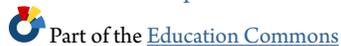2011

Assistive technology: effects of training on education assistants' perceptions of themselves as users and facilitators of assistive technology and consequent transfer of skills to the classroom environment

Dianne J. Chambers
University of Notre Dame Australia

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Introduction

The purpose of this research was to investigate Education Assistants Special Needs' (EASN's) perceptions of themselves as users and facilitators of AT in the classroom and to examine how skills learnt in a training situation might transfer into a classroom setting. In order to situate the study within the context of existing research a literature review has been undertaken. The following literature review will identify what is already known about AT use and EASN and will identify areas where further research is required, including the area under consideration in this study.

2.2. Conceptual Framework

The literature review provides information on the critical areas related to the research, including the theory which underpins the research. The core areas relevant to the study are inclusion, Education Assistants Special Needs (EASN), assistive technology, learning theory and attitude theory. Within these core areas, sub-themes have been identified including defining inclusion, impacts of inclusion, the current context of inclusion, the role and responsibilities of EASN, training for EASN, EASN's perceptions of personal efficacy, defining assistive technology, examining the use of AT in the classroom, social cognitive theory, self-efficacy theory, transfer of learning theory and attitudinal theory. These areas of literature inform the research and assist in exploring views on EASN, AT and training. The areas of literature examined are displayed via a Conceptual Framework (Figure 2.1).
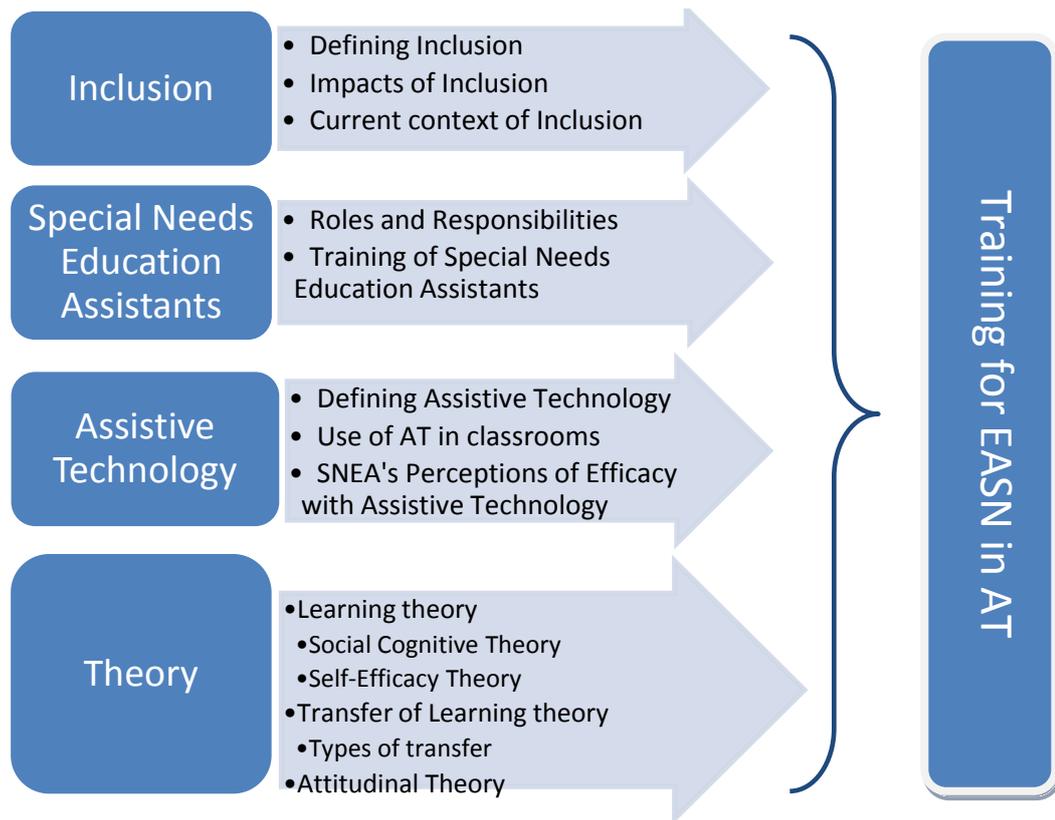
Figure 2.1. Conceptual Framework

2.3 Inclusion

2.3.1 Defining Inclusion.

Over the last 50 years, the conceptualisation of appropriate educational situations for children with special educational needs has moved from Wolfensberger's (1972) principle of normalisation, where the prevention or reversal of deviancy was seen to be a key goal, through concepts of integration to inclusion (Anderson, Klassen & Georgiou, 2007; Westwood, 2010). Bank-Mikkelsen (1969, cited in Wolfensberger, 1972) described normalisation as a process of ensuring that

people with disabilities (particularly those with an intellectual disability) live a life as close to 'normal' as possible. Integration (sometimes known as mainstreaming) was closely aligned with a more accepting view of people with disabilities and often involved the placement of students with disabilities into regular classes. These students, however, were often not fully included in the life of the classroom, accessing a different, often very basic curriculum, and being excluded from participating in all the activities of the classroom (Foreman, 2008; Graham & Slee, 2008). Giangreco, Yuan, McKenzie, Cameron and Fialca (2005) refer to students who have been placed in the regular class, but who are not fully included as being 'islands in the mainstream', referring to the academic and social isolation that exists for some of these students.

Inclusion is a more encompassing term than integration and refers to "…providing all groups of students, irrespective of educational setting, [with] access to a wide and empowering range of knowledge, skills and values" (Curriculum Council, 1998, p. 17). It is a broad concept and "reflects a major shift in the beliefs and practices of educational communities regarding the provision of services for all students" (Department of Education and Training, 2004, p. 29). The inclusion of children with disabilities into regular education settings has been an ongoing initiative in the Department of Education in Western Australia (Department of Education and Training, 2007). The concept of inclusive practice is embedded in the Curriculum Framework (Curriculum Council, 1998) utilised by all schools in Western Australia as "inclusive practice is … a mindset or a worldview that permits inclusivity to be realised" (Berlach & Chambers, 2010, p. 3). Foreman (2008), states

that inclusion is a concept that goes beyond students with a disability and that all schools should be including all students regardless of background or ability.

A review of services for students with disabilities, titled "*Pathways to the Future: A Report on the Review of Educational Services for Students with Disabilities in Government Schools*" (Department of Education and Training, 2004a), found that 3 – 4 % of the students in schools in Western Australia had identified disabilities. The term 'disabilities', according to the government school sector's resource allocation arm, SchoolsPlus, refers to students who have been identified as having Global Developmental Delay, an Intellectual Disability, an Autism Spectrum Disorder, a Vision Impairment, who are Deaf or Hard of Hearing, a Severe Mental Disorder, a Physical Disability or a Severe Medical/Health condition (Department of Education and Training, 2006).   Many students with a disability in these areas attend regular local schools with appropriate support provided. Regular schools are those in which students with and without disabilities are enrolled, with the majority of students not having identified disabilities. These are generally schools within the student's local intake area, being close to their current residence.

The impetus for inclusion has been underpinned by policy and legislation, both locally and internationally. This legislation has been driven by an increased emphasis on aspects of social justice and understanding of diversity in the educational sector. The *Salamanca Statement and Framework for Action on Special Education Needs* (UNESCO, 1994) focused on the inclusion of students with special needs in school settings alongside their peers. The statement was highly influential

world-wide (Rose & Forlin, 2010) and included reference to the design of educational programs and pedagogy that was capable of meeting the needs of all students. These programs, it was felt, would act to combat discriminatory attitudes towards those who may be perceived as being different, and to create welcoming communities that will lead to an inclusive and well educated society (Berlach & Chambers, 2011). UNESCO (2005) subsequently produced a document which provided support for the principles of inclusion which was titled *Guidelines for Inclusion: Ensuring Access to Education for All* and broadened the inclusive education movement to encompass all students, not just those with a disability. These guidelines (UNESCO, 2005, pp. 15-16) describe four main elements of inclusion: a) that inclusion is a process; b) that inclusion is concerned with the identification and removal of barriers; c) the presence, participation and achievement of all students is important; and d) access should be given to those who are highly marginalised or excluded for any reason.

The *Education for All Handicapped Children Act* (Library of Congress, 1975) was early legislation introduced in the United States of America to ensure that all students with special needs received access to education. The Act did not specify where or how this education was delivered, only that it should be available. More current legislation, *Individuals with Disabilities Education Act* [IDEA] in 1990 (Library of Congress, 2004) and the re-authorisation of this legislation in 2004, has refined the previous requirements and now includes reference to the type of education and the quality of education that should be available. The current legislation is also more prescriptive in terms of the responsibilities of educators to ensure that they have catered effectively for all students with disabilities. For

example, there is a mandated requirement for individualised planning and consideration of a least restrictive environment (i.e. the environment that has the widest range of choice for the individual) embedded within the legislation. As a result of the legislation, students with disabilities are increasingly being included in regular settings.

Legislation relating to inclusion in Australia consists of both state and federal legislation. Nationally, the *Disability Discrimination Act* [DDA] (Commonwealth of Australia, 1992) states that students with disabilities should have access to an appropriate education. In order to clarify the responsibilities of education service providers under the DDA, a set of standards have been developed. The *Disability Standards for Education 2005* (Commonwealth of Australia, 2005) provide education service providers at all levels of education (Early Childhood, Primary, Secondary and Tertiary) with specific information on their responsibilities in regards to providing appropriate educational experiences for students with disabilities. The standards "provide a framework to ensure that students with disability are able to access and participate in education on the same basis as other students" (Commonwealth of Australia, 2005, p. iii). Included are standards for enrolment, participation, curriculum development and delivery, student support services and harassment and victimisation. The *Disability Standards for Education 2005* also define a number of key terms that educators need to be familiar with including, 'on the same basis', 'reasonable adjustments', and 'unjustifiable hardship'. The standards are still being absorbed into the culture of schools, and it may be some years yet before the full impact of the standards are felt (Berlach & Chambers, 2010).

Each state education provider within Australia has specific policies and state-based legislation that relate to the principles of inclusion and catering for students with special educational needs (Forbes, 2007). Sometimes the policy and legislation is couched in terms of diversity and covers a wide range of minority groups such as those from other cultures and language backgrounds or who may be living in poverty (Berlach & Chambers, 2010). In Western Australia, policy and legislation that relates to including students with disabilities includes the *Equal Opportunity Act 1984*, which states that a person with a disability cannot be discriminated against in work, accommodation or employment in regards to their impairment (Government of Western Australia, 1984), the *School Education Act* (Government of Western Australia, 1999) which provides guidelines for school administrators on the enrolment processes for students with a disability and the *Pathways to the Future: Report of the Review of Educational Services for Students with Disabilities in Government Schools* (Department of Education and Training, 2004a), which clarified the term inclusivity and referred to the principles, resources and supports required to ensure inclusion in schools was successful. The *Pathways to the Future* document included provision for professional development and training for all government school staff on building inclusive schools and inclusive classrooms.

The policies and legislation that have been implemented in Western Australia have impacted on the number of students with a disability being included in regular classrooms. The number of students identified as having a disability has also increased in recent years, with 4326 students enrolled in 2005 (Department of Education and Training, 2006) compared with 7561 students with disabilities enrolled in 2011 (Department of Education, 2011) . Some of the reasons for this

include "greater community awareness of disabilities and better access to diagnosis and treatment; higher survival rates among children born prematurely and among children with profound disabilities; and an increase in the number of recognised disabilities" (Department of Education and Training, 2006, p. 136). With the increase in the number and identification of students with disabilities, and often more complex disabilities, included in regular settings, there is a need for appropriately trained staff to assist these students to reach their full potential (Students with Disabilities Working Group, 2010).

2.3.2 Impacts of Inclusion.

Inclusion can provide benefits not only for students (with and without disabilities), but also for teachers and the wider community (Raschke & Bronson, 1999). Students with special needs who are included in regular settings may be involved in a more stimulating environment than that of a segregated setting. These students are provided with the opportunity to work alongside same-age peers who can act as appropriate behavioural, social and academic role models (Anderson, Klassen & Georgiou, 2007). Through this interaction, students with special needs are more likely to develop friendships within their local area and a stronger sense of belonging to the community. Such interaction and sense of belonging aids in enhancing self-esteem (Raschke & Bronson, 1999). For other students within the classroom, the inclusion of students with disabilities can allow them to experience the diversity that society has to offer and in turn assist them to develop respect and empathy for others, through an appreciation of individual uniqueness (Anderson, Klassen & Georgiou, 2007). Students without disabilities may be empowered to

make a difference to others around them as a result of experience in an inclusive environment.

Teachers in inclusive classrooms may benefit from being immersed in inclusive practice in many ways. These benefits include being able to determine students' strengths as well as weaknesses, an increased appreciation of the diversity of student needs, enhanced collaborative and creative problem solving skills, improved instructional ability and a more balanced school environment (Raschke & Bronson, 1999). As a community, the growth of an inclusive attitude will impact positively and act to promote the rights of all individuals to live as full a life as possible. An inclusive attitude supports equality within the community. The classroom can be seen to be a microcosm of society as a whole, and the closer this is to the 'real-world' the more likely students will be accepting of difference as adults.

In regards to academic achievement, Farrell, Dyson, Polat, Hutcheson and Gallannaugh (2007) conducted a study to determine whether the inclusion of students with special needs had an impact on the language development of all students within the school, not only the students with special needs. They found that there were no significant overall differences between schools which had a well developed inclusive culture and those who were substantially less inclusive in nature. From this finding they concluded that some of the extreme concerns raised about the impact of including students with special needs in regular schools on the achievement level of peers were unfounded. Students who are having difficulty in school (but who not been identified as having special educational needs) who have been educated alongside peers with identified special educational needs have been

found to perform better academically than students who were not educated with peers with disabilities (Huber, Rosenfeld, & Fiorello, 2001). Huber, Rosenfeld and Fiorello (2001) completed a three-year longitudinal study focusing on academic achievement of general education students in inclusive settings and found that the reading scores of students without disabilities were not impacted by inclusive education. These findings support that the inclusion of students with special needs is not detrimental to the educational progress of other students within the classroom.

      While there are many benefits to inclusion, several cautions need to be considered. Forbes (2007) stresses that inclusion as a process, rather than a place, needs to be carefully considered and that some of the difficulties in implementing inclusive practice should be addressed. She feels that moving students from a specialised setting to a regular setting will result in the staff from the specialised settings being lost to the school system. The knowledge of the professionals associated with these specialised settings will therefore diminish and be lost over time. Concomitantly, the concern is that regular classroom teachers do not have sufficient skills, knowledge and time to be able to assume responsibility for students with disabilities within regular classrooms, without extra support. The willingness of the teacher to utilise inclusive practice is an also important factor in the success of inclusion (Anderson, Klassen & Georgiou, 2007). Lieberman, James and Ludwa (2004) suggested that "quality inclusion produces benefits for all students, but inclusion can also produce negative effects if mishandled. The difference depends to a great extent on the environment the teacher creates" (p. 37).

Inclusion has been most widely accepted for students with physical and sensory impairments, such as vision and hearing impairments (Elkins, 2009). Reasons for this may include a greater knowledge of these disabilities by the staff, and the application of appropriate resources to support these students. Some students with disabilities who require more of a specialist approach, such as those relating to emotional and behavioural disorders and severe health or intellectual disabilities, may not be as readily accepted in regular settings (Clough & Nutbrown, 2004). Clough and Nutbrown (2004) found that there was a sound "capacity of mainstream schools to meet the needs of children with various difficulties though this was often dependent on the 'type' and 'severity' of those difficulties" (p. 197).

Elkins (2009) suggested that in order for inclusion to move forward in Australian schools, education authorities need to ensure that curriculum is modified appropriately, teachers take responsibility for students with special needs, effective school policies are developed and positive attitudes towards disability are encouraged. For these factors to be adequately addressed, all of the adults who work with the students with disabilities, including EASN, should have sufficient knowledge and skills to cater for a diverse range of student needs and abilities. Anderson, Klassen and Georgiou (2007) found that teachers cited the use of EASN as a key form of support that was necessary in a regular classroom to ensure that inclusion of students with disabilities was optimised for all parties.

2.3.3 Current Context of Inclusion.

Several researchers (Anderson, Klassen & Georgiou, 2007; Gessler Werts, Harris, Young Tillery & Roark, 2004) cite evidence to show that assistance in the

regular classroom is essential to the success of inclusion for students with special needs. When examining inclusion in the Western Australian context, this assistance is generally provided in the form of visiting support services (i.e. Centre for Inclusive Schooling, Vision Impairment Services, Western Australian Institute for the Deaf), School Psychologists, extra training for the teacher and, when deemed necessary, the provision of an Education Assistants Special Needs (EASN) to support the work of the teacher. In some countries the use of an EASN (or equivalent) is legally mandated to ensure that inclusion is more likely to be successful (Takala, 2007). This is not yet the case in Western Australia, although the implementation of the *Disability Standards for Education* (2005) gives much impetus to the need to use other adults to appropriately support students with special needs.

In 2002 the Department of Education and Training in Western Australia instigated a system-wide policy initiative in regards to inclusion. The first and second phases of this initiative were titled 'Building Inclusive Schools' (Department of Education, 2002d) and focused on implementing the policy at a system and district level (Anderson, Klassen & Georgiou, 2007). The third phase was titled 'Building Inclusive Classrooms' (Department of Education and Training, 2003) and focused on professional learning for teachers in regards to the theory behind the policy initiative and how to develop more inclusive classrooms.

The professional learning component of the policy, Building Inclusive Classrooms, was achieved through the development and dissemination of five learning modules, each focusing on a particular inclusive aspect (Department of

Education and Training, 2003). Module 1 examined inclusive education, what that meant for teachers and the theory underpinning inclusive education. Module 2 examined policy and legislation that was currently in place to support inclusive practice. Module 3 focused on building strong collaborative communities and examined the teacher's role as a change leader. Module 4 required teachers to examine their own beliefs and practices in regards to inclusion and consider what was required for the future. Module 5 was concerned with working in harmony and focused on the diversity of school staff and what is required to ensure that everyone is respected and included. Taken together, these modules form the basis of an in-depth examination of inclusion, particularly in reference to the individual environments of the teachers.

As well as the system-wide initiative promoting inclusion, a review of services for children with disabilities was completed in 2004. From the review a *10 Point Action Plan* (Department of Education and Training, 2004b) was developed which made "…recommendations that address culture, decision making, provision of resources and effective teaching and learning" (p. 3). The recommendations made include providing additional support for students with disabilities and difficulties, introducing a Learning Support Coordinator role in schools, designing appropriate new facilities, improved information and support materials for teachers and parents, more effective state-wide specialist support services, appropriate allocation of resources, clearly defined standards of practice (including clear policies and procedures), and appropriate processes to monitor the implementation of these recommendations.

In addition to these recommendations, and of particular relevance to this study, the Action Plan also incorporated reference to the use of technology and training. Point 4 of the plan states the specific goal of "improved technology support for students with disabilities and diverse learning needs" (Department of Education and Training, 2004b, p. 1). Improving technology support for students requires an increased budget in the area of technology and increased support to schools provided by technology teams. Point 5 requires that there should be enhanced skills and values education for both teachers and education assistants. Improving skills and knowledge requires the provision of professional learning and a framework in which this learning will take place.

The Department of Education has subsequently developed a *Competency Framework for Education Assistants (Special Needs)* which details practice and professional criteria that are considered to be necessary to perform the tasks required of the EASN, in the current context of inclusion (Department of Education and Training, 2008). The competency framework was developed jointly with EASN and policy makers, and allows EASN to consider their effectiveness in a professional capacity, to identify areas for professional growth and professional development and to reflect on career development. The framework provides guidelines for line managers and administrators regarding performance management and identifying training opportunities, and also allows common understanding and discussion to develop between all stakeholders.

The framework explicitly details the requirements of the EASN to work with AT as part of dimension 6 – Administrative tasks and managing resources

31

(Department of Education and Training, 2008). As a result of the competency framework, EASN now have a clearer indication of their roles and responsibilities within the classroom and the extent of knowledge and skills that are required to be attained in order to be considered effective. The development of the competency framework also has implications for the professional development opportunities that must be made available to EASN to ensure that they have the best possible chance to gain needed skills and knowledge.

2.4 Education Assistants Special Needs (EASN)

2.4.1 Roles and Responsibilities of the Education Assistants Special Needs.

'Education Assistants Special Needs' (EASN) is a term used in Western Australia to describe an adult in the classroom who assists the teacher in implementing the educational program of that classroom. EASN are often employed to assist children with special learning needs to access the curriculum and the social environment in the classroom (Broadbent & Burgess, 2003; Takala, 2007). Education Assistants are known by a variety of synonymous terms such as teacher assistant, teacher aide, learning support assistant, classroom assistant, para-educator, paraprofessional or special needs assistant (Carter, O'Rourke, Sisco & Pelsue, 2009; Giangreco, Suter, & Doyle, 2010). For the purpose of this study the term Education Assistants Special Needs (EASN) will be used in the text, as it the term favoured by the Department of Education in Western Australia, with whom the cohort under

investigation were employed. A wide range of search terms were used to locate relevant literature in this area and incorporated all terms (previously mentioned) that may be used to describe Educational Assistants Special Needs.

The number of EASN employed in regular classroom settings has been increasing over the last two decades (Department for Education and Skills, 2003; Ghere & York-Barr, 2007; McKenzie & Lewis, 2008; Rose & Forlin, 2010). Indeed, "in some schools they already outnumber teachers" (Kerry, 2005, p. 374). Giangreco, Smith and Pinckney (2006) have noted an increase in the ratio of EASN to students with disabilities in the state of Vermont (US) from 1:10 in 1990 to 1:4 in 2005. This correlates with a 300% increase in the numbers of EASN in the Vermont district (Suter & Giangreco, 2009). Swann et al. (cited by Hancock & Eyres, 2004) discuss the increase in staff numbers in schools in England from 1992 to 2000 as being 3.3% for teachers and 111% for support staff (mainly education assistants). Hancock and Eyres (2004) suggested that the EASN employed to assist students who may be at risk of academic failure have responsibility for the remedial education of up to 25% of students in British schools. This increase in the number of EASN is partly due to the growing inclusion of students with disabilities into these settings, but may have also been compounded by a shortage of qualified special education teachers and an increasing requirement of teachers to complete large quantities of administrative tasks, including paperwork (Lee, 2003; McGarvey, Marriott, Morgan & Abbott, 1996). Many other countries have also experienced a substantial increase in the number of education assistants employed in both regular and segregated settings, including Finland, the US and Australia (Broadbent & Burgess, 2003; Takala, 2007).

Legal requirements in the USA, UK and Australia have influenced the increased use of classroom support to assist teachers to cater effectively for students with disabilities. In the USA, the main legislation in regards to the provision for students with disabilities is the *Individuals with Disabilities Education Improvement Act* (United States Congress, 2004), while in the UK the *Every Child Matters: Change for Children* policy (Department for Education and Skills, 2004) is of key importance. Legislation has impacted on the use of EASN in Western Australian schools, as they are often seen as the best way to accommodate children who are having difficulty in the regular setting (Giangreco, Smith & Pinckney, 2006). In particular the *Disability Standards for Education 2005* (Commonwealth of Australia, 2005) require that a student with special learning needs be provided for in the areas of participation, curriculum and student support. This provision may entail the use of the EASN in order to meet these requirements.

Some researchers feel that the increased use of EASN to support the students with special needs in a regular classroom can potentially have unintended or even negative effects (Causton-Theoharis & Malmgren, 2005; Giangreco, 2003; Giangreco & Broer, 2005; Giangreco, Smith & Pinckney, 2006). These effects may include a loss of social interaction for the individual student, an over-dependence on adults, and lack of access for the student to appropriately trained teachers. This may be due to teachers leaving the education of the student with special needs in the hands of the EASN. Giangreco, Smith and Pinckney (2006) stated that this situation should not occur, that the teacher must take responsibility for the educational program of the student, rather than the EASN, and that the inappropriate use of the EASN may be an indicator that the school itself is not functioning well. As EASN

receive further training, there is also the danger that the teacher will relinquish even more of the responsibility for the student, as they feel that the EASN is now able to take on this role (Ghere & York-Barr, 2007; Giangreco, 2003). In some cases, it has been reported that EASN communicate more with parents than the classroom teacher, and often this is without adequate supervision, a role that may not be considered appropriate for an EASN (Giangreco & Broer, 2005). Breton (2010) described a study undertaken with EASN which required them to identify how often they received feedback from the teachers who were supervising them. A large number (39.5%) stated that they never received feedback from the teacher, which is very concerning, particularly if they are involved in delivering complex programs. Appropriate supervision, as well as training, is an important aspect in the utilisation of the EASN in the classroom, and is an element that Giangreco, Smith and Pinckney (2006) feel has not been adequately addressed.

Retention of EASN in a school is an issue that has been raised in regards to the ability of schools to ensure program continuity and to be cost effective (Ghere & York-Barr, 2007; Giangreco & Broer, 2005; Giangreco, Suter & Doyle, 2010). With EASN now being seen as a vital part of the inclusion of students with special needs, it is also necessary to consider how they are best managed within the school. Ghere and York-Barr (2007) stated that the turnover of EASN in a school has a large impact in many areas. Where the EASN play a substantial role in supporting inclusive programs, loss of effective and experienced staff can impact on the costs and time involved in managing these programs. Giangreco, Suter and Doyle (2010, p. 44) suggested that "…turnover can adversely affect students' educational programs and have a disruptive effect on relationships among team members as

well". In turn, a loss of experienced staff may impact on the district and state level implications for the continuing input into the programs being run. One of the reasons posited for the turnover of EASN is the poor clarification of roles and responsibilities at the initial employment phase. Inadequate understanding of the role may lead some EASN to become discouraged about training and career prospects, and cause them to seek alternative employment.

Often there is confusion over the role of the EASN in the classroom and this can lead to a lack of understanding of responsibilities and approaches that are required (Broadbent & Burgess, 2003; Collins & Simco, 2006; Dew-Hughes, Brayton & Blandford, 1998; Moran & Abbott, 2002). The roles of EASN have evolved over time from that of the general assistant to the teacher to one of greater responsibility and management in the classroom (Fox, 1998; Groom, 2006; Moran & Abbott, 2002; Takala, 2007). Whereas EASN may have previously taken a peripheral role in the classroom, they are now more likely to be substantially involved in the educational program of an individual child, small group of children, or on occasion, a whole class. Rather than one EASN working with one student, it is now seen as being more beneficial (both academically and socially) for the EASN to facilitate learning and work with a variety of students within the classroom (Giangreco, Smith & Pinckney, 2006; Groom, 2006; Lee, 2003; Moran & Abbott, 2002).

EASN in the regular classroom are experiencing a rapid change in role from that of being an 'extra pair of hands' (Potter & Richardson, 1999) to being an essential part of the instructional team. Where previously the EASN may have been

responsible for such tasks as photocopying, cutting out resources, laminating, and washing paint pots, they now take on roles such as providing instruction, managing behaviour, and even designing curriculum, although there is some dispute about the ability and/or suitability of the EASN to perform these functions (Giangreco, Smith & Pinckney, 2006; Giangreco & Broer, 2005; Hancock & Eyres, 2004; Kerry, 2005; Lee, 2003; Potter & Richardson, 1999). Giangreco and Broer (2005) suggested that many students with special educational needs are getting their instruction primarily from the EASN. There is therefore a need to ensure that the EASN has appropriate knowledge and skills to adequately cater for the students, and to address the requirements of these changing roles with appropriate training (Butt & Lance, 2005).

Hancock and Eyres (2004) stated that the EASN is almost an invisible member of the school staff. They suggested that EASN have taken on many duties normally associated with a teachers' role, but are more poorly paid, have limited career paths, little job security and training that may be variable, if offered at all. In order to plainly define roles and responsibilities EASN require a clear job description, induction on school policy and procedure, a designated line-manger, and involvement in planning and evaluation meetings (Giangreco & Broer, 2005; Groom, 2006). Mistry, Burton and Brundrett (2004) suggested that appropriate and effective communication and logical line-management structures would improve the situation in many schools. Effective team building practices within the school will enhance the capacity of the school to effectively deploy EASN in an appropriate manner. The more involved in the classroom planning, the greater the ability of the EASN to determine the support that is required by the student or students with whom they are working. For example, if a teacher discusses the day's lessons and the

outcomes that are expected for the lessons prior to the beginning of school each morning, the EASN will have a clear understanding of the expectations of the student/s and their role in ensuring the success of the lesson.

In an attempt to define the role of the EASN, Kerry (2005) created a typology of roles in which the EASN may be involved. These include:

- Dogsbody (menial tasks and little respect from managers)

- Teacher's PA (deals with routine classroom paperwork and runs errands)

- Factotum (versatile role dealing with paperwork and individual instruction)

- Carer/Mentor (concerned with physical or psychological welfare)

- Behaviour Manager (responsible for behavioural support for an individual or group)

- Curriculum Supporter (prepare and revise curriculum materials and plan aspects of curriculum)

Other roles that he identified included a 'ring-fenced operative' (i.e. role requiring specialist training), a specialist (such as a translator who is used for translating, not teaching), a delineated paraprofessional (where teacher and EASN duties are highly compartmentalised), teacher support and substitute (teaching individual and small groups under teacher guidance), and a mobile paraprofessional (a trained person who may teach whole classes under supervision) (Kerry, 2005). Each of these descriptors indicates a different level of task requirement and responsibility for the EASN within the classroom environment.

Of these roles, the ones that, anecdotally, are most commonly identifiable in schools in Western Australia include those of factotum (somebody who does many

jobs), behaviour manager (particularly during recess and lunch time) and a delineated paraprofessional. Some EASN may also relate to the role of the dogsbody, particularly if they have had poor working relationships with teachers. The tasks within a classroom that could possibly be completed by either the EASN or the teacher are those that cause the most role confusion (Calder & Greive, 2004).

Takala (2007) has examined the work undertaken by EASN in mainstream and special education settings. She states that the division of work between teacher and EASN varies considerably and that the content of the work undertaken by the EASN also varied according to the setting in which they were working and the age of the students. EASN working in mainstream settings, for example, were more likely to work directly with the student in a one-on-one capacity, whereas EASN in a special education setting tended to work more closely with the teacher and in a less direct way with the student (Takala, 2007). Similarly, younger students required more direct assistance than older students, and EASN working with older students noted that they spent more time observing and listening to the teacher, than those working with younger students. Some of the skills that teachers have identified as being important for EASN to possess are listening skills, an ability to work unassisted when necessary, an understanding of student needs, adaptability and a willingness to learn and be part of a team (Groom, 2006).

There is often great variation in experience and skills of EASN and this may impact on the role that they undertake in the classroom (Griffin-Shirley & Matlock, 2004; McGarvey, Marriott, Morgan & Abbott, 1996). EASN may also be underused, having talents and skills which are not fully recognised or utilised in the

classroom (Griffin-Shirley & Matlock, 2004; Mistry, Burton & Brundrett, 2004). Occasionally, the teacher can feel overwhelmed by the responsibilities of teaching and will unwittingly leave the EASN to make decisions about the educational program of children with special needs without the EASN having adequate knowledge or skills in the area and without appropriate supervision (Giangreco, 2003). Groom (2006) described some key factors that determine effective collaboration between teachers and EASN. These factors include the schools valuing the work of the EASN, involving EASN in planning and reviewing, opportunities for regular meetings, collaborative opportunities and providing quality professional development. It is important that the EASN is a valued member of the school and classroom as children do not necessarily differentiate between the teacher and the EASN, seeing them both as 'helping adults' (Bowers, 1997; Eyres, Cable, Hancock & Turner, 2004). The EASN can act as a constant in the classroom, particularly if there is a great deal of change of classroom teacher or structure.

Several researchers (Cremin, Thomas & Vincett, 2005; Moran & Abbott, 2002) have referred to models of deployment for EASN in regular classroom settings and the importance of disseminating these models to teachers who may have not previously had to work closely with another adult. Cremin, Thomas and Vincett (2005), for example, discuss the use of three different models to improve and even establish teamwork between teachers and EASN within the classroom and suggest that a structured approach to EASN'S work within a classroom will have beneficial effects for the students. The three models they describe are the room management, zoning and reflective teamwork models. The room management model involves the people in the classroom taking on the role of individual helper, activity manager or

mover. Either the teacher or the EASN can take on any of these roles, depending on the requirements of the classroom. In a zoning model, the room is divided or 'zoned' so that each person has responsibility for a section of the room or for particular groups. The composition of these groups is determined jointly beforehand in regards to the students and their needs. The last model described is that of reflective teamwork. This requires that the teacher and EASN devote at least one 15 minute session per week to reflect on the week and plan ahead for the following week (Cremin, Thomas & Vincett, 2003). Moran and Abbott (2002) stated that when teachers receive training on how to effectively deploy EASN in a classroom environment, that the learning of all students within the classroom will potentially be improved.

While the in-class deployment of EASN is a key consideration in an inclusive classroom, EASN may also be utilised in other ways that do not necessarily involve work in the classroom. Logan and Fieler (2006) described the role of the EASN in linking school and family, and how this can substantially improve the communication between the school and the parents, as well as promoting positive learning practices within the home setting. Giangreco (2003) discusses the use of the EASN in such a way as to increase the instructional time that the teacher spends with the students, as the teacher is generally the more highly trained of the two. One suggestion includes having the EASN take the whole class, and have the teacher work one-on-one with students who require assistance. Once again, much thought needs to be given to the best way to employ the abilities of both teachers and EASN in a specific classroom environment.

In Western Australia, the Department of Education provides for three levels of EASN, with a number of sub-levels within these. A level 1 assistant has the lowest level of qualification and works as a general education assistant, rather than with a specific cohort of students. "Employees at this level work under direct supervision [of the teacher] performing routine tasks which require a basic competency" (Department of Education and Training, 2002a, p. 2). EASN at level 1 are required to assist the teacher in preparing the resources and education programs, caring for the students (including during excursions), preparing food and feeding, administrative support and toileting where necessary. There is little autonomy at this level, although some EASN are given responsibility for teaching small groups or individuals, with supervision.

Level Two EASN are those with greater experience or higher qualifications, or who work with a specific group of students, such as those with language difficulties. "Employees at this level work under general supervision and guidance, performing tasks that require limited discretion and judgement in achieving clearly defined outcomes determined by the teacher" (Department of Education and Training, 2002b, p. 2). At this level, EASN are required to perform the same duties as a level 1 EASN, but may do so under general, rather than direct, teacher guidance. They may also be asked to implement specialised programs, assist in delivery of planned programs, provide feedback on programs, be involved in evaluation processes, assist with communication, collect resources, and (with teacher supervision) give feedback to parents and caregivers.

The level 3 EASN has generally received a qualification in the form of a Certificate 4 Teacher Assistant from a Technical and Further Education institution (TAFE), or a university-run Teacher Assistant course. The Level 3 EASN often works with more challenging students, such as those with significant support needs, or challenging behaviours. "Employees at this level work under limited supervision and may be expected to participate within a team situation, offering advice and expertise relating to their relevant area" (Department of Education and Training, 2002c, p. 2). The level 3 EASN is expected to be able to perform the tasks required of a level 1 and 2 EASN, and may also be required to provide support and advice to teachers on students at risk, design and implement behaviour management programs, maintain records, assist with life-skill training, consult with parents and provide physical restraint (where appropriate).

All EASN working with students with special needs (at level 1, 2 or 3), are required to have knowledge and competence in the area of technology to support learning (Department of Education, 2008). Some of these requirements include the ability to implement programs using computer technologies, using technology to create or modify resources, assisting students with health care or mobility devices, and using and facilitating the use of communication devices. All level 3 EASN require a high level of competency in the "…application of technology to support learning" (Department of Education and Training, 2008, p. 12). This generally includes some type of formalised training in the area of technology and/or assistive technology, to ensure that the appropriate skills and knowledge are developed and maintained by the EASN.

2.4.2 Training of Education Assistants Special Needs.

Education Assistants Special Needs come to the regular classroom with a wide variety of skills, knowledge and training. Some of the EASN have attended formalised training courses for education assistants, either in the area of special education or early childhood education. These are often undertaken at a local university or college and may equate to a Certificate course or even a Diploma course and some EASN may eventually access further training to become qualified teachers (Christie, 2005). These courses range in duration, with some being part time over a six month period, and others over a twelve month period. These initial courses are designed to ensure the EASN have the basic skills and knowledge required to begin working in the role. It is generally assumed that they will access ongoing professional development throughout their careers.

Many EASN currently working within the education system in Western Australia have no recognised qualification, but have accessed formal training courses through the schools at which they are employed. This training, often known as 'on-the-job' training, is generally quite specific in relation to areas in which the EASN is required to provide support (i.e. behaviour management, visual cues, communication) and may have allowed the EASN to have developed a large knowledge base over time (French 2002). A large number of EASN have previously taken on the role as EASN when their own children began formal schooling, particularly as they had little formal training, and were sometimes referred to as 'Mum's Army' (Ainscow, 2000). With the change in roles and responsibilities for EASN, however, this is no longer an apt descriptor.

Although it is recognised that training is a vital element in the efficient use of EASN in the regular classroom, this has often been overlooked by school systems (Cobb, 2007; Giangreco, Smith & Pinckney, 2006; Kerry, 2005; Moran & Abbott, 2002). Giangreco, Suter and Doyle (2010), in a review of research into paraprofessionals in American schools, state that there is still very much a need for training to be both available to EASN, and of adequate quality and that this need is persistent over time. This view is supported by Breton (2010) after research into the training received by EASN over a twelve month period. Approximately 27.5% of the EASN surveyed had received two hours (or less) of training over the 12 months. Even though the schools involved had professional development days set aside, the EASN were generally not paid to attend these days if they were not scheduled to work and therefore often did not access the professional development. Even when they were available to attend, the professional development was often not relevant to the needs of the EASN.

Butt and Lance (2005) surveyed teachers in regards to their perceptions of the training needs of the assistants with whom they worked and 78% reported that the assistants would benefit from more training, while Takala (2007), discusses the practice of placing the least trained person (the EA) with the students with the most demanding needs as being unethical, but widespread. Dew-Hughes, Brayton and Blandford (1998) surveyed 274 EASN in England in regards to the structure of their employment and roles and responsibilities. In-service professional development was cited as an issue that needed to be addressed by education authorities to ensure that the EASN were trained to a high level and so that their professionalism was recognised. In particular, 52% of the EASN surveyed requested that training be

undertaken in the area of information technology (Dew-Hughes, Brayton & Blandford, 1998, p. 181). Griffin-Shirley and Matlock (2004) also surveyed EASN working with students with vision impairments in regards to their descriptions of their jobs, their responsibilities, the training they had received and any further training desired. The training that the EASN thought was most needed, but that was also the most desired by them, was training in assistive technology. It was also suggested that teachers and EASN be trained together so that each was clear about the other's responsibilities.

As EASN can spend a great deal of instructional time assisting students with special needs (up to 50% without a teacher present in some cases), training to ensure that they are able to be as effective as possible is required (Broadbent & Burgess, 2003; Keller, Bucholz & Brady, 2007). Increasing the knowledge of EASN can assist them to increase the instructional time for the student, which has been shown to be an indicator of student success (Groom, 2006; Kennedy, 1999 cited in Giangreco, Smith & Pinckney, 2006). Ghere and York-Barr (2007) found that customised in-service training for Education Assistants, that assisted them to support students with special needs, was vital in order to retain quality staff. It has been shown that when EASN have appropriate training that their confidence and competence are enhanced (Rose & Forlin, 2010; Weintraub Moore & Wilcox, 2006; Woolfson & Truswell, 2005). Such training must be relevant to the role of the EASN and be part of their paid time, rather than as an additional cost or time burden for the EASN (Lee, 2003). It is important that the EASN feel able to complete the tasks required of them.

Causton-Theoharis, Giangreco, Doyle and Vadasy (2007) described the role of an EASN during literacy instruction as supporting the teacher or special educator, but not making the key decisions about what is to be taught and how. The use of research-based instructional approaches is suggested as being a necessary element when employing EASN, so that pedogological decisions are in place prior to the beginning of teaching. Training in the use of the chosen approach and in management of the students is deemed to be critical to the success of any program. Causton-Theoharis, et al. (2007) cite Erlbaum et al. (2000) as indicating that student success in a one-on-one situation could be influenced by the training of the instructor. When provided with appropriate training, it was found that people who were not qualified teachers had an effect on the increase in reading skills for students (Miller, 2003; Vadasy et al., 2006, cited in Causton-Theoharis, et al., 2007).

EASN, even when they have training, have much less training than qualified teachers and special educators (Causton-Theoharis et al., 2007). Giangreco, Suter and Doyle (2010) stated that a study undertaken by Giangreco, Backus, Cichoski Kelly, Sherman, and Mavropoulos (2003) provided evidence of a gain in knowledge, perspectives and skills across content areas for EASN as a result of the training undertaken. The literature tends to indicate that there is a need to provide opportunity and continuity in professional development opportunities for EASN (Collins & Simco, 2006; Cremin, Thomas & Vincett, 2005).

EASN may be assigned to work in a classroom in a variety of ways. These include working with the individual student, within a specific classroom, within a grade level, or within a cluster grouping, for example early childhood (Cobb, 2007;

Fox, 1998). The role of the EASN will impact upon the training that is required. Cobb (2007) outlines a training format that can be used to assist in training EASN to work effectively with students who have literacy difficulties. She suggested that the training consists of three steps: needs assessment, planning of training sessions and follow up and consultation. Feedback is obtained from the EASN in regards to the use of the strategies in the classroom setting and this can then be used to aid further planning in the area. French (2002) also described needs assessment, teaching new skills and giving feedback as important aspects of maximising the use of EASN in the classroom.

Good initial training and in-service training that adequately matches the role that the EASN is undertaking in the classroom is required to ensure that they have the capacity to work well with the students and as a team member within the classroom (Giangreco, 2003). Breton (2010), however, described a recent survey of EASN in which 29.1% were not satisfied with or uncertain about their initial training in relation to the roles they performed. Giangreco (2003) also provided a warning that "although paraprofessional training certainly is a step in the right direction, it is typically insufficient to prepare paraprofessionals to perform the instructional duties that teachers increasingly ask of them" (p. 50).

The use of EASN to provide direction to small groups of students who may be struggling with specific content areas has been suggested as an effective use of their time in the classroom (Muijs & Reynolds, 2003). This may allow more individualised attention for students who require a more directed approach to their learning, without the negative aspects that may be associated with one-to-one

assistance. Muijs and Reynolds (2003) suggested that there is mixed evidence for the efficacy of this approach and that further research is required to determine the effects of EASN working with small groups or individual students. Training must be given of a sufficient length and depth to ensure that the EASN has the required skills and knowledge to effect change in a student's understanding of content. It is not enough to simply increase the number of adults in the classroom (Broadbent & Burgess, 2003; Cremin, Thomas & Vincett, 2003).

A survey of parents found that there is a need for more training, and better communication with the EASN (Gessler-Werts, Harris, Young Tillery, & Roark, 2004). The parents felt that the EASN was an important member of staff in the class and, as they were working closely with their child, that they had a good understanding of the needs of the child. The perceived importance of the role has implications for the training requirements of the EASN, as they must be able to understand the difficulties faced by the student and have a bank of strategies to use in varied situations and for a number of different tasks. Teachers also feel that EASN require further training with a recent study finding that 78% (of 181) teachers surveyed indicating such training was necessary (Butt & Lance, 2005).

The types of training that are required by EASN will vary depending on the previous qualifications and experience of the EASN, but should be based on best practice and be offered in an ongoing nature (Bugaj, 2002; Christie, 2005). Suggestions from district staff, teachers and EASN can assist in developing training programs at all levels that will support the work of the EASN in the classroom, and be effectively targeted towards the required skills and knowledge. The training that

has been identified by EASN as being most sought after includes behaviour management and record keeping, classroom management, instructional skills, communication methods and AT (Breton 2010; Bugaj, 2002; Rose & Forlin, 2010; Schepis, Ownbey, Parsons & Reid, 2000). Other features of training generally include examination of roles and responsibilities, ethics and confidentiality, and working with teachers and parents. Regardless of the types of training offered, the Department for Education and Skills (2005) in the UK stated that there is a need to "…provide for a more consistent approach to the provision of excellent and stimulating continuous professional development" (p. 88).

One way of identifying the training needs of EASN is to conduct a needs assessment prior to the development of the training (Cobb, 2007; Schepis, et al., 2000). Some ways in which the needs assessment can be undertaken include circulating a list of potential training areas to staff so that they can prioritise the order in which they would like to see the training delivered (Cobb, 2007), or so that teachers can indicate which instructional strategies they most use within the classroom so that these can be used as a basis for developing training. Alternatively, a survey, memo or open-ended questionnaire can be used to gather appropriate information from EASN. Interviews with participants may also be effective in suggesting areas of need (Breton, 2010). As part of the development of the training, Cobb (2007) suggested that providing "…background information, an explanation, practical applications, and opportunities for participants to practice" (p. 688) are important elements to incorporate. A follow-up discussion at the completion of the training session will assist EASN to consolidate the information learnt and consider how to apply it in their contexts.
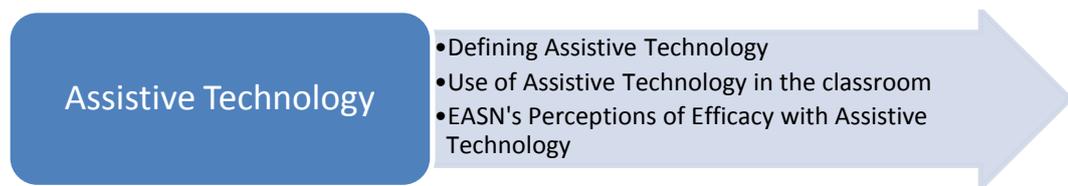
In some situations, the training needs to be targeted to specific groups of EASN, in particular those who work with students with severe and profound disabilities, visual impairments and reading disabilities, as they may require access to very specific types of training (Aird, 2000; Cobb, 2007; Russotti & Shaw, 2004). Burgess and Mayes (2009), when evaluating EASN's perceptions of a training program for high level EA status, found that the EASN involved reported individual differences in requirements for training, which, if addressed, would have made the training more relevant for them. McKenzie and Lewis (2008) surveyed 107 EASN in regards to the training they had received and that which they still desired. Many (49.5%) stated that, although they had received some training in assistive technology, it was the area in which they felt more was needed. It was, in fact, the most requested area for further training.

Bugaj (2002) stated that distance, cost and time are all factors which influence the availability of training for EASN, particularly in rural areas. He recommends the use of technology in the form of online learning as a way to overcome some of these difficulties, citing the University of Nebraska Para-educator Training Program (University of Nebraska-Lincoln, n.d.) as an example. This program provides web-based training for EASN and teachers who are supervising them. Another training format advocated by Potter and Richardson (1999), is that of video feedback to promote reflective practice. Short video clips of the EASN working within the classroom are used to promote discussion among the teaching team on current practice within the classroom and can be used as a tool for determining gaps in knowledge and skills. If possible these gaps can be addressed

immediately in the context of a group problem-solving session, where all parties share experiences and suggestions for future practice.

Hancock and Eyres (2004) stated that EASN have "variable access to training" (p. 231). In Western Australia, EASN are able to access training in the area of assistive technology, among other areas, through the Centre for Inclusive Schooling (CIS). It is a requirement that a staff member has completed a course on the AT through the CIS if the school is going to borrow equipment through the Centre (H. Epton, personal communication, 26 March 2008). There is limited training in general knowledge of AT and in specific applications that are not those used by the Department. The training may not be offered over a long duration (i.e. one off sessions), not be targeted sufficiently, or be inaccessible (i.e. long distance to travel). It is also required that the school principal makes staff aware of the training opportunities that are available and that the school has the necessary relief staff to cover absences. For various reasons this does not always occur. It is not enough to provide training on an intermittent basis. Ongoing professional development is needed so that EASN have the capacity to discuss experiences, and share information with other EASN and teachers (Keller, Bucholz & Brady, 2007).

2.5 Assistive Technology

Assistive Technology
- Defining Assistive Technology
- Use of Assistive Technology in the classroom
- EASN's Perceptions of Efficacy with Assistive Technology

2.5.1 Defining Assistive Technology.

The ability to use computers and technology is a growing requirement for children and adults in today's society (Besio & Salminen; 2004; Netherton & Deal, 2006; Parsons, Daniels, Porter & Robertson, 2008). Scherer (2005) suggested that much of the increase in use of technology (including assistive technology) has been driven by mainstream users who are struggling to 'keep up' in a complicated and busy world. Due to the increasing use and reliance on technology in all aspects of life, including communication and information attainment, students must be taught effective ways to use and access the available technology. Just having the technology in the room, or using it because it is there, is insufficient (Besio & Salminen, 2004; Nelson, 2006; Rapp, 2005). Educators must ensure that appropriate pedagogies are employed when working with students and technology (Besio & Salminen, 2004; Duhaney & Duhaney, 2000; King-Sears & Evmenova, 2007) and that the use of the technology has been applied to appropriate activities.

When assisting students with special needs to access the curriculum, AT and/or instructional technology may be used (Blackhurst, 2005; Jost & Mosley, 2011; Rose & Meyer, 2000; Stoner, Beck, Dennis & Parette, 2011). Blackhurst (2005) also distinguishes between different technologies such as those that improve productivity (e.g. computers allowing more efficient work) and information attainment (e.g. the World Wide Web). Instructional technology is that which is used by all students in the class to enhance learning experiences (Loeding, 2002; Parsons & Cobb, 2011; Stoner, Beck, Dennis & Parette, 2011). Examples of instructional technology include computers, a virtual reality system, and an electronic whiteboard or a projector, coupled with appropriate learning software. The technology by itself

is, however, not sufficient; rather the instruction that is delivered with the support of the technology is the key element: poor instruction will result in poor learning outcomes (Blackhurst, 2005).

AT is defined in the US *Individuals with Disabilities Education Act* as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of a child with a disability" (United States Congress, 2004, sec 602.1). The Australian Government does not provide a consistent definition of assistive technology, although some of the states and territories may do so. For example, in Queensland, AT is defined as "…practical solutions to everyday activities for people with disability, people with long or short term injury, and seniors. Assistive, adaptive and rehabilitative devices allow you to perform tasks that you may be otherwise unable to do, improve quality of life and allow you to remain independent. They range from devices which assist with the use of computers to heavy lifting aids and making general household tasks like turning taps or reaching light bulbs easier" (Queensland Government, 2012, Glossary, para. 1). AT may allow a student to access regular classroom activities that may not otherwise be available to them (Borg, Larsson & Östergren, 2011; Rose & Meyer, 2000) and therefore enhance opportunities to increase or improve upon learning outcomes. Examples of AT include voice output devices, adapted switch software, talking calculators and computer screen magnifiers.

The key differences between instructional and assistive technologies are the intent and audience for the technology, and the function for which it is used. What

may be an instructional technology for one student may be considered an AT for another (Jost & Mosely, 2011). An electronic whiteboard, for example, may be a useful piece of instructional technology for the teacher when taking whole class lessons, but may be considered an AT when used with specific targeted computer software for a small group of struggling students, or for a student who has organisational or visual difficulties. Subject content and academic skills are often targeted through instructional technology, but this does not necessarily accommodate for difficulties that students may be experiencing (Stanberry & Raskind, 2009). There are also occasions when the technology may be both instructional and assistive. Parsons and Cobb (2011), for example, described a virtual reality system for students on the autism spectrum that may act as both an instructional tool (teaching vocabulary) and as an assistive tool (supporting social interaction).

Rose and Meyer (2000) suggested that further developments in technology will act as catalysts for changing the nature of how technology (both instructional and assistive) is used in the classroom, and that differentiation between the two will become outmoded, leading to true Universal Design for Learning (Center for Applied Special Technology [CAST], 2010). Universal Design for Learning (UDL) "…provides a blueprint for creating instructional goals, methods, materials, and assessments that work for everyone-not a single, one-size-fits-all solution but rather flexible approaches that can be customized and adjusted for individual needs" (CAST, 2010, para. 2). UDL provides students with multiple means of representation of information (i.e. textually, graphically, verbally), multiple means of expression (i.e. video, text, voice, picture), and multiple means of engagement with the

materials (i.e. novelty, similarity), depending on their individual needs and learning strengths.

Through use of currently available assistive technology, people with physical, intellectual or sensory impairments can access the curriculum and social/recreational environment of the school or community, where this may have previously been extremely difficult or even impossible for the person (Borg, Larsson & Östergren, 2011; Netherton & Deal, 2006). These benefits are often evident throughout the lifespan of a person with a disability and have advanced to a point beyond what could have been imagined 20 years ago (Bryant, Bryant, Shih & Seok, 2010). AT allows students with disabilities to be included in settings which are the least restrictive for them (allows them the greatest choice), "level[s] the playing field" (Loeding, 2002), leads to more confidence and higher self-esteem (Duhaney & Duhaney, 2000; Scherer, 2005) and assists teachers to meet goals for these students (Campbell, Milbourne, Dugan & Wilcox, 2006; Netherton & Deal, 2006). Stanberry and Raskind (2009) stated that students with learning disabilities, in particular, benefit from the use of assistive technologies by being able to use their strengths to bypass areas of difficulty. A good example of this is the use of audio books and good listening skills to bypass a reading difficulty. The provision of AT can mean the difference between the student remaining in an inclusive setting or having to access a segregated special education setting.

The Individuals with Disabilities Act coming into effect in the United States (originally in 1992), drove further inclusion and the use of the AT for students with disabilities. The *Assistive Technology Act* was passed into law in 1998 (Library of

Congress, 1998). This act directly relates to the provision of funding for each of the States to develop state-wide programs to assist individuals to gain access to AT and associated services. These funds are intended to increase the availability of assistive technology, the involvement of all stakeholders including those who are in rural and underrepresented populations, to ensure coordination between agencies (including private agencies), and to expand the skills and awareness of both service providers and people who access the assistive technology. While Australia does not have equivalent legislation related directly to AT use, the *Disability Standards in Education 2005* (Commonwealth of Australia, 2005) may support the attainment and use of AT through the standards of participation and curriculum. Stronger legislation in this area would have a greater impact on the availability and consideration of AT (and understanding of benefits and uses) in Australian schools.

Lack of access to assistive technology, which may be required to increase an individual's functionality, may be described as an environmental barrier for the student (Borg, Larsson & Östergren, 2011; Scherer, 2005). In the USA, it is necessary to at least consider the use of AT as part of the IEP (Individual Education Plan/Program) process for a student who is eligible for special education provision. Subsequent funding from the government to support the purchase of the AT is available is some cases (Bausch, Mittler, Hasselbring, & Cross, 2005). In the US education system, AT must be provided to the student if it is required for them to access the least restrictive environment, to implement the goals of the IEP, or to benefit from the placement in the classroom (Library of Congress, 1998; Netherton & Deal, 2006). In Western Australia there is opportunity for schools in the Government sector to access AT through the Assistive Technology Team based at

the Centre of Inclusive Schooling (Department of Education, 2010b). The Assistive

Technology Team provides schools with access to a wide range of support from

visiting teachers as well as software and hardware consultancy. The team also offers

a range of professional learning and a loan system for software and hardware. These

resources are only available to Government schools, however, the Independent and

Catholic school sectors also have consultants who may provide assistance in this area

(including assisting with funding applications).

Access to the curriculum/social environment and skills that are acquired

through the use of AT should be those that will benefit the student in their current or

next probable environment (i.e. primary school, secondary school, tertiary setting,

workplace, or community). Bryant, Bryant, Shih and Seok (2010) suggested that

assistive technologies are generally grouped into seven main categories:

"…positioning and seating, mobility, augmentative and alternative communication,

computer access, adaptive toys and games, adaptive environments, and instructional

aids" (p. 204). Students who may have previously struggled to write may be assisted

by tools such as voice recognition software, alternative keyboards and word

prediction software. Mobility aids such as walking frames, wheelchairs and

prosthetics assist those with physical difficulties to access areas of the school and

community and participate in sports and recreational activities (Netherton & Deal,

2006).

There is a wide variety of assistive devices available, and the range is

increasing rapidly (Evans, Williams & Metcalf, 2010; Loeding, 2002). Simpson,

McBride, Spencer, Lowdermilk and Lynch (2009) stated that there are now over

29 000 AT devices available, compared to less than 100 in the 1970s. AT may be considered for use with very young children (possibly younger than 24 months of age) as well as with older children and adults (Dugan, Campbell & Wilcox, 2006). As the products become more widely available and are in more common use in school systems, it is hoped that the price will also reduce to a more affordable level for all potential users.

Assistive devices are often referred to as existing along a continuum and may be classed as low-tech, medium-tech or high-tech depending on the level of sophistication (Blackhurst, 2001; Hopkins, 2006a; King-Sears & Evmenova, 2007; Netherton & Deal, 2006). Often devices that are not electronic, or that are simple to make or acquire, are referred to as low-tech devices (Evans, Williams & Metcalf, 2010; Rose Plaxen, 2005; Scherer, 2005). These may include items such as a built up spoon handle, bowls with lips, communication boards, sticky notes and pen grips. Low-tech devices may be useful in the classroom as they are generally not complicated to use and require minimal maintenance. In addition, they may be disposable or easily replaced (e.g. plastic cup with slot cut out for student who cannot tip their head to drink). Easy replacement is vital if the student is known for exhibiting destructive behaviour (and regularly damages equipment) or if the device is expended quickly (e.g. large print materials that need to be developed rapidly in accordance with individual class programs). A small sample of low-tech assistive technologies is illustrated in Table 2.1.

Table 2.1

Examples of Low-Tech Assistive Technology That May Be Used to Support Students

Low-Tech Assistive Technology	Functional Area
Modified drinking cup	Independent skills
Large grip spoon handle	Independent skills
Colour coding	Organisational skills
Desk-side holder	Organisational skills
Large print materials	Visual access
Magnifying glass/tool	Visual access
Modified board games	Physical access
Pencil grips	Physical access
Book holders	Physical access
Visual cues	Communication skills
Communication board	Communication skills

Medium-tech devices are reasonably complicated devices such as tape recorders, talking calculators, visual timers and wheelchairs (Evans, Williams & Metcalf; 2010; King-Sears & Evmenova, 2007). The distinction between medium and high-tech AT may be very fine. The distinction is often made by examining the cost and relative complexity of the device; the more costly and complicated to use, the more likely it is that the device is of a high-tech nature. Medium-tech devices generally only require basic instruction or minimal ability to use, and are not overly complicated to operate. They may be useful in an educational setting due to this ease of use, and also to the relatively low cost when compared to high-tech assistive

devices. Simple computer software that requires minimal training or knowledge to use may also be included as a medium-tech assistive technology. Further examples of medium-tech devices and the functional areas they assist with are illustrated in Table 2.2.

Table 2.2

Examples of Medium-Tech Assistive Technology That May Be Used to Support Students

Medium-Tech Assistive Technology	Functional Area
Digital tape recorders	Writing/memory support
Audio books	Reading/visual access
Visual timers	Organisation support
Wheelchair	Physical support
Electronic spinner	Cognitive/learning
Single-use voice output device	Communication/commenting
Talking calculator	Vision/learning access

High-tech devices are quite complex and are often specialised to accommodate for a specific impaired function (Bryant, Bryant, Shih & Seok, 2010; Evans, Willams & Metcalf, 2010). These include devices such as voice output devices, prosthetic limbs, electronic page turners, virtual reality systems, and computer hardware and software. High-tech AT generally requires that training be provided, for both the user of the assistive technology, the student, and the facilitator, who is often the classroom teacher and/or the EASN. In addition to

requiring training in the use of the technology, high-tech devices may also be

susceptible to failure or misuse and are not usually able to be repaired on-site. The

need to send the device away for repair, or call in a repair technician, may mean that

the student is without the device for an extended period of time. For a student who

uses a voice output device, for example, this may mean a loss of voice and

communication ability until the device is repaired, effectively gagging the student,

which is less than an ideal situation.

It is important that contingencies, possibly in the form of a low-tech

communication board, for example, be accessible in case of difficulties that may

arise with high-tech devices. It is useful for the classroom teacher and EASNs (if

employed) to discuss alternative tools to augment function if high-tech AT currently

in use is unavailable for any period of time. There are many occasions when a

simple, or low-tech, device can be used to perform the function that is required,

without having to purchase a costly and sometimes complicated high-tech device

(Loeding, 2002). Examples of high-tech AT and functional areas it may assist in are

illustrated in Table 2.3.

Table 2.3

Examples of High-Tech Assistive Technology That May Be Used to Support Students

High-Tech Assistive Technology	Functional Area
Text-to-speech software	Communication skills
Voice output device	Communication skills
Communication software	Communication skills
Concept-mapping software	Cognitive skills/organisation
Subject specific software (i.e. maths)	Cognitive/learning skills
Computer switches	Physical access
Puff switches	Physical access
Prosthetic limbs	Physical access
Voice operated software	Independent living
Voice-to-text software	Writing skills
Virtual reality systems	Social and cognitive skills

When selecting AT for students there are a number of factors which must be considered. These include the cost of the device (Borg, Larsson & Östergren, 2011), the availability of the technology (Scherer, 2005), the ability to upgrade the device (Duhaney & Duhaney, 2000), the maintenance that is required (Duhaney & Duhaney, 2000), the amount of training that is required by the student and those assisting the student (King-Sears & Evmenova, 2007), the attitudes of staff to the use of technology (Loeding, 2002; Scherer, 2005), and the physical structure of the classroom (Loeding, 2002). "Maximising the effectiveness of available technology

requires thoughtful planning and decision making" (King-Sears & Evmenova, 2007, p. 11). Often there is no single factor that affects the use of AT for students with disabilities; rather it is an interaction between many of these factors (Copley & Ziviani, 2004).

The selection of appropriate AT to support students should be made as part of a team approach to the student's educational provision (Marino, Marino & Shaw, 2006; Parette & Stoner, 2008). An absence of appropriately trained personnel to assist in matching and purchasing AT for the person with special needs is seen as a societal barrier, in that society tends to place a low priority on this aspect (Scherer, 2005). It is important that there are people involved who have adequate training in this area and who are up-to-date with current technologies that may be available, as well as with the pedagogies that are associated with the technologies.

Marino, Marino and Shaw (2006) stated that there is a "…lack of adequate training for pre-service teachers entering the field" (p. 18) and that this impacts upon the use of AT in classrooms. Pre-service teachers "…need to be prepared to recommend and utilise innovative technologies which bridge many of the learning gaps for students with special needs" (Nelson, 2006, p. 486). In addition, the degree of comfort experienced by pre-service teachers who are required to use AT has been reported as being very low (Sze, 2009). These authors further express a concern that even experienced teachers who strive to stay current in the AT area have difficulty doing so, due to the large volume of information available and the rapid nature of the changing technology. Sze (2009) stated that the use of the technology alone is not

enough to ensure an inclusive educational environment, and that a consistent support network and team approach for staff is a requirement for any program.

King-Sears and Evmenova (2007) described an acronym to use to assist with selecting and implementing assistive technologies: T.E.C.H. The acronym stands for:

- T – Target students needs and the outcomes required
- E – Examine choices and make a decision
- C – Create opportunities for integration with activities in the classroom
- H – Handle implementation and monitor the learning impacts

The use of the acronym to assist in selecting appropriate AT can help with what is sometimes an overwhelming choice (King-Sears & Evmenova, 2007). The process will also ensure that the AT is appropriately considered in relation to the educational program of the classroom and not as a separate entity. The AT must be sufficiently flexible to be used in a number of contexts where possible. Being able to use the technology in a variety of settings will have a number of impacts on the use of the technology (Borg, Larsson & Östergren, 2011). Use in a variety of settings will allow the person to generalise the use of the device and will assist in ensuring the use (and not abandonment) of the technology. It will also aid in developing competency in the use of the device, as practice is an important consideration. If the person is able to effectively use the device in a number of ways or settings, the utility for them is greatly increased and the chance that the device will continue to be used and further competency developed will be greatly enhanced (Copley & Ziviani, 2004).

The cost of the AT may be seen as a significant barrier for some students and schools (Borg, Larsson & Östergren, 2011; Copley & Ziviani, 2004; King-Sears & Evmenova, 2007). The assistive technologies (particularly high-tech devices) are often expensive as a result of substantial costs incurred by the companies that develop and manufacture the technology, and a relatively small market for some complex devices (such as eye-gaze systems and complicated voice-output devices). The cost of the device for the student has to be balanced by availability of funding and school resources. In Western Australia there are a number of funding sources that can be utilised to assist with funding of devices, including the Independent Living Centre WA, Lotterywest grants, and Commonwealth education funding submissions. For Government schools, there is also access to loan equipment through the Centre of Inclusive Schooling (H. Epton, personal communication, 8th Dec, 2010). AT is increasingly available through internet providers who are able to ship internationally. Internet providers have enabled users to purchase equipment which may not be available in their own country or area, often at more competitive prices than those offered by specific suppliers, although access to support and servicing of equipment can be difficult. The ability to purchase easily from overseas vendors is particularly relevant in Australia which has a relatively small market compared to countries such as the United States or the United Kingdom.

Many suppliers of equipment are able to provide a loan service to the school so that the user may trial the equipment (generally for a small fee), to ascertain its functionality for their purposes, and return it if it is not appropriate (Novitatech, 2004). Some providers (e.g., Spectronics) and not-for-profit agencies (e.g., Independent Living Centre WA) also provide support in the form of online or

personal contact to assist users in identifying appropriate AT for their purposes.

Generally, staff employed by AT providers to assist in determining the needs of

students with special needs are highly experienced and qualified in the area, and

include occupational therapists, speech therapists and special education teachers.

Many staff in schools are not aware of the availability of these specialists or the

support that they can access in determining appropriate assistive technology. The

equipment providers and their staff are generally the most up-to-date source of

information on available technologies and will also advise purchasers on the ability

of the AT to be upgraded or refurbished if required. When considering the needs of

young children, upgradability is an important consideration as the AT needs to be

able to grow with the child and their needs.

Training for both the user and the facilitator of AT is essential if AT is to be

used to its full potential (Hopkins, 2006a; Kelly & Smith, 2008; Simpson, McBride,

Spencer, Lowdermilk & Lynch, 2009). It is useful to select AT that is close in

functioning to devices that are already well known to the student. For example, a

computer program that uses similar commands to one that the student is familiar

with will be easier to master than one that is vastly dissimilar (Hopkins, 2006a).

Those who have already mastered the AT may be able to train those who are new to

the technology. In some cases, the lack of trained staff to support access to the AT

can be detrimental to the social and cognitive development of students (Kelly &

Smith 2008). Kelly and Smith (2008) examined computer and phone social

interaction of students with a visual impairment and found that further teacher

training was required to provide teachers with the skills they needed to teach their

students how to access the appropriate AT and thereby initiate greater social

interaction. Training should be structured to cover not only technical aspects that may be required by the staff, but also how the device will be used as part of the classroom program (Copley & Ziviani, 2004).

The need for training has implications for schools, where only a small number of staff may receive training in the area of AT or on specific devices used by specific students. Staff often feel that the training is inadequate, is not supported by follow-up services and that they do not have a complete understanding of the AT and are unable to troubleshoot problems (Copley & Ziviani, 2004). It is important that there are sufficient trained users in case of absence amongst trained users or when staff that have been trained leave the school and take their expertise with them. Training may also add to the cost of the device and should be part of the overall consideration given prior to the purchase of any assistive technology. The training may be a 'one-off' requirement or be part of ongoing costs to the school/parent.

A positive attitude towards the use of AT and a belief that it is an effective way to assist students are seen as being vital to the consideration, implementation and continued use of AT (Copley & Ziviani, 2004; Dugan, Campbell & Wilcox, 2006; Loeding, 2002; Scherer, 2005). Copley and Ziviani (2004) suggested that the (sometimes poor) attitudes of teachers towards the use of AT in the classroom are due to the way in which it was introduced to the classroom in the first place and that a lack of consultation and support diminish the teacher's role in the process. Beliefs about the pre-requisite skills that students should have before accessing assistive technology, such as an ability to determine cause and effect, may impact on whether or not AT is used with the person with a disability. Other beliefs that may be held

include the premise that AT will require a lot of effort, that AT is inappropriate for the child's age group, that the student will not have an opportunity to learn specific skills, or that the AT is prohibitively expensive and that obtaining funding is difficult (Dugan, Campbell & Wilcox, 2006). It is necessary to address these beliefs with teachers, EASNs and parents, if AT is to be given adequate consideration in the classroom program. Goode (2006) and Scherer (2005) suggested that a person's attitudes are formed in relation to their values, ideologies and cultural and religious beliefs and are a factor in whether or not AT is utilised in the home, school or community.

There are many positive outcomes associated with the use of AT for people with disabilities. Some of the benefits include the development of functional skills which are able to be generalised to natural settings, improved physical fitness, enhanced social communication, better time management, greater task completion, communication with others (where this may have previously not been possible), heightened self-worth, and improved academic outcomes (Brodin, 2010; Brodwin, Cardoso & Star, 2004; Bryant, Bryant, Shih & Seok, 2010). AT can be used from a very young age, across the life span, to assist the person with a disability to gain the most possible out of their lived experiences. Improved productivity and increased contributions to society as a whole are potential outcomes. Indeed, Brodwin et al. (2004) stated that "…assistive technology is more than computers…, it is the integral process of assisting individuals with disabilities, especially those with severe disabilities, to maximise their human potential" (p. 29). AT will continue to increase in range and diversity in ways in which Bryant, Bryant, Shih and Seok (2010) suggested "….appear limitless" (p. 211). For educators and other key stakeholders it

will be important to keep abreast of these rapid changes so that appropriate supports are provided for students with disabilities.

2.5.2 Use of Assistive Technology in the Classroom.

AT in the classroom may be used by any number of students. Quinn, Behrmann, Mastropieri and Chung (2009) examined students using AT in schools and found that students with multiple disabilities were the most common users, followed by students with learning disabilities, orthopaedic impairments, autism and intellectual disabilities. Many of these students were situated in regular classrooms, although the majority were in self-contained settings.

The Department of Education (2010c) in Western Australia recognises a number of disability groups who are eligible for targeted support services, including students with global developmental delay, intellectual disability, autism spectrum disorder, vision impairment, hearing impairment, severe mental disorder, physical disability and severe medical conditions. Many of these students may benefit from the use of assistive technologies. In addition to students with identified disabilities, support is provided to struggling students via a number of in-school initiatives including *Getting It Right Numeracy (GIRN)*, *Getting It Right Literacy (GIRL)* strategies and the provision of staff in the form of Learning Support Coordinators. The Learning Support Coordinators are responsible for facilitating the work of Learning Support Teams in the school and collaborating with teachers to meet the needs of students with disabilities (Department of Education, 2010d). They also coordinate other support for teachers and assist with providing any professional development that is required.

There are a number of factors that will affect the use of assistive technologies within any classroom setting. These include "diverse learning environments, educator experience, product awareness, individual student needs, legacy [existing] computer systems and budget limitations…" (Hopkins, 2006b, p. 26). Consideration of whether or not the AT must travel from school to home with the student is also needed (Marino, Marino & Shaw, 2006). All of these factors create a complex array of issues that need to be addressed by schools. Hopkins (2006b) suggested that more time and money is generally required when schools and teachers adopt assistive technology, and that many teachers will initially feel overwhelmed or out of their depth.   School leaders and IEP team members play a critical role in insuring that AT is appropriately considered (Dyal, Bowden Carpenter & Wright, 2009). They may also be responsible for ensuring that funding and training are provided where necessary. Incorrect selection, implementation and monitoring of AT use may result in poor or unexpected outcomes for students and potential abandonment of the assistive technology.

Abandonment of AT is often evident immediately or within the first year of use in 30% to 90% of cases where AT has been prescribed by relevant professionals (Scherer, 2005; Verza, Carvalho, Battaglia & Ucelli, 2006) and results in a "…lost opportunity for students who need support" (Hopkins, 2006a, p. 14). This is often attributed to the poor match between person, technology and the environment and can result in the person's needs not being met and subsequent increased costs to the individual or health system (Verza, et al., 2006). The perceived advantages of using the technology and how involved the person is in the choice of technology have also been shown to impact on the abandonment of the technology among users (Riemer-

Reiss & Wacker, 2000). There is a need to clearly match the technology with the student's instructional requirements in the areas of acquisition, fluency, maintenance and generalisation (King-Sears & Evmenova, 2007; Raskind, 2006; Scherer, 2005; Simpson, et al., 2009).

A number of tools have been designed to assist students, parents and educators with the decision making process when selecting AT for particular students and for incorporating the use of the AT effectively in class programs. These have mainly been developed in the United States (as a result of the US Federal government requirement that AT be considered for all students with a disability) and include, among others, the Matching Person and Technology Model (Scherer, 2004), the AT Consideration Checklist and Intervention Plan (Georgia Department of Education, 2008a) and the SETT Framework (Zabala, 2002). Marino, Marino and Shaw (2006) stated that "successful programs utilize pre-assessment, collaboration, problem-solving, effective implementation and systematic evaluation" (p.18).

When matching the AT with the user, there are a number of considerations that must be taken into account. These include the individual's disability and what this constitutes in regards to function for the person, the person's expectation of the AT and what they want it to do, and the person's reaction to the use of AT (Scherer, 2005). Scherer (2005) further described these considerations in terms of characteristics and requirements of the person, of the environment and of the technology in the *Matching Persons and Technology* (MPT) model (Figure 2.2). The characteristics of relevance to the person include: their lifestyle; needs, capabilities and preferences; prior support use; motivation and readiness; and expectations.

Characteristics and requirements of the environment in which the person is situated include: physical; cultural; legislative/political; cultural; economic; and attitudinal components. When considering the technology that is to be used the characteristics include: comfort; performance; cost; appearance; and availability. In relation to this model, Scherer, Sax, Vanbiervliet, Cushman, and Scherer (2005) have developed an instrument, the *Assistive Technology Device Predisposition Assessment* (ATD PA), to enable educators to measure both the pre-disposition of users to AT and the match of selected AT to the user, which they suggested will enhance the outcomes associated with AT use.
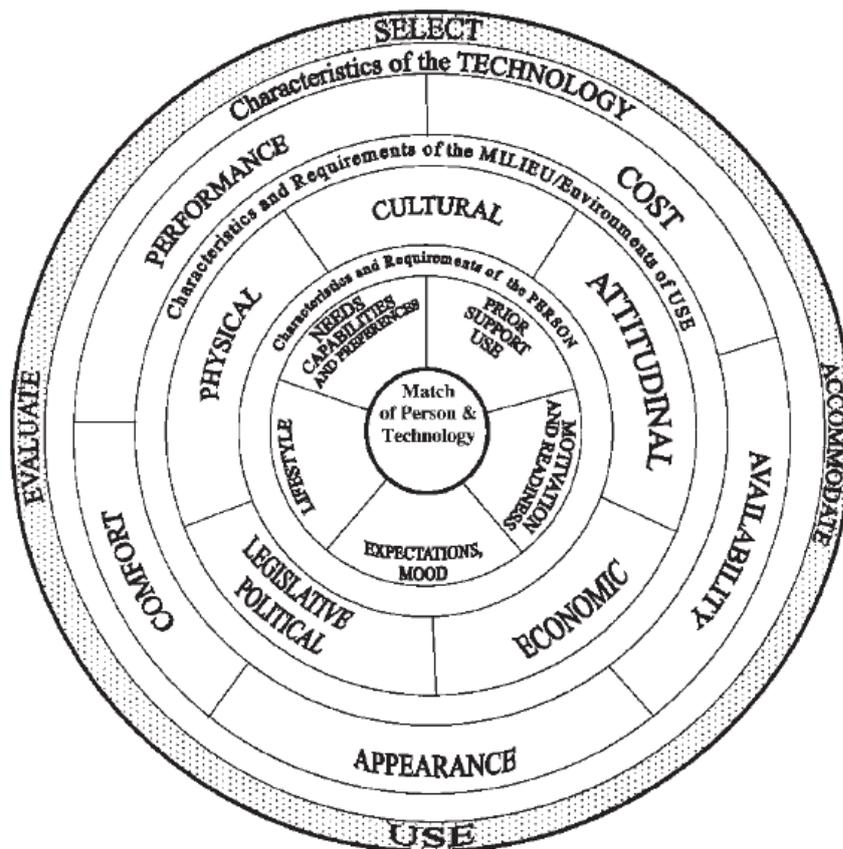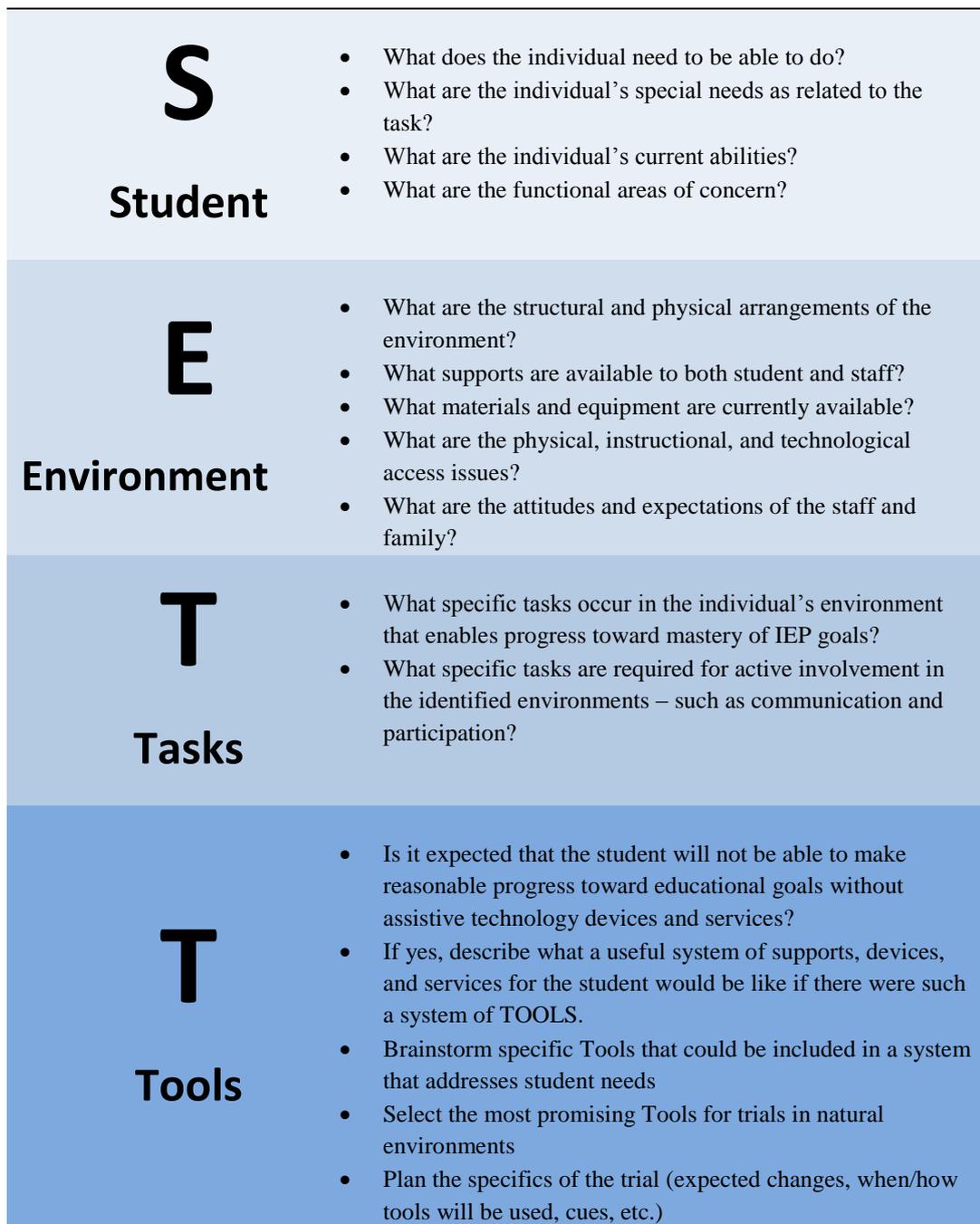

Figure 2.2. Matching persons and technology model (Source: Scherer, 2005, p. 734)

The AT Consideration Checklist and Intervention Plan (Georgia Department of Education, 2008a) were developed as components of an overarching strategy for the Georgia Department of Education to "…improve student achievement, productivity, independence and inclusion by enhancing educator knowledge of AT and increasing student access to appropriate AT devices and services" (para. 2) and include some of the components as suggested by Scherer (2005). The AT Consideration Checklist (Georgia Department of Education, 2008b) is useful in identifying the instructional areas in which the student is having difficulty and the tasks that are required of them throughout the day. The standard classroom tools that are being used, as well as any modifications and assistive technologies currently in place are noted, as is the level of participation of the student (i.e. independent or with assistance). If the student requires further assistance to complete some of the tasks required this information is also included. The AT Consideration Checklist allows the teacher, educational assistant, parent and any other member of the IEP team to contribute information in regards to the functioning of the student and to ensure a substantial and comprehensive picture of the student's abilities and needs is represented. The checklist can be used throughout the year to continually check on the student's requirements for revision if necessary.

The Intervention Plan (Georgia Department of Education, 2008c) requires staff to identify areas of difficulty, tasks required, the current level of functioning of the student, and the expected outcome/s of the use of the AT. Within this document, there is also provision for description of the classroom environment, the activity and how the AT will be used within the activity, as well as any additional supports that are required by the student. The staff responsible and a review date for the student's

progress are critical aspects of the Intervention Plan, as they ensure that there is someone who is accountable for the student's learning needs and that these will be assessed regularly. Both of these forms, along with further information about assistive technologies that may be of benefit, are available to schools free of charge via the internet.

The planning format currently used by the Centre for Inclusive Schooling, Assistive Technology Team in Western Australia (among others) is the SETT (Student, Environment, Tasks and Tools) framework which was developed by Joy Zabala (2002). It is a relatively direct planning format that can be used by schools to gather information about the needs of the student in order to effectively plan for the use of AT in the classroom. This format allows the IEP teams to gain an overview of the student, the environment in which the student works, the tasks the student is required to perform and the tools that may be appropriate to assist them in accessing the environment and curriculum of the classroom and to achieve the tasks required. One aim of the format is to ensure that the student becomes an active participant in the classroom (Zabala, 2002) and that they experience educational success. The SETT framework is a simple format and can be used by all members of the student's educational team, including teachers, psychologists and educational assistants. Figure 2.3 is a pictorial representation of the SETT framework, as it may be used by school staff. The questions in each section aim to guide the process and assist in identifying relevant components to be included.

S **Student**	• What does the individual need to be able to do? • What are the individual's special needs as related to the task? • What are the individual's current abilities? • What are the functional areas of concern?
E **Environment**	• What are the structural and physical arrangements of the environment? • What supports are available to both student and staff? • What materials and equipment are currently available? • What are the physical, instructional, and technological access issues? • What are the attitudes and expectations of the staff and family?
T **Tasks**	• What specific tasks occur in the individual's environment that enables progress toward mastery of IEP goals? • What specific tasks are required for active involvement in the identified environments – such as communication and participation?
T **Tools**	• Is it expected that the student will not be able to make reasonable progress toward educational goals without assistive technology devices and services? • If yes, describe what a useful system of supports, devices, and services for the student would be like if there were such a system of TOOLS. • Brainstorm specific Tools that could be included in a system that addresses student needs • Select the most promising Tools for trials in natural environments • Plan the specifics of the trial (expected changes, when/how tools will be used, cues, etc.)

Figure 2.3. The SETT framework (Source: Zabala, 2002).

Using the previously described planning tools to effectively embed the technology into the curriculum and social and recreational activities will assist in ensuring that it is not the technology that is the focus of the activity being conducted, but the activity itself that is the key aspect (Blackhurst, 2005). Some authors feel

76

that there is a danger that the use of technology may inhibit the student from reaching independent goals or that it may stifle creativity (Loeding, 2002; Rapp, 2005; Scherer, 2005). Another concern is that the technology may be too complex for the student to use as intended (Scherer, 2005). It is important that the AT does not prevent the student developing skills that they would otherwise have acquired, had the AT not been available. The AT may, in some cases, become a 'crutch' for the student (Rapp, 2005), if not used as an additional or augmentative tool for learning.

Educators should be cautious about claims made by manufacturers and providers of AT in regards to the function of the software or hardware (Blackhurst, 2005), and should look for independent or reliable information from appropriate sources if they are unsure as to the suitability of the technology. Rapp (2005) strongly advocates against the use of technology for technology's sake. The educator will need to be cognisant of these concerns and be watchful that opportunities are given to the student to perform tasks independently when possible and that the AT is being used as intended and required.

Educators in the field of special education have successfully used a variety of assistive technologies for many years and are fully aware of the benefits that these tools provide for students with disabilities, particularly in increasing independence in the classroom (Lankutis & Kennedy, 2002; Sze, 2009). The benefits of AT are potentially available to all students in the classroom, particularly those who may be struggling in certain academic domains such as reading, writing, and math, but who have not been labelled as having a disability and for students who may be gifted and

talented but who also have learning disabilities. Students who have different learning styles to those traditionally catered for in a regular classroom may also benefit from the use of assistive technologies such as concept mapping software and educational websites (Sze, 2009). Students who have difficulty with communication may benefit from technology that allows them to ask questions, comment and re-tell information. These skills have been shown to impact on the student's ability to successfully use written language at a later date (Sze, 2009) and may influence their inclusion in the general education curriculum.

Students using AT may be able to meet academic goals in an appropriate time frame and manner, limiting the need for 'remedial' instruction (Rapp, 2005). An example may be a student who has social, language and spelling goals to achieve. The use of email correspondence with students at another school may provide the student with opportunities to achieve success in each of these areas (Rapp, 2005). Many different classroom designs have been recommended to ensure students with diverse needs have access to appropriate instruction and learning experiences, including multi-age classrooms and inclusive settings (Lankutis & Kennedy, 2002; Simpson, McBride, Spencer, Lowdermilk & Lynch, 2009).

A multi-age classroom, containing students with a range of difficulties including physical disabilities and learning problems is suggested as an appropriate environment for the use of assistive technologies which can be individualised to cater for each student's needs (Lankutis & Kennedy, 2002). The multi-age classroom has benefits, such as peer mentoring, collaborative learning and access to a wider range of assistive technologies due to the large variety of users. When

establishing a multi-age classroom, it is important to plan carefully and fully before beginning teaching to ensure that the needs of all students are taken into account, and the AT is used to supplement or assist, not be the focus of the lesson/s (Lankutis & Kennedy, 2002). Simpson, McBride, Spencer, Lowdermilk and Lynch (2009) also discuss the use of AT in the classroom, but do so in the context of an inclusive environment, or one which is proposed to be universally designed (UDL). The authors feel that many teachers in inclusive settings have yet to be made aware of the extent of AT that is available and the pedagogies that can be incorporated to ensure the assistive technologies are used to full effect. Brodin (2010), when discussing whether ICT (Information and Communication Technology) can assist students with disabilities to access regular settings, adds to these concerns by stating that while the intent is good, the implementation may be lacking. She suggested that both social support and technical support needs to be given to ensure the technology is able to help students to be accepted in inclusive environments.

It is important that the performance of the student is effectively assessed when using the technology (King-Sears & Evmenova, 2007). Performance includes the ability of the student to use the technology for the intended purpose, and the effect of the technology for allowing the student access to the curriculum or to communication functions (Moore, Cheng, McGrath & Powell, 2005). It may be necessary to pair the use of the technology with prompts for the student (i.e. verbal or gestural prompts) to ensure that it is being utilised correctly (King-Sears & Evmenova, 2007). If the technology is not having the desired impact or effect for the student, then changes to the way it is accessed or utilised may need to be incorporated. A change in speed of text being read by the computer or level of

maths problems, for example, may be required. Monitoring the performance of the student who is using the AT also allows the teacher to be responsive to the needs of the student and to modify the use of the AT accordingly.

Assessment of the use of the AT in the classroom should be undertaken at a number of points in the process, from initial referral, through implementation and periodic review (Marino, Marino & Shaw, 2006). Some of the information that may be gathered includes progress in the use of the assistive technology, outcomes for the student, reliability of the AT and any concerns that are evident. This information can be gathered in a number of ways, including checklists, rating scales, observations and end-products (e.g. video, photo, work sample). The University of Kentucky Assistive Technology (UKAT) toolkit includes a resource to assist educators in long-term assessment of students using assistive technology. The *Assessment Planning and Data Collection* tool (University of Kentucky, 2002) provides guidelines for teachers to plan appropriate assessment strategies. This is an easy to use format that can assist in ensuring the technology is being used as it should be and that the outcomes for the student are enhanced.

King-Sears and Evmenova (2007) described a number of considerations for integrating AT into instruction in the classroom. These include that assistive technology, when used appropriately and well, will prepare students for future careers that require them to use technology. They also suggested that the technology should be used in a natural way in the classroom, rather than as a lesson in its own right. This ensures that the students view the AT as an integral part of the functioning of the classroom and have a seamless transition to future settings. The

third consideration is that the teacher be aware of any changes in AT as this is a technology that is changing rapidly. It is important to be aware of these changes so that the student has access to AT that is most appropriate for them, and that new technology that may be more functional for them is identified.

As well as considerations for the use of assistive technology, King-Sears and Evmenova (2007, p. 8) stated that there are four principles that should guide the use of AT in the area of instruction. These are that the AT:

- Aligns with curriculum outcomes

- Matches students instructional needs

- Helps students blend in with peers

- Considers efficient and cost-effective choices (parsimony)

These principles will assist with the decision-making process when selecting AT and may also help to justify the choices made. A justification for the choice of AT may be required in order to access funding or to obtain the device from the educational system body that oversees AT allocation. It may also be necessary to justify the use (and potential expense) of AT to school boards, other teachers, and the parent community in the school. Being able to clearly state the purposes and benefits of the AT to the entire school body may encourage them to embrace the use of the AT in all areas of the educational process.

A study conducted on training educators in how to integrate AT with specific curriculum standards found that with appropriate training and support, there was an improvement in the educators' knowledge of AT and where the AT may fit well with the curriculum of the classroom (Puckett, 2002). Teachers with a sound theoretical

basis for teaching and learning are more able to effectively enhance their use of AT in the classroom, with a solid understanding of learning theory underpinning its use (Duhaney & Duhaney, 2000). The use of the technology should correspond to the teaching theory that is being used in the instructional context (e.g. behaviourism, constructivism). Behaviourist strategies may be most relevant in situations where there is a large amount of content to be learnt and little time for the teacher to spend one-on-one time with the student (i.e. self-instruction materials, drill and skill software). In a more cooperative context, the use of constructivist instructional processes such as web-based learning and group research may be more appropriate (Duhaney & Duhaney, 2000).

Netherton and Deal (2006) suggested that there is a need for educators to access information about AT and appropriate ways to use this technology. Findings from research conducted by Bausch, Ault, Evmenova and Behrmann (2008) which focused on determining the use of AT support services used, stated that there is a strong need for "…training and increased awareness of AT services among teachers and other professionals working with students with disabilities" (2008, p. 1). Educators are able to access information in a number of ways. There are many websites that allow educators to view new and existing assistive technologies and theories of support as they become available. Table 2.4 provides a small sample of useful websites.   Conferences in the area of assistive technology, subscription to online newsletters and listservers, online tutorials and professional development sessions with experts in the area are all useful and accessible ways for educators to keep up to date with some of the advances and uses of technologies for people with disabilities and difficulties (Loeding, 2002).

Table 2.4

A Sample of Websites Dealing with Assistive Technology

Site	Brief Description	Address
Georgia Project for Assistive Technology	Resources to assist educational teams in the implementation and integration of assistive technology into instructional activities.	http://www.gpat.org/
National Assistive Technology Research Institute	Conducts assistive technology (AT) research, translates theory and research into AT practice, and provides resources for improving the delivery of AT services.	http://natri.uky.edu/index.html
Resources for Assistive Technology in Education	Resources for learning more about assistive technology devices and services in educational settings.	http://sweb.uky.edu/~jszaba0/JoyZabala.html
Council for Exceptional Children- Technology and Media Division	Support educational participation and improved results for individuals with disabilities and diverse learning needs through the selection, acquisition, and use of technology.	http://www.tamcec.org/
NovitaTech	Supply a wide range of speech generating devices, environmental controls, computer access equipment and other assistive technology products.	http://www.novitatech.org.au/at_home.asp?p=245
Spectronics	Supplier of special needs software and assistive technologies.	http://www.spectronicsinoz.com
Independent Living Centre of WA	Provide an information service on assistive technology and equipment.	http://www.ilc.com.au/

As well as accessing information individually, development of a school or district-wide user group may allow teachers and other personnel who support students with disabilities in the classroom to increase their knowledge of assistive technology, collaborate effectively with one another and make better use of their

time (Parette & Stoner, 2008). Collaboration of all stakeholders, including parents, is important to ensure that consistent messages are delivered to the student, and so that skills can be practiced in a variety of environments (Skau & Cascella, 2006). The formation of a user group may be initiated by individual teachers or the school district and has been found to be effective in developing teacher and EASN skills in the area of AT (Parette & Stoner, 2008).

An AT user group involves a number of teachers or other education professionals who have a shared interest in AT and who seek to share their knowledge with others and gain new skills and knowledge as a result of their interactions (Parette & Stoner, 2008). Often a person who has the highest level of knowledge of AT (and the greatest experience in using it) will lead the group in hands-on examination and training and subsequent application of the assistive technology. Some of the benefits for staff involved in AT user groups that have been reported include: allocated time to develop skills; enhanced skills in using assistive technology; opportunity to develop fluency and speed when using assistive technology; generalisation of the AT to different settings and situations; and modification and adaptation of their skills to accommodate different tasks within the classroom. For the student, the benefits include the ability to be included within the regular setting, a reduction of behaviour problems and enhanced communication abilities (Parette & Stoner, 2008).

In Western Australia all of the education sectors at primary and secondary level provide diverse forms of AT training to staff. The content and amount of this training varies considerably, as do staff who may access it. Hands-on training or

training in the environment in which the technology will be used is seen to be the most beneficial for educators (Loeding, 2002), however, this does not always occur as there may be licensing or logistical requirements (e.g. only one or two people to be trained from each school) that prohibit onsite training. In addition to appropriate selection of AT devices for students with disabilities and training of relevant staff members, support from AT services is also a vital element in ensuring that it is effectively implemented in the classroom (Bausch, Ault, Evmenova & Behrmann, 2008).

In the Government sector in Western Australia, training is primarily provided by the Assistive Technology Team from the Centre for Inclusive Schooling, although schools may also access support services that may be provided through not-for-profit agencies or through retailer support services. The support provided varies substantially and may be related to the selection of a device, the use of the device, adapting the device or software, coordinating the use of the device with other agencies/ professionals, technical assistance for the child or technical assistance for the school. Without such support the effectiveness of the AT may be somewhat limited (Bausch, Ault, Evmenova & Behrmann, 2008).

An instrument known as the Quality Indicators of Assistive Technology Services [QIAT] (QIAT, 2010) has been developed by a collaborative group of researchers to help guide the use of AT services in schools. QIAT aims to assist in improving the educational outcomes for students with disabilities and focuses on developing indicators of effective practices, developing tools to evaluate services, creating resources to guide planning and implementation, sharing information and

resources and providing opportunities for communication and collaboration. The

QIAT group has developed quality indicators to assist schools to assess their

provision in the areas of consideration, assessment, inclusion in an IEP,

implementation, effectiveness, transition, administrative support, and training. These

indicators can be accessed via the website of the group. Indicators for successful

implementation of AT in the school/classroom, for example, include development of

a collaborative plan, integration of the AT across the curriculum, personnel available

to support the student using the technology, students given opportunities to use a

variety of strategies to support their learning, training of all parties is provided,

implementation is based on initial data and is assessed in an ongoing manner, and

maintenance and management of devices is determined and followed. It has been

suggested that by ensuring these quality indicators are evident in the school, that the

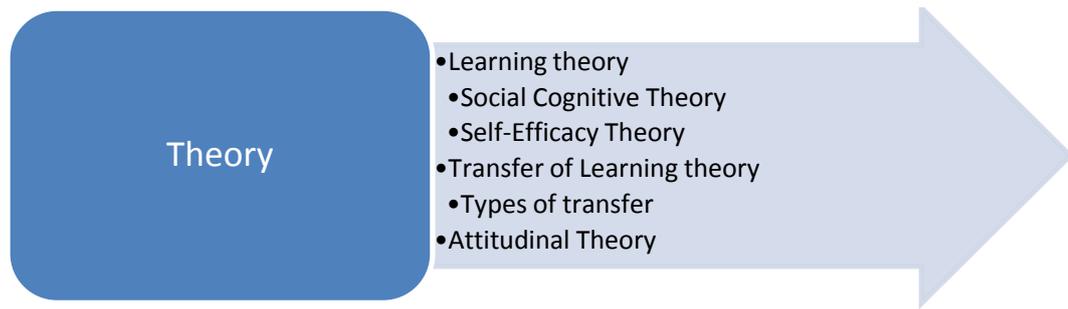implementation of the AT is more likely to be successful (QIAT, 2010).

2.5.3 EASN's Perceptions of Efficacy with Assistive Technology.

While there is some research available on the perceptions of EASN in regards

to training in general (Breton, 2010; Rose & Forlin, 2010), there is limited research

available on the perceptions of EASN as to their efficacy in using and facilitating

learning with AT and the effects of training in this area (Loeding, 2002; Sharp, et al.,

2005). Search terms such as self-efficacy, efficacy, perception and feelings were

coupled with paraprofessional, education assistant and teacher assistant (among

others) without result. Much of the available research in this area focuses on teachers

as the person primarily responsible for the use of AT in the classroom. As the role of

the EASN becomes broader and more in-depth, the likelihood of working closely

with students who use assistive technology devices becomes greater, as does the

potential of taking on more responsibility for this area, rather than the teacher being the only facilitator. A number of researchers have examined the effects on students and teachers when EASN are utilised in the classroom, but often do not take into account the thoughts and feelings of the EASN or the use of assistive technology.

Specific skills are required in order to ensure that the AT is being used as it was intended, that it has a positive impact on the functioning of the student and that the use of the technology is appropriately integrated into the curriculum (King-Sears & Evmenova, 2007). Such skill development can be achieved through appropriate training and follow-up to determine the efficacy of the training and to identify further areas of need. If there is little research detailing the responses of EASN to AT, it is very difficult to effectively target the training that is required. Weintraub Moore and Wilcox (2006) stated that "a person's sense of confidence can be increased with training and experience" (p. 16). The ability to understand AT and use it with confidence will have an impact on the use of technology in the classroom. As the EASN is often the person using the technology with the student, and in some cases teaching the student to use it, there should be an emphasis on ensuring that they have the necessary skills and self-efficacy to be successful. In order to ensure that students with disabilities have access to devices which will allow them to reach their full potential, and the support from staff to utilise these, training of all staff is vital.

2.6 Relevant Theory

Theory
- Learning theory
- Social Cognitive Theory
- Self-Efficacy Theory
- Transfer of Learning theory
- Types of transfer
- Attitudinal Theory

2.6.1 Learning Theory.

There are many theories of learning which impact upon the way in which research and training are undertaken but each "involves acquiring and modifying knowledge, skills, strategies, beliefs, attitudes and behaviours" (Schunk, 2009, p. 1). Learning experiences should be designed to assist the participants involved in the experiences to acquire knowledge and skills and apply these effectively in new or existing situations. The social cognitive model asserts that learning is a mental process which involves the person acquiring, organising, rehearsing, storing and retrieving information, in the context of a social situation. A further examination of social cognitive theory, self-efficacy theory and transfer of learning theory follows as it is considered that these theories underpin the learning that occurs during training in small groups and are relevant to the subsequent use of the training in the desired context; in this case, a classroom.

2.6.1.1 Social Cognitive Theory.

Social cognitive theory is a framework for understanding human behaviour based around the interactions between the individual, the environment and the behaviour and was developed by Albert Bandura, building on the work of Robert Sears, among others (Grusec, 1992). Social cognitive theory originated in the behaviourist field of operant conditioning, but goes beyond pure observation of

actions of an individual to explain behaviour, to also examining cognitive processes that may be at work. At the heart of social cognitive theory is the understanding that "learning occurs within social spheres and contexts, which inform, develop, deepen and influence individual identity, thinking, learning and meaning-making processes" (Jordan, Carlile & Stack, 2008, p. 69). This theory has some parallels with Vygotsky's perspective on the importance of the social environment in facilitating learning (Schunk, 2012). Bandura (2001) stated that the "human mind is generative, creative, proactive, and reflective, not just reactive" (p. 4), characteristics which need to be considered within a social context. Cognitive processes are an important component in learning new information (knowledge and skills for acting on the knowledge), but the role of social interaction in any training environment cannot be underestimated, as teaching and learning are very much social enterprises (Kim & Baylor, 2006).

Observation of how another participant in the training reacts to an idea will affect (but not necessarily determine) whether the idea is accepted or rejected by the participant. Observational learning is a key element of social cognitive theory, where the participant learns through watching others' reactions and responses to novel ideas and practices. The observational learning impacts on the way the individual makes choices and acts upon these choices to change their own behaviour (Grusec, 1992). Peer interactions constitute a very powerful element in learning and having motivation to learn (Kim & Baylor, 2006). Indeed, Bandura and Walters (1963) stated that observational learning was a more efficient way to change behaviour than either direct learning or successive approximation.

Observational learning as described by Bandura has four main components. These are attention (to events or objects), retaining of information, action (copying a model) and motivation (Bandura, 1977). The more compelling or valued an event is, the more likely a participant is to pay close attention to it. Once this attention is given, it is then necessary to provide a system, such as a verbal description or pictorial representation, for the information to be effectively retained. An example is a mnemonic for remembering the colours of the rainbow (i.e. R O Y G B I V- red, orange, yellow, green, blue, indigo, violet). Once participants have retained the information, practice is given in the form of opportunity to perform a task/action. This may include demonstration of a task or completion of an activity designed to allow practice in the area of knowledge or skill. Lastly, the participants have to be sufficiently motivated through incentives to perform the skill or use the knowledge in their local environment.

Self-regulation of behaviour is another construct important to social cognitive theory. Self-regulation refers to a person's ability to modify the way they react to a specific situation (Bandura, 1982; 2001). Self-regulation may be referred to as a "…metacognitive process that requires students to explore their own thought processes so as to evaluate the results of their actions and plan alternative pathways to success" (Usher & Pajares, 2008, p. 443). The key elements of self-regulation include: setting standards and goals; self-observation; self-judgement; and self-reaction (Ormrod, 2004). Behavioural standards and goals are often determined by an individual when observing the standards of others who are similar in competence to themselves. In order to be aware of how well they are progressing towards a goal, a person needs to be able to observe their own actions and then make a judgement as

to whether or not they are meeting the standards they have set for themselves. If the person is meeting or has met these standards, they are likely to choose to reinforce themselves (Ormrod, 2004). Alternatively, if they feel that they have not achieved their goals, they may feel guilty or depressed about lack of progress and punish themselves by denying reinforcement. To enhance self-regulatory behaviour, techniques such as self-instruction, self-monitoring and self-reinforcement may be employed (Ormrod, 2004).

A well known experimental representation of social learning theory is that of Bandura's 'Bobo Doll' experiment (Bandura, Ross & Ross, 1961). The aim of the study was to determine if children would imitate aggressive actions if they were passive viewers of adult aggression. A group of 72 young children (mean age 4.4 years old) was shown one of three conditions. The first was a person behaving aggressively towards an inflatable clown toy (Bobo doll). The second group were shown a person behaving passively towards the Bobo doll, and the third group were not exposed to either situation, acting as a control group. The groups were further broken down into gender and whether or not they viewed same sex or different sex models (i.e. male model or female model). The study found that the children who viewed the more aggressive model demonstrated more aggressive behaviour, that boys were more aggressive than girls, and that both boys and girls were more aggressive if the model was male (Bandura, Ross & Ross, 1961). The findings supported Bandura's social cognitive theory and observational learning and demonstrated that people could learn new skills and cognitive constructs as a result of observation and imitation. This learning applies to negative as well as positive actions. Modelling of behaviour does not have to be explicitly targeted towards the

person: it is possible to learn incidentally in any situation, or vicariously from a secondary source.

When instigating small group training, it is important to be cognisant of social cognitive theory, as the components of verbal discussion and modelling of concepts and behaviours by all group members are inherent in this type of training (Ormrod, 2004). These components allow participants to represent and assimilate information through social as well as cognitive processes (Grusec, 1992). This assimilation of information takes place in a variety of cognitive domains, including expectation of outcomes, self-efficacy and self-evaluations and reaction, and will impact upon how the participants respond to future situations centred on the training constructs and whether or not they actively seek out situations in which to apply training principles. As small group training is a feature of the current study, it is important to consider the social components and interactions between participants.

2.6.1.2 *Self-Efficacy Theory.*

Self-efficacy theory describes people's beliefs about their own abilities and how their behaviour is directed by those beliefs (Grusec, 1992). Self-efficacy theory differs from theories of locus-of-control, where people attribute success or failure to either internal or external forces, as it deals with a person's belief about whether or not they are able to perform a particular task or how well they can perform that task. If an individual believes that they are unable to complete a task, they will become pre-occupied with thoughts about their perceived inability, which then impacts negatively on achievement of outcomes. Perceived self-efficacy can be enhanced in a number of ways, including: successful personal experiences, where the person

attempts a task and is successful; vicariously, through the successful experiences of others in a similar position; verbal persuasion, through being told that they are capable of an action; and physiological state, where a person's level of agitation is low and they feel physically strong and assured (Bandura, 1982). Poor self-efficacy will act as a barrier to an individual in performing a task to the best of their ability, or possibly even attempting the task in the first instance (Grusec, 1992).

Self-efficacy affects behaviour in the areas of choice of activities, goals, effort and persistence and learning and achievement (Bandura, 1989; Ormrod, 2004). Having knowledge and skills and being able to perform an action are necessary to be successful in an undertaking, however, some people who have identical skills and knowledge are more successful than others. Perceived self-efficacy can have an impact on both the behaviour and the motivation of a person and is a strong influence on thought patterns, actions and emotions (Bandura, 1982). Bandura (1982; 1989), stated that there is a causal relationship between high levels of self-efficacy and high levels of performance, meaning that the more a person believes that they are capable of performing a task, the more likely they are to be successful (assuming they also have the pre-requisite skills and knowledge to do so). "People avoid activities that they believe exceed their coping capabilities, but they undertake and perform assuredly those that they judge themselves capable of managing" (Bandura, 1977, cited in Bandura, 1982, p. 123).

Self-efficacy can be measured in a variety of ways. As researchers are attempting to determine a person's personal response to a situation, self report is a logical tool to use. Researchers may ask participants to indicate whether they feel

they are able to perform a task at a specific level with a simple 'yes' or 'no'

response. When the total number of positive responses is added together, this type

of measurement is known as self-efficacy magnitude (Bandura, 1989; Lee & Bobko,

1994). Participants may also be asked to rate the strength of their self-efficacy along

a continuum (i.e. very well, well, satisfactory, poor) in response to specific

statements (Bandura, 1989; Lee & Bobko, 1994). This type of measurement allows

the researcher to determine the strength of the self-efficacy belief, by summing the

ratings across all levels. Lee and Bobko (1994) stated that self-efficacy strength is

the most commonly used form of self-efficacy measurement. Other means of

measuring self-efficacy include the use of scales, including Likert-type scales. Self-

efficacy measures target-specific situations and tasks, rather than an all

encompassing feeling of ability which may be known as self-concept (Ormrod,

2004). There has been a move towards the development of a General Self-Efficacy

scale in recent years, which aims to measure the individual's ability "…to perform

well in a variety of situations" (Scherbaum, Cohen-Charash & Kern, 2006, p. 1047),

although this is not yet widely accepted and work is continuing on determining the

reliability and validity of the instrument.

Self-efficacy affects not only whether or not a person attempts a task in the

first place, but also how long they persist with the task, and how much effort they

will put into the task (Bandura, 1982; Ormrod, 2004). People with low self-efficacy

in relation to the particular task are more likely to give up on the task if obstacles are

raised. Those with a high self-efficacy will work to overcome the obstacles in their

path. Bandura (1982; 1989) contends that a high self-efficacy, tempered with some

cautiousness/doubt, is optimal in learning situations. He believes that a learner who

has a very high sense of self-efficacy may not be fully able to prepare for learning

new information and concepts as they already think they are capable. This may

hinder new learning, and not result in successful performance of a task. If a learner

feels that a task is difficult, but achievable, they are more likely to devote greater

resources and effort to it than if they believe it is an easy task which does not require

much effort (Ormrod, 2004).

There are a number of factors that can lead to development of a poor self-

efficacy (Bandura, 1982). A very confident person can leave another person feeling

that they are not as capable as the confident person, leading to a poorer self-efficacy,

even when the tasks that are performed are routine and everyday tasks. Similarly, if a

person is labelled as being inferior or told that they are not able to perform to an

appropriate level, they will not complete tasks as well as they are able, even if they

have the appropriate skills and knowledge. Examining a task for differences, rather

than similarities to prior experiences, is likely to result in poorer performance of the

task, which may be attributed to a lower self-efficacy (Bandura, 1982).

In a study conducted with a group of people who held a number of different

phobias, Bandura (1982) described how various levels of self-efficacy related to

participants varying abilities to deal effectively with their particular phobia. What

was also of interest was that "…perceived self-efficacy was a better predictor of

subsequent behaviour than was performance attainment in treatment" (Bandura,

1982, p. 125). Even if an individual was successful in completing a task, their

perceived self-efficacy was the main determinant of whether or not they felt capable

of completing a similar task, rather than their previous success. An increase in self-

efficacy may result through success in a task, and as a result of challenging poor beliefs about a person's capabilities. Modelling predictability and controllability are also key elements in enhancing a person's self-efficacy (Bandura, 1982). Predictability involves exposing participants to a variety of situations in which the task would need to be performed, allowing them to gain an understanding of the ways in which the task may need to be undertaken, thereby reducing stress for the participant. Controllability involves demonstrating ways in which individual tasks and situations may be approached and handled, providing participants with models for approaching or completing tasks or activities.

The majority of people spend their lives in social group situations and therefore the efficacy of the group, as well as the individual, should be considered (Bandura, 1982). Bandura (2001) stated that if a group holds a strong sense of efficacy in relation to an undertaking, their motivation and aspirations to perform well will be stronger and their persistence and resilience when faced with difficulties will be greater. This leads to a better overall performance of the group. Bandura uses the term 'perceived collective efficacy' to describe this form of social cognitive interaction. The stronger sense of collective efficacy, the more the group feels that they can solve problems and improve their situation. Personal self-efficacy (or self-efficacy of the individual) operates within the context of the broader collective efficacy of the group and is enhanced when the group achieves success. Self-efficacy can be modified through vicarious experiences, by one member of the group viewing the success or failure of another, similar member of the group (Bandura, 1982).

Self-efficacy can be examined in relation to any task a person performs within the sphere of daily living, including work, education, home life and personal interaction. Technological advances, for example, impact upon the lives of many people and there is often low self-efficacy related to the use or control of these technologies, particularly amongst older people (Bandura, 2001). This may cause difficulties for individuals as many people are increasingly required to use technology in their daily lives. It is not enough to have skills such as using a mouse or keyboard; the person must also have a perception of themselves as a competent user of the technology (Wang & Wang, 2008). Kim and Baylor (2006) have suggested that the application of an interactive 'peer' in the form of an animated digital character is one way of using social cognitive principles to assist people in accessing and developing positive self-efficacy in relation to the use of computer technology. Bandura (1982) stated that perceived self-efficacy acts as a cognitive mediator of action and further development of a positive self-efficacy will ultimately lead to a greater use of appropriate technologies. A positive self-efficacy in relation to the use of AT will, potentially, lead to greater use of AT in the classroom (Ajzen, 2001; Ajzen & Gilbert Cote, 2008).

2.6.2 Transfer of Learning Theory.

Transfer of learning from one context to another is a part of everyday life (Ormrod, 2004), without which people would have to learn how to react in every single situation in which they found themselves. The transfer of information and skills learnt in one setting to new contexts has been studied in a scientific manner since the beginning of the last century (De Corte, 2003). Thorndike initially described the use of an identical elements approach (old and new environments share

identical elements) in learning transfer (1906, cited in Lobato, 2006) and this was

then expanded upon by cognitive theorists, who determined that an individual

constructs a mental representation of both the training and transfer environment, and

that if there is enough similarity between the two, transfer takes place. The

examination of transfer stemmed from an interest in the behaviour change as a result

of training or application of learning and whether or not this produced results for the

individual or group.

The transfer of skills learnt in a training situation to that of a workplace,

which includes a classroom, refers to the "application of knowledge, skills, and

attitudes learned." (Sofo, 2007, p. 104) and can be seen as "…fundamental to the

overall learning process and…a cornerstone for the success of the total learning

experience" (Thomas, 2007, p. 5).   The maintenance of these skills over time is also

an important consideration. While much of the literature in the area of training

transfer has been conducted in the Human Resource area, it is also extremely

relevant in an educational context and transfer is indeed a key goal for education (De

Corte, 2003; Lobato, 2006). There are a number of reasons why it is necessary to

determine the extent of the transfer of skills and knowledge developed in training

situations, including to assess the value of the training for the workplace and to

determine the effectiveness of the training materials and delivery (Garavaglia, 1993).

The transfer of learning can be conceptualised through a variety of

perspectives (De Corte, 2003). The behavioural perspective suggests that the

training environment must mirror that of the work environment in order for transfer

of learning to take place. The environment may consist of tools, processes and

supports that the participant is likely to find in their workplace. The cognitive view proposes that the transfer of appropriate general skills (not necessarily those which are an exact match to the work environment) is able to occur, and that as long as these skills are taught, the person is able to transfer learning to a work context. A combination of these perspectives can also be applied, with aspects that mirror the work environment (classroom) and the training of skills that are applicable to a variety of contexts (i.e. problem solving skills) both given emphasis (De Corte, 2003). Other cognitive processes may include identifying needs of students in the classroom and appropriate matching of pedagogy to classroom requirements.

Some researchers (e.g. Hager & Hodkinson, 2009; Lobato, 2006) suggested that the use of the term 'transfer' should be abandoned, as it carries connotations of a passive transfer of knowledge, rather than an interaction of the knowledge with the learner and environment. While transfer of learning was previously limited to the immediate application of knowledge in similar or new settings; this view has now expanded to encompass a broader perspective of 'preparation for future learning' (De Corte, 2003; Hager & Hodkinson, 2009) which emphasises the ongoing nature of learning. This perspective emphasises the concept of learning as a constructive element and that the learner has an impact on how they use the knowledge and skills and the other resources that they may have available to them. Transfer will be impacted by the interactions of people and resources within systems. It is for this reason that planning for the transfer of learning should take place before, during and after the training (Thomas, 2007).

Transfer is a complex process that can involve many variables (De Corte, 2003). A number of variables have been identified which impact upon the success of transfer of training to work situations (Figure 2.4). These include characteristics of the learners, design of the training, the tasks that are required to be transferred, the learning environment and the transfer environment (De Corte, 2003; Wehrmann, Shin & Poertner, 2002). Individual trainee characteristics include the participant's expectations, how involved they are in deciding to undertake the training, how involved they are in deciding on training outcomes, and effort given to the training (Sofo, 2007; Wehrmann, Shin & Poertner, 2002).
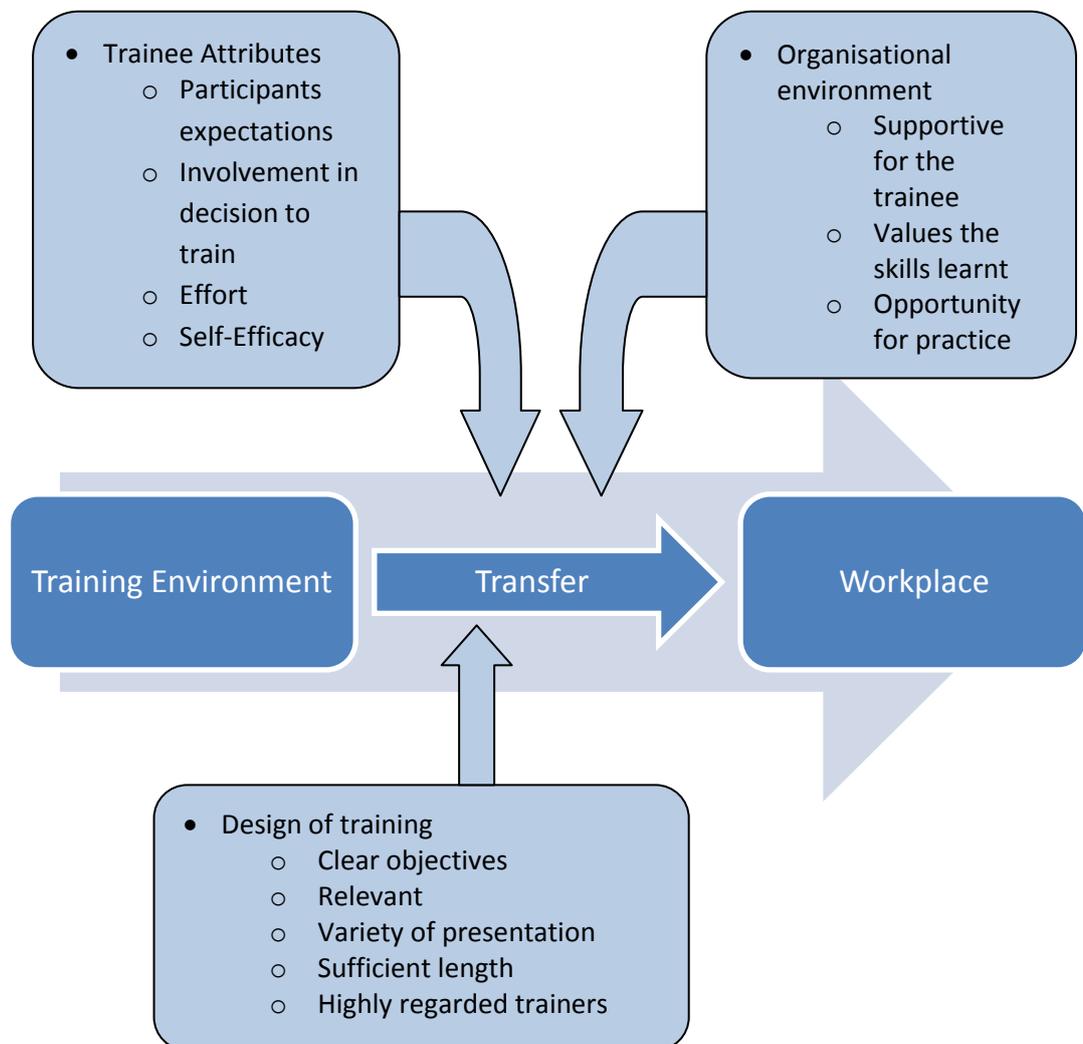
Figure 2.4. Factors affecting transfer of skills from a training environment to the

workplace (adapted from Foxon, 1993).

The decision to undertake specific training and ability to have an input into the content will affect transfer. Participants who choose to undertake training are more likely to have better outcomes than those who are required (mandated) to access training. Having participants provide input into the content of the training will ensure that the training is as relevant as possible to the individuals involved (Wehrmann, Shin & Poertner, 2002). Familiarity with the content prior to training will also impact upon the trainee's use of new skills and knowledge. Participants who already interact with the skills/knowledge in some form are likely to be more willing to integrate new information. A strong personal self-efficacy will result in more effort being applied to the new information and subsequently higher performance levels as a result. Transfer of training is also more likely to occur if the participants have a thorough understanding of the goals and outcomes of the training and what is expected of them as a result of the training (Wehrmann, Shin & Poertner, 2002). The aforementioned considerations for ensuring transfer of training have informed the development of training in the current study.

The design of the instruction should include clear objectives, be relevant to the workplace, be presented in a variety of ways, be of sufficient length to maximise learning, and use trainers who are highly regarded (Sofo, 2007; Wehrmann, Shin & Poertner, 2002). The objectives that are set for the training should be congruent with those of the organisation, ensuring that there is consistency in approach. A variety of instructional approaches will cater for the wide variety of learning styles that employees may bring to the training environment. Instructional approaches such as modelling, demonstrating, role play, drill, and guided discovery may be used individually or in concert to assist learners with attaining new knowledge and skills

(Barry & King, 1998). The participant's perceptions of the trainer will determine the status of the trainer. This status is generally determined by how experienced the trainer is seen to be and whether or not they are trusted by the trainees (Wehrmann, Shin & Poertner, 2002).

The organisational environment (e.g. the school) ought to be supportive for the trainee, and opportunity to use the skills learnt provided as part of this support. Without an opportunity to apply the skills that have been taught, the participant may not maintain the trained skill level and also may not perceive the relevance of the skill for their workplace. The opportunity to practice learned skills or use knowledge ought to be supported by the organisation (including managers and peers), and in some cases may even be determined by management. If a participant does not feel that appropriate support is available for them after training, the transfer of learned skills will be affected (Wehrmann, Shin & Poertner, 2002). As well as time and space for learnt skills and knowledge to be applied, the management has to be seen to value the training. A formal evaluation of the transfer of learnt skills to the workplace may be one way for an organisation to demonstrate that they are conscious of the need to accommodate training practice and that the outcomes of the training are valued.

Kirkpatrick (1994, cited in Goldman & Schmalz, 2005) described four levels of evaluation that may be applied to training: a) reaction – did the participants enjoy the training? b) knowledge – did the participants demonstrate that they had learnt the skills and knowledge? c) behaviour – are the participants applying their new knowledge in the workplace? And d) results – is the organisation closer to their goals

as a result of the application of the learning? Wehrmann, Shin and Poertner, (2002) evaluated the transfer of training for child welfare workers by asking the participants to indicate their "…perceptions of how well they attained specific learning outcomes at the end of the training as well as six months later" (p. 33) and suggested that pre-training assessment and supervisor report would also have been useful to strengthen the measurement of the transfer. They found that the attributes of opportunity for practice and peer support for using the new skills were very important in the transfer of learning. Additionally, Lobato (2006) stated that when researchers are evaluating learning in new situations they should examine the influence of the learner's prior activities as these will provide insight into the way in which learning is generalised.

Goldman and Schmalz (2005) stated that very few workplaces directly assess whether or not behaviour has changed as a result of training, and that there is little support to manage the process of transfer. In addition, "no more than 20% of training investment actually results in transfer to the job" (Goldman & Schmalz, 2005, p. 5). This is disconcerting when examining the huge outlay that many workplaces make in relation to training for their staff. Some of the reasons for this disconnect include the poor alignment of training programs and strategic directions for organisations, little post-training follow-up, and the lack of support between managers and trainers of staff.

There are many barriers that may be encountered when participants are attempting to transfer knowledge and skills from a training situation to their working environment. Barriers to transfer can include little or no reinforcement for a change in behaviour in the workplace, pressures within the workplace environment (e.g.

time, colleagues, authority, equipment), and a lack of support within the organisation as a whole (Goldman & Schmalz, 2005; Thomas, 2007). The participants' perceptions of the content and practicality of the training programs and increased levels of discomfort or effort will also impact on the transfer to the work situation. Goldman and Schmalz (2005) suggested that a thorough understanding of the barriers that may be at work in disrupting transfer is vital for an educator so that they are able to prepare appropriately to minimise these. A trainer can prepare for transfer by working collaboratively with all individuals who may have a bearing on whether or not new knowledge and skills are implemented, and through the development of a plan of action for transfer. Through a plan of action, participants can articulate the objectives they wish to meet and detail their progress (Thomas, 2007). An action plan may include specific outcomes and objectives to be achieved, strategies to assist in achieving the objectives, potential barriers, supports required and criteria for success. Including participants in the design of the training and balancing content and process can also aid in facilitating transfer, as can application of a test situation which requires transfer to be applied (Rohrer, Taylor & Sholar, 2010) or the use of post-course reflection to enhance transfer of learning (Leberman & Martin, 2004).

Ellis and Kershaw (2005) investigated the transfer of skills and strategies for teaching students with speech and language impairments from a training environment to the classroom. They found that at the completion of the training the teaching assistants, rather than teachers, had the greatest impact on the implementation and continuing use of strategies provided during in-service training. Teaching assistants were most likely to access resources available and were very

receptive to developing their skills and knowledge base. The teaching assistants were provided with ample opportunities to practice these strategies within the context of small group or individual support; a factor which has been shown to enhance transfer of learning (Wehrmann, Shin & Poertner, 2002). Ellis and Kershaw (2005) stated "…that all too often teaching assistants were the unsung heroes of inclusion" (p. 79). Follow-up sessions after training were advised so that the teaching assistants could clarify and consolidate their understanding and reflect upon what has and has not worked in their environment and reasons for this (Nelson, 2006; Potter & Richardson, 1999).

2.6.2.1 Types of Transfer.

Theorists have described many different types of transfer that may occur after a training period (Ormrod, 2004). These are often described in terms of dualisms and include positive versus negative transfer, vertical versus lateral transfer, near versus far transfer and specific versus general transfer (Figure 2.5). Positive transfer relates to learning being demonstrated well in a new setting. Negative transfer refers to interference from previously learnt information when a person is attempting to learn or perform in a new situation, resulting in difficulty acquiring new knowledge or skills (Perkins & Salomon, 1992). Vertical transfer relates to the transfer of learning by building on necessary previous knowledge. If the knowledge from one area is not necessary, but is useful for acquiring new knowledge or skills, the transfer is said to be lateral (Ormrod, 2004).
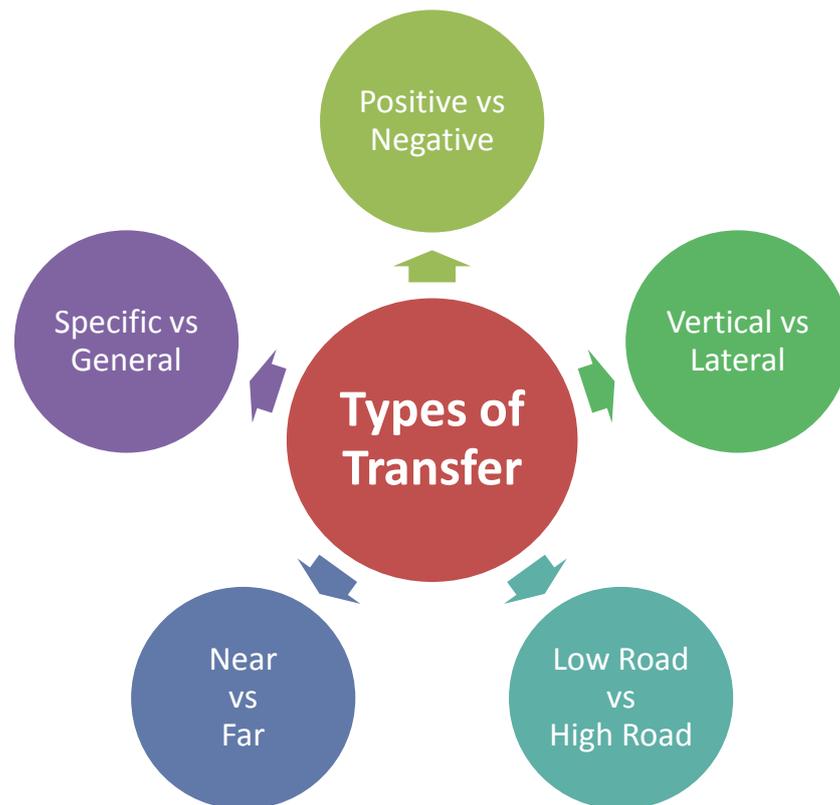
Figure 2.5. Types of transfer (Adapted from Ormrod, 2004; Perkins & Salomon,

1992).

Learning situations that are very similar in both surface characteristics and

underlying structure to the work situation result in near transfer. When the

underlying structure is the same, but the surface characteristics are different, far

transfer may occur (Perkins & Salomon, 1992). Both far and near transfer are

examples of specific transfer, where the tasks in both the training environment and

the performance setting overlap in some way (Ormrod, 2004). General transfer

occurs when the learning that has taken place in one situation is transferred to an

unrelated situation. "Research clearly shows that near transfer is more common than

far transfer and that specific transfer is more common than general transfer"

(Ormrod, 2004, p. 363). Perkins and Salomon (1992) also described a type of

106

transfer known as low road/high road transfer. Low road transfer refers to learning being transferred easily to a new situation in a reflexive manner, while high road transfer requires a more concerted effort on the part of the participant to make meaningful connections.

Knowledge of the types of transfer of learning may assist educators in designing instructional programs that will allow participants to successfully transfer new knowledge and skills to their work situations. In addition to the design of the training, the educator should aim to develop, within the participants, a positive attitude towards the use of the skills and knowledge in the workplace so that consequent behaviours displayed by the trainees are favourable towards the training principles and the application of these principles in novel settings. Taking transfer of training into consideration when designing AT training for specific groups will ensure that the training has the greatest chance of affecting change in the classroom.

2.6.3 Attitudinal Theory.

"People act in accordance with their attitudes" (Ajzen & Fishbein, 2005, p. 173). Attitudes are internal beliefs about psychological objects which influence the behaviour exhibited by individuals and can be used to predict behaviour in many cases (Ajzen, 2001; Ajzen & Gilbert Cote, 2008; Schunk, 2009). A psychological object may be a physical item, an organisation, a person, a group of people, a policy or an abstract concept (Ajzen & Fishbein, 2005). Attitudes towards psychological objects are acquired, not innate and can be learned, but are generally developed in an indirect manner through processes such as observation and accepting the beliefs of others (Ajzen & Gilbert Cote, 2008). Ajzen (2001, p. 32) stated that there is

"evidence indicating that evaluative reactions tend to be immediate and fast, and can occur outside of awareness". Therefore, rather than the person being fully aware of the formation of their attitudes towards an object, these may be forming as they interact with the object or at any other time in the future.

While it is not possible to explicitly 'teach' attitudes, conditions may be arranged to facilitate opportunities for participants to examine their existing attitudes and determine where these stand within their specific context and societal structure (Ajzen, 2001). Only through this examination can attitudes be modified or changed. According to Kaplan and Fishbein (1969), an individual holds beliefs about objects, where the object may be an intangible concept, such as a value or feeling. They suggested that there is an attitude associated with each object [although Ajzen (2001) raises the possibility of more than one attitude being associated with each object] and that these attitudes may be context-dependent or related to the relevance of the object for the person.

Attitudes become strongly attached to the object through the processes of conditioning and mediation, which ensures that the attitude is present whenever the object is at hand (Kaplan & Fishbein, 1969). Also surmised is that if an object is highly emotive for the person, then a strong attitude towards it will be evident and if it does not elicit strong emotion then the attitude toward it will be weaker. For this reason it may be useful for researchers and others involved in examining and attempting to influence attitudes to have an understanding or evaluation of initial attitudes towards an object through pre-testing or discussion with the people involved. Ajzen (2001) stated that the evaluation of an object is often represented in

"…attribute dimensions such as good-bad, harmful-beneficial, pleasant-unpleasant, and likable-dislikeable" (p. 28), although such extreme dichotomy is rarely the case.

The model of attitudinal theory developed by Kaplan and Fishbein (1969) that is of most relevance to the objects of inclusion and AT is that of the expectancy-value model. This model suggests that attitude towards an object is a function of the beliefs of the person about the object and how they have evaluated the characteristics and qualities of those beliefs (Ajzen, 2001; Ajzen & Gilbert Cote, 2008; Fishbein & Ajzen, 1972). By applying the model to behaviour change, it can be seen that an evaluation of a person's beliefs about an object will allow a change in beliefs and the evaluative aspects of those beliefs, and a potential change in behaviour as a result (Ajzen, 2001; Liska, Felson, Chamlin & Baccaglini, 1984). Kaplan and Fishbein (1969) have placed this relationship into an equation which is represented as:

$$A_o = \sum_{i=1}^{N} B_i a_i$$

In this equation A_o represents the attitude toward the object (o), B_i is the strength of the belief (i) about the object (o), a_i is the evaluative aspect of the strength of the belief (B_i) and N is the number of beliefs held about the object (o) by the individual. The validity of the expectancy-value model and the relationships as expressed by the equation has been supported by many researchers (Ajzen, 2001; Fishbein & Middlestadt, 1995; Hackman & Anderson, 1968).

Measurement of attitudes can be undertaken in a number of ways. Liska, Felson, Chamlin and Baccaglini (1984) described the use of specific items about which information is sought and the use of response categories for participants to indicate their level of agreement with each item. Ajzen (2001) discusses the potential use of response latencies, which can measure reaction to stimuli, to measure attitudes towards objects. He stated that the use of these types of indicators may be "free of reactive effects" (p. 33) and can be useful when examining socially sensitive areas (such as racial attitude). Likert-type scales such as those designed by Loreman, Earle, Sharma and Forlin (2007) have also been used to measure the self-perceptions of participants in regards to their level of skill before and after training. Rose and Forlin (2010) noted the influence of training on attitudes and beliefs, and also confidence to implement new knowledge and skills in the classroom.

In the area of inclusive education, attitudes towards students with disabilities and their inclusion in regular settings is of critical interest. As attitudes affect the actions of a person, then development of positive attitudes towards inclusion may be seen as a necessary element to ensure that students with disabilities are appropriately considered within the regular classroom setting, and that the person who is assisting the students with accessing the curricular or social aspects of the classroom has a positive attitude towards this role (Anderson, Klassen & Georgiou, 2007). Ways to develop or modify attitudes towards inclusion have often consisted of structured and unstructured opportunities to interact with people with disabilities (Golder, Norwich & Bayliss, 2005; Richards & Clough, 2004). It is posited that the more positive an attitude a person has towards inclusion and assistive technology, the more likely they

are to embrace the use of AT to support students in regular settings and be willing to assist others in its use.

Ajzen (2001) suggested that attitudes are not fixed in place, but that they can be modified. However, once established it may be difficult to modify negative attitudes (Ajzen, 2001; Brownlee & Carrington, 2000).   Attitudes that determine specific behaviours are a function of the beliefs that the person holds about the behaviour and can be influenced by consequences to the performance of the behaviour. Positive consequences to the behaviour strengthen beliefs about the behaviour which in turn promotes a positive attitude towards the behaviour (Ajzen & Gilbert Cote, 2008). Implications of a negative attitude toward inclusion of students with disabilities and their use of AT in the classroom can lead to the abandonment of AT and potentially poor curriculum and social outcomes for the students (Dugan, Campbell & Wilcox, 2006; Scherer, 2005). In order to promote appropriate conditions for the favourable development of positive attitudes towards both inclusion and the use of assistive technology, knowledge and skill development, as well as reflection and discussion of critical issues to address any negative attitudes can be useful (Ajzen, 2001). These methods have been shown to have a positive effect on the development of attitudes.

Alongside attitudinal theory there should also be a consideration of resistance of the individuals to change, both within the classroom setting and internally. Starr (2011) describes resistance as referring to "… 'negative' actions and non-action, ill will and resentment, and defensive or confrontational dispositions" (p.647). Starr suggests that it is natural for people to resist changes that impact upon them if they

do not have any control over the changes. As with attitudes, people may have to confront pre-conceived notions and beliefs and have experiences which are outside of their comfort zone when experiencing change. If the participants view the change as not valuable, or even negative, it may be perceived as a threat to identity (Collarbone, 2009) resulting in direct defiance and lack of change. Collarbone (2009) states that when making changes to beliefs, attitudes, understandings and position within an organisation or culture, a period of resistance is possible, but that with effective management this period should be short. Similarly, involving the participants in the changes to their own thinking and to classroom practice serves to reduce the anxiety towards change and possible resistance of new ideas.

2.7 Implications of Theory for Assistive Technology Training

Learning theory, specifically social cognitive theory (Bandura, 1977) and self-efficacy theory (Bandura, 1982) underpin the training developed for the EASN in AT. By conducting training in small groups, with a wide variety of skill and ability levels, the participants are able to learn through interaction and through modelling of skills, even when the instructor is not present. As there is more than one participant from each school setting, the opportunity to discuss and collaborate on AT initiatives is enhanced. By increasing the EASN's self-efficacy, they are more likely to attempt to use the technology when not explicitly supported by perceived 'experts', and may even explore the option of using AT in novel ways to support the individual needs of the students whom they support. By increasing the EASN's knowledge of AT and enhancing their perception of themselves as skilled users, their self-efficacy is also increased.

In order to ensure that content and skills learnt in the training are able to be transferred to the classroom, the explicit strategies described by authors such as Perkins and Salomon (1992) were utilised in the training. Some of these included planning for the transfer of skills and utilising resources that were readily available to the participants. A thorough understanding of transfer strategies may enhance training success for professional development providers.

Lastly, an examination of attitudinal theory exhorts the critical need to build opportunities for participants in the training to develop a positive attitude towards AT and the use of AT in the classroom. A positive attitude towards the use of AT is more likely to result in the EASN persevering with AT use and in asking for assistance if they require it (Parsons, Daniels, Porter & Robertson, 2008). By having a positive attitude towards the training the EASN will gain the most from the sessions. The attitudes towards AT may be shaped in a number of ways including examination of the benefits of the AT, successful experiences using the AT, positive responses from others who work with the EASN and increased knowledge of where to access AT.

2.8 Summary

The areas of literature identified as being relevant to the research highlight the changing features of schools in relation to the inclusion of students with disabilities and the use of AT to meet their needs. Central to the idea of inclusion is the provision of EASN to support the inclusive process. The EASN's role is rapidly changing to encompass tasks in which they may not currently have sufficient knowledge or understanding. Training in AT therefore must be provided to ensure

that the skills required are attained. Once the training has been undertaken, the use of the AT in the classroom must be seen to be applied appropriately as a result of the training and the transfer of skills and knowledge in this area, and participants' self-efficacy and attitude towards the use of AT will be important considerations.