knowledge as well as the optional skills, competencies and knowledge that make up an EduAT can be seen in the ESCO database entry for the assistive technologist which shows the elements that are required for this role (ESCO, 2022). It should be noted that the EduAT competency framework used in the MSc EduAT programme greatly expands the skills, competences and knowledge beyond the ESCO definition of the role. The reason for this is to cover the broad range of contexts that the role operates within and to support students to consider which parts of the EduAT competency framework apply to their role, and therefore should form part of their learning journey. Most people undertaking EduAT already have a professional context, this could be teaching, therapy or technologically based. As has been identified, the assistive technologist is a trans-disciplinary role that integrates knowledge skills and understanding from a range of other roles, and these are included within the EduAT competency framework. Development of effective working methodologies to enable collaborative working and integration with other professionals is an important factor that is included in the MSc EduAT programme.

It is important to focus on ongoing professional development for the role, and this is why the EduAT competency framework emphasises the need for professional standards as part of an ethical framework for practice. The EduAT competency framework points to a range of existing skills and knowledge from other professions, and this range matches the available

elective modules within MSc EduAT. Students are encouraged to use the elective modules to address their learning opportunities.

<a>Overview of MSc EduAT at the University of Dundee

The design of any new MSc programme is a significant undertaking. This has been even more challenging in the case of the EduAT degree, due to the small pool of potential teaching staff. It took a year from first advertisement to the appointment of a second lecturer, further illustrating the difficulty in developing a new approach to training assistive technologists. At the time of writing, there are over 30 students or graduates who have completed, or who are currently enrolled on the MSc EduAT. This represents a significant increase in the number of people in the UK who are trained at a postgraduate level in AT related areas. Indeed the fourth cohort for MSc EduAT due to start in January 2024 may be the largest cohort yet.

The Genesis of the MSc EduAT

The Dart Project (Maudslay, 2015) was funded by LSIS (Learning and Skills Improvement Service) and Jisc 2010-2015. As part of Dart, a curriculum was developed to train assistive technologists. The Dart curriculum has inspired the approach taken in MSc EduAT and has been expanded upon considerably. In 2014 attempts were made to create the MSc; these did not materialise until early 2019 when a small group gathered to consider core module scope and structure. By the end of 2019, the first author had drafted the programme specification and the specification for the core modules. During 2020 the core modules and the programme specification were scrutinised internally and approved mid-2020. The first author was appointed as senior lecturer in late-2020 to begin the development and delivery of the MSc EduAT. The programme development has benefitted greatly from the advice and encouragement of expert colleagues interested in AT from across the education sector and academia who formed the MSc EduAT advisory group.

The MSc EduAT curriculum

The MSc EduAT (University of Dundee, 2023) has six core modules which collectively amount to 100 credits:

1. The educational assistive technologist
2. Introduction to AT systems
3. Mainstream and specialist AT
4. Assessment for AT
5. AT in educational programmes
6. AT partner relationships

In addition students select 40 elective credits and choose a 40-credit project dissertation. The 100 core, 40 elective and 40 project dissertation credits make up the 180 credits required for an MSc award (See Figure 7.1).

<Figure 7.1 about here>

Figure 3.1: MSc EduAT Module Structure

The first module uses a guided tutorial approach to guide students to undertake a supportive gap analysis using the EduAT competency framework. This is also the focus of the first assessment that is undertaken by students; a reflective piece that encourages students to 'argue out with themselves' where they can get best value out of their elective module choices. Based on identifying gaps in their knowledge, the student with support from the programme team suggests elective modules from education, computing or IT and health or therapy to address the learning opportunities that have been identified as requiring development in the EduAT competency framework.

Module one establishes the nature of the role, how it can change for different contexts and shares context and background information of relevance. The module also establishes a common understanding of the EduAT role and defines 'The EduAT method'. Modules two and three cover the broad spectrum of available electronic AT and accessories, inclusive of hardware, software, integrated accessibility affordances, mounting and positioning equipment etc. Module four provides the theoretical basis for the assessment of AT and includes a range of different examples of formal AT assessments, including assessment for AAC, DSA (disabled students allowance) and EAT (electronic assistive technology). Module five provides students with the tools to embed AT within taught programmes and the final core module covers the professional context of the role and how students can make referrals to various parts of the education, health and social care systems. More detail on the core and elective modules can be found on the MSc EduAT website(University of Dundee, 2023).

There are three 'Computing' focused elective modules. *Assistive Technology Interaction* is a reimagining of human computer interaction (HCI), with examples drawn from assistive technology. Students are introduced to usability engineering, learning how to evaluate and design user interfaces, with a view to taking an evidence-based approach to influencing and assessing the effective design of AT. *Work Based Skills and Innovative Practice*, which requires the student to design their own learning outcomes providing an opportunity to research an area of practice of interest to them with academic support. This allows students to engage in a range of learning including work placements, literature reviews and employment specific innovations such as the introduction of a new way of working. *An Introduction to User Experience (UX)* equips students with skills and approaches to designing systems which are more intuitive using design patterns and design principles. An understanding of this theory is crucial to ensure successful design within a wider context.

There are two 'Education' focused elective modules. *The Inclusive Educator* provides an overview of inclusion models and specialist education and puts this into context using current legislation and policy. *Innovation in Education* provides background on the drivers for educational reform and supports students to undertake an education innovation project within their workplace. A *Health led Education for Practice* module is also available, which supports people with a health background to develop their knowledge and skills in education.

We are exploring adding additional elective modules as part of a multi-pathway future evolution of MSc EduAT to enable students to select a pathway best suited to their employment, or future career development pathway. This would enable students to select highly-specialist content such as AAC (Augmentative Alternative Communication) or complex access if these were focus areas within their employment context.

The course is 'blended', with the majority of delivery online as students are based UK-wide. Most students work full time and undertake MSc EduAT coursework within their working contexts. There are no exams, all assessment is via coursework. Coursework is designed so that students use work they are conducting in their employment as a basis for their academic work. This makes the assessment relevant to students working contexts and more achievable overall, whilst working full time. One on-campus teaching and conference week is undertaken per year of part-time study. Entry requirements have been kept as flexible as possible to support a diverse range of students to join the course.

The course is 'profession agnostic' and is aimed at anyone who wishes to become an educational assistive technologist (EduAT). Students could be teachers or teaching assistants; therapists or therapy assistants/technicians; technologists, from a variety of backgrounds; engineers, scientists or technicians. Most students have prior AT experience and are employed in a suitable AT environment. These environments include education, social care or third sector organisations and in a role that typically requires the post holder to support the use of AT. Where a student is not employed in a suitable context work placements will be identified, this is notably important for students who wish to undertake the course full time over two years.

<a>What has been learned?

The students who are taking MSc EduAT are employed in a range of different organisations: sector membership bodies; specialist and mainstream schools and colleges; third sector (charity) and care organisations; higher education institutions; private AT or AAC practice and therapy services; local authorities (advisory teachers or electronic AT specialists) and the National Health Service (NHS). The first cohort includes students working in 'AT mature' organisations. This is to be expected as students in the cohort joined to develop their skills, address learning opportunities and validate their existing skills and knowledge. The second and third cohorts are drawn from a more diverse range of organisations. International students have been made offers for 2024 entry and the EduAT team are developing AT placement opportunities with partner organisations in many of the types of organisations from which our part time students are drawn.

Some students are fully supported by their organisations; they have leadership buy-in and ownership of AT as a core part of the organisations' offering. This leads to improved AT training and development and active engagement in improving the wider AT service. However, it is not always straightforward, as there is large variance in the AT maturity of organisations and very different expectations are made of the AT role. There can be differences in terms of budget support, ability to buy assessment equipment and limited budget for additional staff as the AT service scales. The EduAT team have seen occasional

concerns with other professionals or groups around accepting the need for a 'professionalised AT role' in the unfounded belief that this may encroach on existing roles.

More experienced colleagues are, in part, studying the MSc EduAT because they want to improve recognition for a professional AT role within their own organisation. For those starting out with AT, the course can provide knowledge skills and understanding to undertake assessment, provisioning and ongoing support of AT in a range of organisations. There is now a 'formal' route into AT training for those who wish to train as an assistive technologist, this means students can develop as an assistive technologist or embed AT skills into another role such as teacher, technologist or allied health professional (primarily Speech And Language Therapy or Occupational Therapy). In some organisations our student may be the only person who is working to support AT, in others they may be part of a wider AT team. The EduAT team have experience of a wide range of examples of how AT is implemented in the UK. There is also variation in where AT is located in organisational structures, sometimes within education teams, therapy services, IT or within a dedicated AT or a broader technology team. In some organisations we see good management buy in, and in others this is very difficult. The EduAT team have supported students and their management teams to embed the Assistive Technologist role and have signposted other services such as TechAbility and Jisc ^[10,11]. This support has been informal in some cases, and organisations have also engaged members of the programme team in a consultancy capacity to provide more time intensive or targeted support for assistive technology improvement programmes. The programme team have also formally supported the recruitment of assistive technology roles. This has included support for the development of role and person specifications, development of candidate assessments, panel interviews and ongoing post-employment support and mentoring.

A useful feature of the course is the peer review and development that has taken place through an active learning set within the student body. Students have collaborated offline; and have in some cases supported each other through peer-review and development visits to each other's organisations and to provide assistance with difficult assessment cases, or to provide support with specific technical developments. The programme team plans to support the alumni of the course by converting existing digital spaces into an alumni resource that former students can access following graduation to network with peers and to access updated MSc EduAT teaching resources as the programme team continues to develop the programme.

<a>An idea whose time has come?

In considering why it is a good time to professionalise the AT role now, this is partly due to the improvements in the underlying technology, in terms of reliability, cost and acceptance, factors that provide opportunities to an increasing number of people who might benefit. These opportunities can only be taken full advantage of if those using AT are supported to learn how to use it, alongside any supporting persons being trained to develop their understanding and ability to support the user and their technology.

Technology has improved with additional operating systems and productivity tools now having improved accessibility affordances and support for various access technologies such

as switch access and eye-gaze natively 'baked into' the software. The expectations of users of assistive technology have also been raised, in part due to the mainstreaming of accessible, lower cost equipment. We should be clear that this mainstreaming of assistive technology is not just about tablets and computers, it includes voice assistants, IoT (internet of things) technology and home automation or smart home type technology used in place of higher cost age and disability badged ECS (environmental control systems). We can also include the mainstreaming of AI (artificial Intelligence) backed personal assistants and the potential of generative AI tools such as ChatGPT, Bard and Bing.

A solution to a difficult problem?

The programme team, like many others, have been seeking a solution to the problem of having assistive technology equipment and software in existence that is not being used to its potential for some time. This concern applies to both specialist and mainstream assistive technology tools. The in-built accessibility options and affordances within mainstream operating systems and productivity tools continue to be iterated by the mainstream technology companies but few educators and other supporting staff understand how to use them. Specialist assistive technology software and hardware has also been improved. The tools are better than ever, however the specialists that are required to manage the assessment, provisioning and ongoing support of assistive technology are not yet widely deployed. The problem of high-quality assistive technology hardware and software existing, and supporting staff not knowing how to assess for, provision or deploy it and to provide the ongoing support for its use can be met by the assistive technologist role. Waller (2019) considered that:

[The proposed role of the Assistive Technologist] is a new concept and a new professional cadre is required to realize it. There is a need for the training of assistive technologists which goes beyond the DART curriculum to include AAC training. Indeed, many online training and development resources already exist, e.g., the modules commissioned by the Scottish government based on the IPAACKS (Informing and Profiling AAC Knowledge and Skills) framework. However, there is a need to provide accredited training for a new profession who will work alongside other professionals to support and adapt the use of AT to meet the day-to-day needs of individuals, and those around them, in education, employment and in social settings (p. 162).

Waller (2019) concluded that in relation to the provision of AAC technology that the assistive technologist profession has a crucial role to play:

Even when technology is innovated in collaboration with a wide range of stakeholders and identified by multidisciplinary teams, the adoption of AAC technology depends on a knowledgeable support environment. AAC technology is not an appliance which is plugged in and switched on. Instead it is a tool requiring ongoing support, ideally from assistive technologists working with educators and care staff to ensure that the true potential of AAC technology is realized! (p. 166).

The assistive technologist role is intended to pick up where a more generalised level of AT support provided by other professionals is no longer sufficient. Advocating for universal usability or universal adoption of accessible learning materials is an important factor, but it

is not where efforts should stop. The concept of ordinary-extraordinary user design (Newell & Cairns, 1993) asserts that by meeting the requirements of users with the most complex needs, interfaces will be easier to use by everyone. This premise has underpinned the research and teaching within computing at the University of Dundee for over three decades and has motivated an inclusive approach to the design of digital AT. There are however limits to what can be achieved with universal service delivery, you may be able to meet the needs of most, and not all users by advocating for a universal design approach, however being inclusive does not mean treating everyone in the same way.

The UDL (Universal Design for Learning) approach as much to commend it (CAST, 2018); however there are some limits to this approach. It may not be possible to meet the needs of all students via a UDL type approach, even though you may meet the needs of many. Perhaps the most useful part of the UDL framework are the points related to the design of 'accessible educational materials.' The concept of ensuring that all educational materials are born accessible holds great value. It is crucial that educational materials are accessible so that a user of an assistive technology may access them, for example a screen reader user cannot access an inaccessible pdf document that is formulated using scanned images of text.

The UDL approach is viewed as complex, it is open to challenge and hard to measure the impact of a given element as Boysen (2021) so clearly articulates:

If the premise of UDL sounds familiar, it is because it is also happens to be the central idea of learning styles [...]. In fact, UDL shares a startling number of similarities with the now discredited concept of learning styles. These similarities do not necessarily mean that the approach is ineffective or that it should be abandoned, especially as an accommodation for disability. However, critical analysis of overlap between the approaches is essential so that educators, theorists, and researchers do not make the same mistakes with UDL as they did with learning styles (p. 2).

Boysen also quotes earlier work from Edyburn (2010), who commented on the difficulties on measuring the outcomes of UDL:

Having multiple measures of learning within a single intervention makes it difficult to determine if UDL is effective (Edyburn, 2010). In addition, UDL presents students with multiple modes of representation and engagement. Thus, demonstrations of effectiveness need to account for the fact that implementations will inherently contain "multiple concurrent interventions" and multiple outcomes (Edyburn, 2010, p. 39). Overall, the complexity of UDL leaves a Gordian knot that researchers have not yet untangled in studies of the framework's effectiveness (p. 7).

Universal Design For Learning may be helpful as an approach, especially with respect to the provision of accessible educational materials for students with specific requirements, however as the approach cannot meet the needs of people with more complex needs there is a risk that some leaders may think that the approach solves all accessibility and assistive technology provision requirements. An additional service level, beyond that offered by universal approaches such as UDL is required for people with more complex needs. This is where the assistive technologist role is critical. Reducing AT abandonment is also an

important factor which the person-centred approach at the core of the EduAT approach supports through asking the individual AT user what they wish to achieve and addressing those factors first. The problem we are seeking to address with the assistive technologist role is how to ensure the provision of high-quality user centred assistive technology services. An assistive technologist can assess for, provide and support the use of additional accommodations and technologies to enable a user to access materials that have been provided in an accessible format. This approach is closely allied to the ideas set out by Jewell and Atkin (2013: p. 17) in their report *'Enabling Technologies'*. Their recommendation to "allow the experience to be customised" can also be reframed as providing the hooks or digital affordances in product or system design. This can include accessible educational materials. Given accessible materials, then the assistive technologist may function as the 'chief integrator' of the technology system used by the user to access whatever they require. The UDL type approach may not be effective for 'edge cases' or to put it another way, for people who have additional specific needs. This may mean that we can ask the question is it even still a universal approach?

This open approach to extensible technology is helpful to those in the AT role as they can utilise the digital hooks or affordances to enable access through whatever input methods or tools may be appropriate and may even build new experiences upon the affordances provided. The recent experience in the education sector of having to move to online delivery during the Covid-19 pandemic has stimulated interest in accessibility from across the sector. Indeed, post pandemic we have seen an increase in the demand and the need for digital skills, digital inclusion in general and the required accessibility improvements across digital platforms.

Funding the future

There are not enough people working to support assistive technology in education and beyond, as can be evidenced by the difficulties many organisations face when recruiting assistive technologists. There is a need to support training for people who wish to become assistive technologists. As a programme team we have supported the development of an EduAT scholarship that has been both charitably and corporately funded. This scholarship has been heavily oversubscribed, with applicants noting that without this support they cannot be supported by their organisations to access the course, due to increasing budgetary pressures. The MSc EduAT scholarship is a competitive process, with submissions assessed against an application essay rubric by a sub-group of the independent EduAT advisory group. It can also be identified that of the unsuccessful applicants, most do not otherwise find a way to access the course. This is a concern, as smaller organisations may not be able to access this professional development route due to budget concerns. Once people are trained, it is useful for them to have a funded role to go to. We are aware that many organisations are not able to prioritise the budget to provide dedicated AT roles, even where the evidence of efficacy and therefore benefit to users of AT is accepted, primarily due to increasing pressure on budgets. We propose that by combining both support for training and support for AT roles in suitable organisations that this downward spiral could be broken, with a trained workforce able to provide support to colleagues and AT users alike.

The wider AT support context

Interestingly the calls for additional assistive technologists came at the same time as a reduction in the levels of sector wide support available nationally in the UK from sector membership bodies and other organisations who previously provided AT support.

We would argue that there is a need for a new pan-sector AT focussed support body to replace the education sector support bodies that have been lost. A number of organisations have historically supported AT in education, such as The Special Education Microelectronic Resource Centres (Seale, 2022) Jisc TechDis (ETF, 2023) and the Jisc RSC's (Regional Support Centres) which provided AT, accessibility and inclusion support to Higher and Further Education Organisations and to the skills sector (Soares, 2014), the Brite Initiative which provided AT support for Further Education Colleges in Scotland (Brite Initiative, 2014), and the British Educational Technology Agency (Becta) which provided AT support to schools and others (Becta, 2011). All of these organisations provided both formal and informal staff development opportunities for people who were working to support the use of assistive technology in their organisations. This reduction in support again provided a driver for the development of a course to prepare people to be educational assistive technologists, as so many formal and informal development opportunities for those supporting assistive technology are no longer available thanks to the losses of the support bodies noted above. All of these organisations no longer exist, due to the 'project' or short-term nature of the service funding, and the resulting 'gap' in support is clear to those who have worked in the AT and education sectors for some time. Indeed, in the early part of the first authors career the support provided by these organisations had a significant impact on individual and organisational AT practice development. It can be argued that as a result of these losses the AT sector has seen a 'generational gap' where younger practitioners have not been identified, supported and developed in their assistive technology related careers. Indeed the losses in AT support also extend to the reduction in specialist advisory teachers in some local authorities.

The National Centre for Assistive Technology that was proposed as part of the now defunct National Strategy for Disabled people (Disability Unit, 2022a; McLaren, 2021), or something like it, may be included in a future iteration of the Disability Action Plan (Disability Unit, 2022b), which has effectively replaced the National Strategy for Disabled People. It is possible that should the National Centre for Assistive Technology, or equivalent entity, become a service delivery organisation that this could provide the context for a national, UK-wide, pan-sector AT support body.

Today there are very few places for people who support AT in education and beyond to go for AT support, other than potentially the AT suppliers. This is not optimum as many suppliers do not have a sufficient account management or training function to practically support a large number of enquiries, also some may have an assumed or actual proclivity to promote their products over products that may be more suitable for a given individual or group of users.

The first author has advocated for the support of the Natspec TechAbility service, which is part funded by the Karten Trust ^[10,12,13]. In part, the creation of the Natspec TechAbility

service was advocated for due to the losses outlined above. Without a national support body for assistive technology it is very much more difficult for AT efforts to be nationally coordinated and supported. It is also difficult for policy makers to understand the 'situation on the ground' and to make good (evidence based) decisions about future AT related policy. It is suggested that the proposed AT support body could have service delivery, advice and guidance and national coordinating functions. This would enable those who are actively supporting AT users and colleagues across the various parts of the UK to provide useful feedback to ensure that policy makers and decision makers within the civil service at all levels could obtain useful intelligence with which to aid future decision making and service delivery.

Potential solutions to the problems of both professionalising AT and coordinating support for AT efforts?

We believe that in order for AT to reach it's potential in the UK a number of things must happen simultaneously:

1. Ringfenced funding support is required for training, at all levels and not just for professional level courses such as MSc EduAT. Support must include entry level and intermediate continuing professional development (CPD) courses.
2. Once people are trained, they must have AT roles to move into. It is important therefore to support ringfenced funding for AT specialist posts in a variety of contexts. This can include specialist colleges and special schools, general further education colleges and universities, as well as various social care and third sector contexts. Such contexts have the funding models and localised demand for AT to create specialist roles. In mainstream primary and secondary schools, and other smaller contexts, access to a AT specialist must, for reasons of economics or scale be shared over multiple sites. In the education sector, this could perhaps be done within a Multi-Academy Trust or within a Local Education Authority. In other sectors other regionally defined structures would be required.
3. Thirdly, a national pan-sector (education, social care, health and other contexts) AT support organisation is required to support both specialists and people in other roles in a coherent way. Currently there are very few organisations for those working to support AT users to go for professional support themselves. Such a body has not existed cross-sector previously.

Without the above three actions taking place simultaneously or near to simultaneously it is suggested that it will be difficult to reverse the decline of available AT related support nationally in the UK that has taken place over the last decade and previously.

<a>A research agenda for AT

The Dundee AT/AAC Research Group has a long history of innovative AAC, AT and user centred computing research (See Waller, 2019). The group plans to develop new projects as well as renewing some of the group's previous technology projects by developing research into replicable and scalable 'products' that the community may benefit from. Some of those

new projects will be drawn from our experience of developing the MSc EduAT. The collective experience of the programme team has brought us to the conclusion that supporting the professionalisation of the assistive technologist role would be useful. We developed the MSc EduAT in order to provide such a professionalisation route. The direct experience of developing and delivering the MSc EduAT and critically the experience gained through supporting our students have also led us to propose the development of three new research projects that are designed to address the challenges that have been further elucidated by this professionalisation effort. Perhaps most importantly each proposal is directly informed by the professionalisation effort. To put it another way the proposals are designed to address problems that the programme team and our students are experiencing in the development and delivery of AT services in the UK context.

** Proposal 1: Identifying the social return on investment (SROI) generated by specialist AT roles**

This proposal is perhaps the most important, as it is focussed on evidencing the impact of dedicated AT roles by investigating the social return on investment gained by society, AT providing or supporting organisations and critically the people who these organisations support to use assistive technology. This project can be summarised as an interdisciplinary social return on investment project, aiming to inform evidence-based policy making. It is acknowledged that in the UK context any incoming government drawn from any political parties will be facing difficult decisions on what to support with a limited resource. Any calls to support dedicated funding for AT posts and training will need to be backed up with evidence of efficacy to be taken seriously. There may also be opportunities to support the development of a service delivery organisation, to both learn from previous efforts and build upon them.

This project has been designed to address the need to evidence the impact of specialist assistive technology roles such as the assistive technologist. In recent years there have been a number of AT related policy developments that for various reasons have not come to fruition. The development of the proposed National Centre for Assistive Technology, as discussed in the now defunct National Disability Strategy has apparently stalled. This development has not yet been included in the replacement National Disability Action Plan. However there remains a focus from government in the National Disability Action Plan on joining up efforts across departments to support disabled people.

This proposed project would support the increased prioritisation for AT development that has been in evidence in various government departments and organisations that support disabled people. Examples of improved join-up include the Department for Education's Assistive Technology training pilots (Department for Education, 2022), which aimed to develop the AT skills of teachers and other staff in mainstream schools and the Department for Work and Pensions Access to Work Passports (Department for Work and Pensions, 2021), which aimed to bridge the transition from University and College focussed Disabled Student Allowance and employment.

The proposed research would focus on what the SROI (social return on investment) is, when specialist AT roles such as the Assistive Technologist are introduced to an organisation such

as a school, college, university, or other research context. This project can consider quantitative data such as destinations, achievement rates and where possible exam or course pass rates. In addition there is value in specific stories or case studies as they can bring a richness to the lived experience of individuals, it is acknowledged that it will be important not to represent these stories as data. This project will aim to understand the difference that the assistive technologist role makes to organisations, teams, and individuals, in terms of changed student outcomes, destination data etc. It may be useful to undertake a medium to long term project looking at the impact of the assistive technologist role on organisations in order to ensure that changes are sustained, and subsequent policy proposals can be evidenced appropriately.

It is thought to be helpful to clearly evidence the impact of AT roles, as it will be difficult to validate further investment in training, ringfenced funding for organisations to resource AT posts and for support around the creation of a national AT support organisation. The latter could underpin all related activity and link what is happening 'on the ground' to enable decision makers to be clearly informed. Note the clear links here to two of the recommendations made by (Edyburn, 2020) regarding AT Training for specialists and connecting AT input to AT outcomes.

This work will be interdisciplinary, therefore, beyond computing/assistive technology researchers, this project can involve colleagues within:

1. *Education*: Many of those in an AT role work in education contexts. We plan to consider if changes / improvements to educational outcomes as a result of high-quality AT assessment, provisioning and ongoing support might lead on to improved achievement rates, destinations, inclusive of further study, and ultimately employment and resulting economic activity. This would be a medium to long term (possibly longitudinal) study and can also consider historical data where this exists.
2. *Health and social care*: A health economist could help calculate potential savings. For example, when a person with physical disabilities is taught or trained to use environmental controls and other assistive technology, how does this potentially impact on their lifetime cost of care? This must be approached with caution, to avoid ethical concerns such as social isolation or other risks of harm, should human support be inappropriately replaced with technology.
3. *Humanities/Social Science*: Informed access to research methods from Anthropology such as ethnographic survey, can provide the richer human case studies / stories of how high-quality assistive technology assessment, provisioning and ongoing support has had an impact on an individual or group.

The proposed project is informed by work to professionalise the assistive technologist role as we know that organisations find it difficult to fund both assistive technologist roles and the training such post holders require. Through undertaking this project it will be possible to elucidate the impact such roles have in order to support the case for ringfenced funding for AT posts, AT training and ultimately a pan-sectoral support body that can underpin all AT work nationally.

Proposal 2: AT assessment tool development.

We propose the building of a web-based AT Assessment (ATA) software tool to support suitably qualified and experienced staff to undertake high quality needs-based assessment. It is not intended to replace people with AT skills, rather to support them. Based on feedback from MSc EduAT students, undertaking AT assessment is an area that they need support to develop. By having a branching logic underpinning the assessment tool it will be possible to support the assessment process through the inclusion of prompt questions that will support decision making. The documentation of assessment and the creation of support documentation could be partially automated, as this is another area that EduAT students have identified as difficult with some describing that they do not have formalised AT assessment policies, procedures or documentation in place. Such an effort would reduce the need for each organisation to 'reinvent the wheel', in order to put a formal assessment process in place. The tool could scale with the complexity of the assessment and could point to statutory assessment routes where relevant. In this way developing professionals could be supported to access expert support.

The aim is for the same tool to be useful for assessments undertaken at multiple educational stages, levels, ages, transition points, and for it to output useful reporting and guidance materials (e.g. AT or AAC passports), or training and support materials for staff members who will be setting up or preparing AT equipment or software for the AT user. The aims of creating an ATA tool can include:

1. Reducing abandonment of AT.
2. Being genuinely person centred, including prioritisation of what the user wants to do (first!).
3. Reducing administrative burden on assistive technologists and the organisations that they work within.

Being genuinely person-centred is extremely important with respect to reducing AT abandonment. Any tool must start from the user's requirement and work from there, in order for user acceptance to be paramount. The expectation is that this ATA tool will also include a knowledge base of available AT, this will be a significant undertaking to create in the first instance and would also need to be regularly updated to continue to be useful. Early answers or selections in the ATA tool will inform the path through a branching tree logic diagram, Informing the proposed methods of a given AT assessment, and the tools suggested for trial. It is a high priority for the tool to be used to bridge 'transition stages' (school to college, college to university, school or college to work etc.). The reason for this is to reduce the time spent repeating previous steps, this will save both the AT users time, and will give the AT assessor intelligence so that their new work may be informed by any previous work.

It would be helpful to include a 'log' for the staff team undertaking the ATA and should outputs also include training or setup materials for those supporting the user, this will save significant time as such documentation would not need to constantly be re-created, thereby also reducing some of the opportunity for abandonment if the staff team around the user are able to support the technology in an informed way. As a consequence of creating a

knowledge base of available AT systems there may also be some additional opportunities to standardise how accessibility information is presented for each tool. It is critical that the development of this tool be informed by disabled peoples experiences, to this end it is proposed that all development be co-produced or better yet co-investigated by disabled people.

Proposal 3: Developing and AT Framework and discovery tool

The Educational Assistive Technologist is not the only post that supports the use of assistive technology, indeed part of the vision for the EduAT role is to train the trainer. Many other members of staff in various organisations require a level of knowledge around AT, and they require training. Not every organisation that provides AT support needs or can afford to employ a specialist assistive technologist. The EduAT programme team do not believe that all those working to support AT require a masters level qualification. The EduAT programme team, members of the advisory group and students have identified that it can be difficult to find the right course to meet a specific need.

Our third proposal focuses on improving the discoverability of AT resources and training through the design of an AT training framework that identifies what training is needed by people in a range of roles, in different organisational contexts and at different stages of their AT journey. We propose that this can be achieved by developing a web-based tool that catalogues all of the AT training and resources available within commercial, education, health and social care contexts. The web based AT training and resource discovery tool would require some scaffolding to ensure that useful courses and resources were presented to people who are working in various roles in different types of organisations and at various stages of their AT learning journey. To that end the development of an AT framework is proposed. It could be based on the existing AAC specific IPAACKS (NHS Education for Scotland, 2014) tool, but would need to be broader in terms of the types of AT covered and the levels of awareness or competences. This would require the inclusion of an additional level 0 'awareness raising' level (i.e. below the Level 1 in the current framework). The available AT training and resources would be stored in a database and can be mapped onto this framework, using simple metadata to identify for whom they may be useful. The process by which existing courses are identified and catalogued with metadata to enable them to be selected by the web-based tool's system logic would also enable training gaps to be identified, enabling future AT training course development to be targeted in an informed way.

The proposed web-based tool would ask simple questions, including: where do you work, what is your role and what is your AT awareness / learning level? The output from this would be a proposed pathway, with links to the various training options and resources offered by various organisations. In this way the web tool could be used by colleagues from a variety of organisations to support the discoverability of AT resources and training at multiple levels. This project would output the AT training framework, the web based AT training and resource discovery tool and an analysis of where the gaps in training provision might be.

<a>Conclusions

This chapter has aimed to consider how the experience of the EduAT programme team, our advisory group and the input of our three cohorts of students gained through the development and delivery of the MSc EduAT has informed our AT research agenda. We have described how and why we built the MSc EduAT. We have reflected on what we have learned from our students as we have developed and delivered the sole assistive technology focussed MSc in the UK. Finally we have gone on to discuss what research may be required in order to support future development of high-quality assistive technology service delivery.

It is concluded that support for training alone is not enough, this must be supported by funding for posts in organisations that assess for, provide and support AT. The assistive technologist post holders and many other professionals who also support AT users can be effectively aided by a national, pan-sector assistive technology support body. Should these elements be enacted together it is possible for the entire enterprise to be more effective.

In order to make the case for these interventions at a policy level, it is essential that the underpinning assistive technology research is developed. By evidencing the impact of the assistive technologist role and other similar AT specialist roles through the proposed social return on investment project we can help build the evidence base. This work supports policy development that can improve funding for specialist AT posts and the training that such posts require. This work can provide the due diligence or assurances to decision makers that such an investment will have a useful impact on the quality of life, and positive life outcomes for all of the disabled people who might benefit from assistive technology. It will not be possible to provide such evidence without conducting research to demonstrate the impact of the AT role, to show the social return on investment. By developing transdisciplinary research methods, quality assurance and service improvement methods and metrics, the impact of the transdisciplinary assistive technology role can be quantified. We propose that by equipping Assistive Technologists with an AT assessment tool that they will be supported to undertake high quality person centred AT assessments. Assessments that are focussed on what the AT user wishes to achieve may support a reduction in AT abandonment, hence the proposal to develop a supportive AT assessment tool. In order to develop the AT skills, knowledge and practice a range of professionals, in a variety of organisations, who are at different stages of their AT journey we propose the development of a AT training framework onto which available AT training opportunities can be mapped. Having done this, it will be useful to create a web-based tool to render such training discoverable and to present it in a way that is highly relevant to the user of the tool. Additionally the act of creating the framework and the discovery tool will illuminate gaps in provision.

Our proposals to undertake this work is borne out of our professional experience and our recent focus on the development and delivery of the MSc EduAT. This work has been closely informed by the experience of AT users, our students and colleagues. We would like to work together collegiately with colleagues from the UK and beyond to realise this proposed work for the advantage of everyone who can benefit from assistive technology. We encourage users of assistive technology, disabled people, academic colleagues, postgraduate students and researchers, professionals working in education, health, social care and beyond to

support this effort. The EduAT programme team welcomes contact from any interested persons to constructively comment on, improve or extend our proposals. By conducting practically focussed outcome driven co-designed or better yet co-investigated research that is driven by AT users and disabled peoples experiences we can ensure that the potential of assistive technology is realised for everyone who can benefit.

<a> Notes

- [1] Rehabilitation Engineering and Assistive Technology Society of North America: Get Certified: <https://www.resna.org/Certification>
- [2] Dundee University User Centre: <https://aac.dundee.ac.uk/user-centre/>
- [3] All-Party Parliamentary Group for Assistive Technology, Policy Connect: <https://www.policyconnect.org.uk/appgat>
- [4] Rehabilitation Engineering and Assistive Technologies MSc: <https://www.ucl.ac.uk/prospective-students/graduate/taught-degrees/rehabilitation-engineering-and-assistive-technologies-msc>
- [5] Natspec is a UK membership association for organisations that offer specialist further education and training for students with learning difficulties and/or disabilities aged 16 to 25: <https://natspec.org.uk/>
- [6] Beaumont College: <https://www.beaumontcollege.ac.uk/>
- [7] College Development Network: <https://www.cdn.ac.uk/>
- [8] Care Quality Commission: <https://www.cqc.org.uk/>
- [9] Ofsted: <https://www.gov.uk/government/organisations/ofsted>
- [10] TechAbility: <https://www.techability.org.uk/>
- [11] Jisc <https://www.jisc.ac.uk/>
- [12] Karten Trust: <https://iankartencharitabletrust.org.uk/>
- [13] Note that the author is a trustee of the Karten Network, which is related to the Karten charity, and therefore declares an interest.

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