STAK
Social Skills Training for Autistic Kids
A Personalised Dual-Adaptive Learning System for Caregivers

A Thesis submitted to the
University of Dublin, Trinity College
for the degree of
Doctor in Philosophy

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Declaration

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Abstract

The aim of this research is to design, develop and evaluate a personalised dual-adaptive learning system for caregivers to help them meet the challenge of teaching social interaction skills to children diagnosed with autism spectrum disorders (ASDs). Due to their social-cognitive learning disabilities children with ASDs are unable to develop social skills or interpret the social nuances around them. The need for caregivers to tackle the issue of social competence is important for the overall development of children with ASDs to allow them to participate fully in school life and later in society. A review of sixty existing social skills interventions indicates that these interventions are used mainly to teach language, pragmatics, and communication skills. This approach does not deal adequately with the social deficit in ASDs as it assumes that specific social skills can be taught in isolation from other aspects of social development. Furthermore, since each child with autism is unique, interventions which recognise their individual differences tend to be more effective. This thesis is a qualitative multiple case study which explores the research question: how a dual-adaptive learning system matches child profiles with appropriate educational resources and teaching strategies, while providing caregivers with support using those recommended strategies at levels consistent with their own profiles, to enable them to develop social skills in children with ASDs. To achieve this aim an investigation was conducted in two stages: (a) an iterative design process to determine the most appropriate support for both caregiver and child, involving 3 exploratory case studies with 20 participants; (b) the evaluation of the personalised dual-adaptive learning system, STAK (Social Skills Training for Autistic Kids) resulting from the first stage of the research, through 3 explanatory case studies conducted with 38 participants. Data was collected using online questionnaires, semi-structured interviews, database logs, telephone conversations and field notes. The objective of the evaluation was to examine caregivers’ opinions regarding how technology could be used to assess the child’s individual needs and the caregiver’s support requirements for the purposes of selecting appropriate resources to meet their particular needs and to investigate the design implications for the building of dual-adaptive learning systems to support caregivers teaching social skills to children with ASDs to inform the design of future applications.

1 Caregiver or carer is defined as any person who has the responsibility of looking after children with autism spectrum disorders. This group would include parents, teachers and key workers.
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Abbreviations

ABA  Applied Behaviour Analysis
ABC  Antecedents, Behaviours and Consequences
ADHD  Attention Deficit Hyperactivity Disorder
ADI  Autism Diagnostic Interview
ADOS  Autism Diagnostic Observational Schedule
AES  Adaptive Educational System
AHS  Adaptive Hypermedia System
ALD  Autistic Learning Disability
ALS  Adaptive Learning System
APA  American Psychiatric Association
AS  Asperger’s Syndrome
ASD  Autism spectrum disorder
ASHA  American Speech-Language-Hearing Association
CAPS  Comprehensive Autism Planning System
CMS  Content Management System
DLE  Digital Learning Environment
DSM-5  Diagnostic and Statistical Manual of Mental Disorders (fifth edition)
DTI  Discrete Trial Instruction
ERD  Entity Relationship Diagram
ICT  Information and Communication Technology
IEP  Individual Education Programmes/Plans
NIDCD  National Institute on Deafness and Other Communication Disorders
PALS  Personalised Adaptive Learning System
PDD-NOS  Pervasive Developmental Disorder – not otherwise specified
PECS  Picture Exchange Communication System
PHP  Hypertext Pre-processor
RTI  Response to Intervention
SIA  Special Interest Area
SOCCSS  Situations, Options, Consequences, Choices, Strategies, Simulation
SOLVE  Seek, Observe, Listen, Vocalize, Educate
SODA  Stop, Observe, Deliberate, Act
SNA  Special Needs Assistant
SST  Social Skills Training
STAK  Social Skills Training for Autistic Kids
TEACCH  Treatment and Education of Autistic and Related Communication Handicapped Children
UI  User Interface
VLE  Virtual Learning Environment
Chapter 1: Introduction

1.1 Motivation
Today one in every sixty-eight children is diagnosed with an autism spectrum disorder (ASD) (CDC, 2014). Social interaction difficulties lie at the core of this developmental condition (Wing & Gould, 1979; Carter et al, 2005). As a result of their social-cognitive learning disabilities, children with ASDs are unable to develop social skills or interpret the social nuances around them (Smith Myles et al, 2004). It is therefore important that caregivers (individuals including parents, teachers and key workers with responsibility for looking after children who have been diagnosed with ASDs) tackle the issue of social competence, as it impacts on the overall development of children with ASDs (Howley, 2001). Without social interaction skills children in this group will be unable to participate fully in their communities (Marans et al, 2005).

Since caregivers are familiar with the distinctive nature of the child’s problems and the varying levels of difficulty children experience when interacting with the people around them, they are best placed to help this group (Smith, 2003). Unfortunately it can be difficult for caregivers to identify what specific skills they need to teach the child to help them to be successful socially. In addition many do not have the means to determine why children with ASDs are confused or unable to achieve particular learning objectives (Attwood, 2007). Therefore caregivers require easy and immediate access to a structured social skills training programme comprising appropriate teaching strategies to create a stimulating educational environment for this group (Whitman & DeWitt, 2011) and educational resources which will cater for the variety of cognitive, emotional and social capabilities that children with autism present with (Mitchell, 2008).

Due to the long-standing problem of unproven educational interventions in the field of autism caregivers have difficulty choosing the best solutions for their children (Heward, 2009). An analysis by the author of reports on over sixty tried and tested interventions devised to teach social skills to children with ASDs revealed that many of these interventions facilitated the development of language, pragmatics and communication skills without reference to the child’s overall social development. These results highlighted the need for the design and development of a learning system which would support caregivers teaching social skills with social understanding to children in this
group to encourage them to generalize their newly acquired skills in everyday situations.

Adaptive educational systems (AESs) have been successful in providing support to learners in other domains through the creation of internal representations of users following analysis of their behaviour including their knowledge and characteristics (Brusilovsky & Peylo, 2003). The resulting profiles have been used to adapt the learning environment so that it best suits the individual learners. In fact personalised learning is considered by many as an opportunity to exploit the potential of information and communication technologies (ICT) in education to improve the quality of the support provided to learners (Thyagarajan & Nayak, 2007). Given that the third generation of adaptive hypermedia systems (AHS) uses individual services for sourcing learning content, personalising material and presenting content (Lawless & Wade, 2006) these technological advances may be of benefit in supporting dual-user adaptivity. In particular emergent adaptive technologies may be further exploited in order to tailor systems to take the learners’ prior knowledge, learning progress, growth of expertise and desired learning outcomes into account (Steiner & Albert, 2008).

Against this background, the present qualitative study attempted to address the gap in current knowledge. In so doing, it aimed to design, develop, implement and evaluate a dual-adaptive learning system to support and scaffold caregivers, by harnessing their own experience of teaching social skills and their knowledge of the children they work with to create user profiles which would match resources specific to their own and to their children’s requirements during the learning process. This enabled the author to investigate questions in relation to the design, development and implementation of profiling tools to assess caregivers’ prior knowledge of strategies and children’s capabilities for the purpose of selecting suitable resources for teaching social skills. Within this context this research also investigated how sound pedagogical approaches could be integrated with adaptivity features in order to engage caregivers in a cognitively rich online learning experience (O’Keeffe et al, 2006).
1.2 Background and Context

This thesis is grounded in the main areas of research which apply to teaching children who have been diagnosed with ASDs and helping them to develop social interaction skills. It is also concerned with studies in the field of personalised adaptive learning systems, with a view to meeting the challenge of providing resources that suit the individual needs of caregivers and children, in order to facilitate the effective exchange of information on teaching strategies and social skills in accordance with a structured training programme. This section frames the thesis within the pertaining literature and provides a brief theoretical rationale.

Children with ASDs present with difficulties in two core areas: (a) social communication/interaction and (b) restricted and repetitive behaviours (DSM-5, 2013.) Upwards of twenty-five per cent of children in this group have additional learning difficulties while children at the higher-functioning end of the spectrum generally have an IQ above average (Baron-Cohen, 2008). The prevalence of this condition in Ireland is on the increase according to census figures of the number of students diagnosed with this condition who have been enrolled in mainstream primary schools over the past ten years (Figure 1.1) (CSO 2011).

![Students with ASDs enrolled in Special Classes in Mainstream Primary Schools](image-url)
Studies have shown that children with ASDs appear to be unaware of what other people are thinking (Happé, 1995) and they tend to miss out on essential social cues because they are unable to ‘read’ minds and have an apparent indifference to the feelings of those around them (Baron-Cohen et al 2005). Some children in this group are capable of achieving good performance on tasks that require attention to detail but their weak central coherence may interfere with their performance on tasks that require recognition of global meaning (Happé, 2005). Children with ASDs can also appear to be disorganised and have a total disregard for the school timetable but, paradoxically, may develop an obsession with ritual and routine (Hanbury, 2012). Their inability to coordinate their visual attention with another individual in relation to some object or event can make it difficult for them to initiate interactions with their peers (Mundy & Burnette, 2005). This in turn can affect their language, pretend play and their ability to understand the relations between stimulus and reward (Bigelow et al, 2004; Dawson et al, 2004).

Children with autism have quickly become one of the most challenging groups for educators to teach. This is due to a number of factors including the rapid growth in the number of children identified with the condition, the lack of definitive criteria for recognizing children as having ASD and the limited research on best practices for serving this group of children (White et al 2012). Some of these children may be found struggling to cope in mainstream school where specialized resources have been greatly reduced.

1.2.1 Design Challenges

Among the many challenges in designing such a system for children on the autism spectrum is that while they share common types of symptoms and a common style of learning and thinking each individual child is unique because the severity and pattern of his/her autism and intellectual ability are unique (Janzen, 2009). As children with ASDs are among the most challenging of all students to teach careful planning, meticulous delivery and individualized programmes are essential for success (Heward, 2009). Wing (1980) wrote: “An autistic child can be helped only if a serious attempt is made to see the world from his point of view, so that the adaptive function of much of his peculiar behavior can be understood in the context of his handicaps” (page xi). It is clear that ‘one size does not fit all’ in this context so interventions set on sound principles which
recognize individual difference have proved to be the most effective (Smith, 2003). Therefore it is crucial for the success of this learning system that the child’s personal profile is central to the design concept.

1.2.2 Caregiver’s Role

Since caregivers are familiar with the distinctive nature of these children’s problems and the varying levels of difficulty children experience when interacting with the people around them, they are best placed to help this group (Smith, 2003). However caregivers do not have time to attend courses or read academic textbooks to determine why children with ASDs are confused or unable to achieve particular learning objectives (Attwood, 2007). Moreover they do not know what specific skills they need to teach their children to help them develop social competence and unravel the ‘hidden curriculum’. Furthermore, their quest for trustworthy resources that best suit their children’s individual social capabilities has often been thwarted due to the preponderance of interventions that have not been empirically evaluated (Heward, 2009).

1.3 Research Objectives & Contributions

This thesis is a qualitative multiple case study and the research question explores:

- how a dual-adaptive learning system matches child profiles with appropriate educational resources and teaching strategies, while providing caregivers with support using those recommended strategies at levels consistent with their own profiles, to enable them to develop social skills in children with ASDs.

In particular the thesis investigates how technology could be of benefit:

- by matching teaching strategies to the child’s learning stage (novice, intermediate, advanced and acquired) in each social skill
- by linking the support level consistent with a caregiver’s prior knowledge of teaching social skills to the teaching strategies recommended for a given child
- by matching educational resources to the child’s learning style, language ability, comprehension ability and special interests.
It also examines the following subset of questions:

1. how can a framework based on best practice in social skills training inform the learning content recommended by a dual-adaptive system?
2. how can a dual-adaptive learning system enhance the learning experience for both caregiver and child?
3. how does STAK use technology to assess the child’s individual needs and the caregiver’s support requirements for the purposes of selecting appropriate resources?
4. what are the design implications for the building of dual-adaptive learning systems to support caregivers teaching social skills to children with ASDs, arising from this study?

The thesis contributions are the following:

1. The design and implementation of the personalised dual-adaptive learning system, STAK
2. The evaluation of STAK
3. The design and implementation of the tools to create Carer and Child Profiles
4. The design of the framework for teaching social skills to children with ASDs
5. The creation of learning content for children with ASDs
6. The building of two content management systems and a discussion board
7. Insights into the teaching and learning implications arising from this study

1.4 STAK Personalised Dual-Adaptive Learning System

STAK is a personalised dual-adaptive learning system (PALS) designed by the author to support caregivers teaching ten social skills to children with ASDs either at home or in school settings. A number of teaching strategies are applied in the system to promote skill acquisition or to enhance skill performance as part of a logical sequence corresponding to the child’s skill level and not in an ad hoc fashion. The rules regarding the selection of the teaching strategies are constructed around the child’s profile (specifically the learning stage in each of the ten social skills). The level of support that the system provides the caregiver is determined by the responses he/she has given during the creation of his/her Carer Profile. Similarly the rules surrounding the recommendation of educational resources for the child are based around the Child Profile (learning style, language ability, comprehension ability and special interests).
1.5 Thesis Structure
The remainder of this thesis is divided into seven chapters:

**Chapter Two** provides a review of the literature on interventions that are currently used to teach social skills to children with ASDs and investigates the current state of the art in technology in personalised adaptive learning systems. The chapter provides the theoretical framework for the present study.

**Chapter Three** presents and discusses the research methodology chosen for this qualitative investigation. It outlines the reasons for the adoption of the multiple case study methodology for this inquiry. It describes the two phases of the research: (a) the iterative design process to devise the personalised dual-adaptive system, STAK, involving 3 exploratory case studies and (b) the evaluation of STAK, comprising 3 explanatory case studies. The chapter also outlines the data collection tools, the data sets, and data analysis techniques applied in this study.

**Chapter Four** is concerned with the iterative design process leading to the design of the personalised dual-adaptive learning system. It provides an overview of the three exploratory case studies conducted, providing information regarding the procedure followed, the context and the participants involved. It concludes by discussing the findings and addresses how technology could enhance the learning experience for both caregiver and child.

**Chapter Five** presents the personalised dual-adaptive learning system designed to support caregivers teaching social skills to children with ASDs and describes an instance of this system called STAK (Social Skills Training for Autistic Kids) which was developed by a third party. The application’s five components comprising the Introduction, the Carer Profile, the Child Profile, the Activity Centre and the Administration section are outlined. It explains how the profiling tools assess the caregivers’ prior knowledge of teaching strategies and the children’s learning styles, language abilities, comprehension abilities and special interests. It defines the rules which determine the level of support required by caregivers and the selection of appropriate educational resources for the children concerned. The chapter also presents the technology used in this instance of the learning system.
Chapter Six provides a description of three explanatory case studies conducted to evaluate STAK. In addition, it presents details regarding the context and participants, duration, and procedures of the cases.

Chapter Seven discusses the findings of the evaluation of STAK and addresses the remaining research questions of this thesis.

Finally, Chapter Eight summarises how the research questions have been addressed, outlines the limitation of this study, and provides recommendations for future work.
Chapter 2: Literature Review

2.1 Introduction
This chapter sets the present study in the context of the relevant literature pertaining to the areas of autism theories, assessment tools and social skills interventions. It examines how technology has been used in the education domain to enhance the learner experience. It suggests the exploration of adaptive techniques to assist caregivers teaching social skills by harnessing their knowledge of their children to create profiles which could be matched to appropriate resources to meet their individual needs while at the same time supporting caregivers on their own learning journey by taking their prior experience of strategies into account.

2.2 Autism Spectrum Disorders
Autism is defined as a neurological disorder that causes discrepancies in the way the brain processes information. This information-processing difference affects the children’s ability to comprehend and use language to interact and communicate with people; to understand and relate normally to people, events and objects; to respond typically to sensory stimuli and to learn and think as typically developing children do (Janzen, 2009). Unfortunately there is no biological set of markers (such as a combination of specific gene variants or specific protein levels) measured in blood or other bodily tissue or cells on which to base a diagnosis of ASD. Clinicians increasingly rely on standardized behavioural and interview-based instruments such as the Autism Diagnostic Interview (ADI) and/or the Autism Diagnostic Observational Schedule (ADOS) to help them evaluate children’s conditions (Baron-Cohen, 2008).

Recently the diagnostic criteria for autism spectrum disorder have been modified based on earlier research literature and clinical experience (DSM-5 APA, 2013) (Appendix I). The revised diagnosis represents a new, more accurate, and medically and scientifically sound method of diagnosing individuals with autism-related disorders. Using DSM-IV, patients could be diagnosed with four separate disorders: autistic disorder, Asperger’s disorder, childhood disintegrative disorder, or the catch-all diagnosis of pervasive developmental disorder not otherwise specified. Researchers found that these separate diagnoses were not consistently applied across different clinics and treatment centres. Children who have already been diagnosed according to DSM-IV criteria retain those diagnoses.
Autism could also be described as a developmental disorder since it emerges early in life with symptoms that gradually unfold as the children develop. Since individuals diagnosed with autism have deficiencies in the areas of language and social interaction they usually experience problems in other areas such as academic and vocational functioning and independent living. Viewing autism from a developmental perspective has important intervention implications including social environment, the timing of the intervention and the multidimensional and dynamic nature of the condition (Whitman & DeWitt, 2011). Figure 2.1 shows the complex relationship between biological and environmental factors and their influence on the development of ASDs. Although the specific defects that produce autism have not been identified research has provided some initial insights according to Whitman & DeWitt (2011). As indicated in this figure one pathway of influence is from genes, which affect neurobiological substrate development which in turn influences the emergence of behaviours associated with autism. Social and physical factors make up the environment that produce changes in these behaviours including the influence of parents, family, teachers, and educational interventions.

### 2.2.1 Characteristics of ASDs

Autism manifests itself in significant behaviour and communication differences including abnormal social and communication skills and restricted interests and activities (White et al, 2012). Children with this condition display a preference for solitude and are often described as ‘aloof’, ‘remote’ and ‘living in a world of their own’ (Christie et al, 2009). Other characteristics include a dislike of changes in routine, the use of objects in unconventional ways (eg spinning wheels of toy cars repeatedly), stereotyped and repetitive motor movements, severe tantrums and self-injury and delays in age-appropriate self-help skills such as dressing and grooming (Ben-Arieh & Miller, 2009). Symptoms begin in early childhood but may not be fully recognised until social demands exceed the child’s capacity to cope (Hyman, 2013). Since there is no chromosomal marker or physiological feature evident it is only by observing the child’s behaviour that one can say that a child has an ASD and only by analysing that behaviour that one can understand the child’s needs and find strategies that suit those needs (Hanbury, 2012).
Communication difficulties range from not understanding or using spoken language at all to having an above-average vocabulary but without having much to say that could be described as mutually conversational. Communicative autistic learning disabilities (ALDs) include problems understanding body language and facial expression, using expressive body language and facial expression, and comprehending and using spoken language. Impairments in reciprocal social interaction map onto three main areas of social ALDs: a lack of awareness of others as they live in their ‘own little worlds’; a lack of social and emotional reciprocity which leaves them uninterested in having social interaction that please (or displease) parents or teachers and which leads to them losing out on early learning stages; and finally a lack of social imitation which closes a main source of new experiences for them (Siegel, 2003).

2.2.2 Models of Autism

A number of models have been proposed to explain the characteristics of autism since Kanner’s seminal work (1943) in which he described a group of children who did not relate to others, had delays in speech development, engaged in repetitive behaviour and were upset with changes in routine (Kirk et al, 2012). Each of these models helps to
provide an insight into a particular aspect of autism and can be used to understand the experiences of the individual with autism from their perspective. These models can assist caregivers in identifying children’s strengths and weaknesses so that they can begin to support their progress in the ways that suit them best (Hanbury, 2012).

The concepts described below form part of the conceptual framework which underpins current thinking in the field of autism. It is important to consider this framework as ever-changing as knowledge of the condition increases (Hanbury, 2012).

2.2.2.1 Triad of Impairments

The Camberwell study conducted by Wing and Gould (1979) found all the children with ‘autistic features’ showed an absence or impairment of social interaction, communication and development of imagination. The strength of Wing’s model (2002) is that it is flexible enough to cover the full range of the autistic spectrum and thus allows one to view each child’s condition uniquely. Although it is necessary for all three core deficits to be present (ie impairments in social communication, social understanding and imagination) (Figure 2.2), the degree to which each of these components affects the individual with autism varies from person to person. For some individuals one element of the triad may be particularly marked, while other individuals may manifest significant difficulties across two components and hardly any in the third. For some people the overall impact of the triad may be quite severe whereas other people will learn to manage the affects without too much difficulty. The infinite possible combinations and permutations of the triad accounts for the huge breadth of the autism spectrum and the variety of children diagnosed with this condition (Hanbury, 2012).
2.2.2.2 Theory of Mind

Children with ASDs appear to be unaware of what other people are thinking and of what people are trying to make other people think (Happé, 1995). Therefore they miss out on essential social cues because they are unable to ‘read’ minds (Baron-Cohen, 2000). In 2002 this ‘mindblindness’ theory was extended and a theory of empathising-systemising was formulated to explain the apparent indifference of children with ASDs to the feelings of those around them (Baron-Cohen et al 2005).

2.2.2.3 Central Coherence

Frith (1989) coined the term central coherence to describe the force which pulls large amounts of information together in order to see the bigger picture. Weak central coherence is therefore understood as ‘a lack of a drive for meaning’ (Frith, 2003, p 152). Happé (2005) notes the central coherence theory can explain how good performance will be achieved by children with ASDs on tasks that require attention to detail but results may be poor on tasks that require recognition of global meaning. For this reason children with autism can recognise the identity of familiar faces from a part of an image but fail to pick up on context clues when reading. Weak central coherence also accounts for the piecemeal fashion that children with autism acquire knowledge and the unusual cognitive profile presented by many individuals. Caregivers may observe the lack of
central coherence in the narrowed interests of children with autism, in the way that they are unable to generalise skills or in the ‘islets of ability’ that they sometimes display (Hanbury, 2012).

2.2.2.4 Executive Dysfunction

The term executive function is used to describe goal-directed behaviours (dealing with obstacles in gaining a goal). This category includes a number of skills such as flexibility, planning, inhibition, organisation, self-monitoring, goal setting and working memory (Ozonoff et al, 2005). Children with ASDs can appear to be disorganised and have a total disregard for the school timetable or the completion of tasks but, paradoxically, may develop an obsession with ritual and routine. Supportive materials including written lists of instructions, symbols and images can be used to help them, as they tend to be less overwhelmed by a complex task when it is presented as a series of small steps (Hanbury, 2012).

2.2.2.5 Joint Attention

What distinguishes children with ASD from typically developing children is not so much the fact that they do not interact with others but rather the ways in which they interact. For instance, they may approach caregivers with requests, make occasional eye contact and even take part in games taking turns but they do not tend to share their achievements and their interests with others and/or conversely they do not share in the interests of the people around them. In other words they do not share attention jointly with others (Whiteman & DeWitt, 2011). Joint attention refers to the ability of young children to coordinate their visual attention with another individual in relation to some object or event and associated skills include monitoring or directing the focus of attention of another person through pointing, gestures and gaze monitoring (Hanbury, 2012). Deficits in joint attention can lead to the early onset of a dramatic reduction in the tendency of children with ASDs to initiate episodes of social sharing with other people (Mundy & Burnette, 2005). Research indicates that joint attention is critical for acquiring oral language, deciphering other people’s communications and nonverbal facial expressions, learning through observation, developing empathy and understanding the minds of others (Whitman & DeWitt, 2011). This in turn can affect not alone
language development but pretend play and their ability to understand the relations between stimulus and reward (Bigelow et al, 2004; Dawson et al, 2004).

2.2.2.6 Sensory Processing

In recent years difficulty in processing sensory information has become recognised as a further defining feature of ASD (Hanbury, 2012) although the role of perceptual abnormalities in causing autistic behaviours have not been systematically investigated and therefore requires further investigation (Bogdashina, 2003). Most children with ASD have unusual perceptions of sensory input and perceive everything as it is without interpretation or understanding ie ‘literal perception. Some individuals have problems in filtering sensory stimuli which may distort their perception so that they experience heightened sensory sensitivity (Grandin, 2006; Attwood, 2007) or hyposensitivity (Delacato, 1974). Some people may acquire compensatory strategies in order to cope with excess sensory information. When their brains become overloaded with sensory input this places them in a state of arousal and stress. Some may also have specific sensory dislikes such as the smell of food, noise of a dog barking, etc. Anxiety can escalate in sensory-rich environments such as supermarkets, playgrounds and classrooms. Their anxiety can be triggered when they receive specific input which they dislike eg smells and their responses at such times include ‘fight or flight’, emotional outbursts or the children concerned may appear ‘on edge’ (Bogdashina, 2003).

2.2.2.7 Personal Autobiographical Memory

A lack of ability to reflect on their own thinking means some children with autism have difficulty relating personal events but yet can recall many particulars about these same events as if they were observers of what was happening (Jordan & Powell, 1995).

2.2.3 Individualisation

The effects of autism can vary from mild to severe and the intellectual ability of the children can range across the spectrum from gifted to severely intellectually challenged (Baron-Cohen, 2008). Children with ASDs also present with a variety of cognitive, emotional and social capabilities (Mitchell, 2008). Evidence also suggests that children with ASDs have a visual learning style (Kuttler et al, 1998; Grandin, 2006), interpret
sentences literally (Smith, 2003; Gray, 2004), display good visuo-spatial skills that do not involve language (Wing, 2002), and have a short attention span (Frith, 2003). Moreover children with ASDs often focus on irrelevant stimuli and show no apparent interest in what is going on and may have an outburst of aggression or self-injury with little or no warning. Without the cognitive flexibility to understand and process new events children can be easily thrown into meltdown (Baker, 2008). Caregivers, who are best placed to know the children’s particular requirements, need tools which are flexible and adaptable to cater for the idiosyncratic and individual nature of each child’s difficulties.

2.2.4 Learning Stages

Smith (2003) maintains that most children diagnosed with ASD are keen to do what is right and to behave in socially appropriate ways, if only they knew what they were. Whereas most neurotypical children seem to acquire basic social skills (initiating conversation, turn taking) quickly and easily through experience, imitation and by trial and error, children with ASD have to be taught these skills directly before they can be successful socially. Social interaction skills are learned and mastered through practice and performance by learning the sequence of steps in a new task and repeating those steps until a level of automaticity is reached (Bellini, 2008).

Social skills acquisition should be viewed as a continuum with children progressing from novice to mastery through three learning stages as follows:

- At the **novice stage** children require a great deal of cognitive effort and attention to complete a task
- At the **intermediate stage** children become more independent with the task but still need a great deal of cognitive energy to complete it
- At the **mastery stage** children can complete the task with little cognitive energy

At each of these stages the learner displays certain characteristics as illustrated in Table 2.1. Skills that are mastered may require additional instruction so caregivers will need to continue to teach children how to perform the skills better and provide them with opportunities to practise and perfect each skill (Bellini, 2008).
Table 2.1  Stages of Skill Acquisition (Source: Building Social Relationships by Bellini, 2008)

<table>
<thead>
<tr>
<th>Learning Stage</th>
<th>Characteristics of Learner</th>
</tr>
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| Novice        | 1. Exerts a great deal of cognitive effort to complete task  
2. Vulnerable to distraction  
3. Requires assistance to complete task  
4. Makes frequent errors  
5. Completes tasks slowly |
| Intermediate  | 1. Becomes more independent but still requires a great deal of cognitive effort to complete  
2. May hesitate between steps of the task, as she attempts to recall the procedure  
3. Performs tasks inconsistently  
4. Makes fewer errors than novice learners; fluency is increased  
5. Requires instant feedback on task performance |
| Mastery       | 1. Completes tasks independently with little cognitive energy  
2. Is able to complete multiple tasks at the same time  
3. Does not hesitate between steps of a task  
4. Fluency is significantly increased  
5. Typically performs errorlessly  
6. Able to complete tasks across various settings and persons  
7. Adapts performances to environmental demands |

2.2.5 Learning Styles

The way an individual approaches learning and studying is known as his/her learning style or preference. There are a number of instruments available for assessing people’s learning preferences including the VARK system which classifies learners into four groups: visual, aural, read/write and kinaesthetic (Fleming & Mills, 2002; Fleming & Bonwell, 2008) (Appendix II). Nowadays many educational psychologists are sceptical about the value of learning preferences and maintain that learners, especially those who have difficulty learning, prefer to learn in a certain way because they have no alternative. For instance, children with autism may choose pictures because they have a difficulty comprehending the written word due to their weak central coherence (Woolfolk et al, 2013).

For many years researchers examined individual differences in ‘styles’ – cognitive styles, learning styles, problem-solving styles, thinking styles, and decision-making styles. This work can be divided into three traditions: a) cognitive-centred styles assess the way individuals process information by being, for instance, reflective or impulsive
in responding; b) personality-centred styles assess more stable personality traits such as extroverted versus introverted; and c) activity-centred styles which assess a combination of cognition and personality traits that affect how individuals approach activities eg surface-processing or deep-processing. Mayer & Massa (2003) conducted a study into the distinction between visual and verbal learners with a focus on learning from computer-based multimedia which revealed that students may have a preference for learning with pictures but their cognitive spatial ability (if low) could make using pictures for learning less effective. Spatial abilities may also be important when it comes to learning from static pictures but may matter less when animation is used to aid learning (Woolfolk, 2013).

2.2.6 Language

A language may be defined as a system of communication which relies on symbols that can be expressed acoustically or graphically. One learns a language mainly through listening to users of that language. Delay in the acquisition of language may be caused by hearing deficits and delay in the use of language to communicate by motor deficits, not uncommon in individuals with autism (Tantam, 2013). Language deficiencies are in fact a core diagnostic characteristic of ASD with many children in this group failing to reach normal milestones in speech development (Appendix III). There seem to be critical periods for speech and language development in infants and young children when the brain is best able to absorb language. If their condition is not diagnosed at an early stage children may not be exposed to language during these critical periods and consequently they may experience communication problems later. As babies grow they first recognize important sounds in their environment (such as their mother’s voice) and then begin to sort out the speech sounds that compose the words of their language so by six months they should be able to recognize the basic sounds of their native language (NIDCD, 2014).

Moreover development of language can vary considerably among children who have been diagnosed with ASD (Whitman & DeWitt, 2011). Studies have shown that almost half of children in this group do not speak or only utter simple sounds (Heward, 2009) while children at the higher functioning end of the spectrum may develop quite complex language skills (Whitman & DeWitt, 2011). The use of language is rarely divorced from communication for the choice of words or phrases, or the tones of voice or stress
patterns with which statements are made are often influenced by nonverbal communicative demands as well as purely linguistic ones (Tantam, 2013). It is quite often the case that children with ASDs tend to use language to get their needs met when they feel it is either the only way or the most efficient way (Siegel, 2003).

2.2.6.1 Expressive Language

Many children with ASD can learn to request and label items (Heward, 2009). However children may present with disorders of language expression despite having a normal understanding of language. This may be the result of impaired coding of language in which case language-based thinking is also affected, or of translating language into appropriate movements (articulation disorders such as stuttering) (Tantam, 2013). Sometimes their language may be marked by immediate echolalia (verbatim repetition of what people around them have said) or by idiosyncratic phrasing or usage (Janzen, 2009).

2.2.6.2 Receptive Language

Children with delayed use of speech may also have a delayed understanding which could indicate that their language processing is selectively impaired in comparison with their other cognitive abilities (Appendix IV). This is termed specific language impairment and is often associated with grammatical errors but errors of word meaning may also occur (Tantam, 2013). Consequently many children may learn to read and spell without formal instruction but they are unlikely to attach meaning to these words on their own (Janzen, 2009). Moreover they may experience processing-speed delays and this can also cause them to miss some of the message and hinder them from reaching the same comprehension milestones as typically developing children (Siegel, 2003). Children in this group also tend to process verbal information literally and thus often have difficulty in understanding abstract concepts, idiomatic expressions or humour (Heward, 2009). For this reason it can be hard for them to compare or contrast ideas, make judgements, adapt rules or evaluate alternative options (Janzen, 2009).
2.2.7 Special Interests

Some children with ASDs become intensely interested in unusual subjects (eg light bulbs, dinosaurs, train timetables etc) almost to the point of obsession and will talk non-stop about these topics at the risk of boring their listeners. Their development of spontaneous usage and expressive language are often tied to talk around their special interests (Siegel, 2003). Sometimes caregivers can use these fixations to motivate a child to remain focused on a lesson. Special interest areas (SIAs) can function as the irresistible bait to lure the children to acquire academic and/or social skills (Heward, 2009). For example, the Power Card strategy (created by Gagnon 2001) is a visual aid that uses a child's special interest to help him understand social situations (Henry & Myles, 2007). The card contains a picture of the special interest and a brief three to five-step summary of the solution. When children with ASDs are allowed to discuss and explore their special interests in an environment created specifically to share those interests such as clubs and workshops their desire to interact and socialise can increase (Henry & Myles, 2007). Other programs such as Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH) assess a child’s interests as part of their holistic approach to teaching children with ASDs.

2.3 Assessment Tools

Without the professional services of suitably qualified personnel a diagnosis of ASD cannot be reached. However there are some tools available which can help caregivers to highlight language delay which is one characteristic of the autistic condition. There are also a number of instruments available which attempt to assess children’s current skill repertoire and serve as a basis for the selection of educational objectives:

1. The Assessment of Basic Language and Learning Skills-Revised (The ABLLSTM – R) is an assessment curriculum guide and skills tracking system for children with autism and other developmental disabilities (Partington, 2008). The purpose of the ABLLSTM –R Protocol is to identify those language and other critical skills that are in need of intervention in order for a child to become more capable of learning from his or her everyday experiences. The ABLLSTM –R language component is based on Skinner’s analysis of language (1957). This tool assesses the child’s ability to attend to verbal and nonverbal stimuli, and to multiple and complex stimuli, which are all critical for language learning. It also assesses the child’s ability to use
language learned in one situation in a range of other relevant contexts. In order to complete this protocol the teacher must score the child on a range of receptive language tasks, vocal imitation, requests, labelling, intraverbal tasks, spontaneous vocalisations, syntax, grammar, reading, writing, and spelling skills.

2. The Verbal Behaviour Milestones Assessment and Placement Program (VB-MAPP) is a language and social skills assessment program for children with autism and other developmental disabilities (Sundberg, 2008). VB-MAPP is also based on Skinner’s verbal behaviour, developmental milestones and field-test data. There are five components to the protocol: (a) 170 measurable milestones that are balanced across sixteen skills areas and three developmental levels; (b) 24 learning and language acquisition barriers often faced by children with language delays; (c) summary assessment of a child’s readiness to move to a less restrictive educational setting; (d) 900 skills in a task analysis that are presented in the form of checklists and charts for skill tracking which serve as a more thorough verbal behaviour curriculum guide and finally (e) a placement and IEP goals section.

3. The American Speech-Language-Hearing Association (ASHA) has devised a set of milestones for receptive language, listener skills and reading comprehension to help parents and practitioners determine the developmental abilities of typical children.

4. The University of Michigan Health System provides an outline of the natural progression or timetable for mastering the skills of speech and language skills in children from birth to five years of age to assist doctors and other health professionals. Sometimes a child may not be on track due perhaps to hearing loss or to a speech or language disorder.

2.4 Educational Psychology
One of the basic principles of learning theory is that all learning occurs in a specific sequence that includes a cue that signals or triggers a response or behaviour, which in turn triggers a consequence, either punishing or reinforcing. Thus we learn from each other (ie social learning) whenever there is an interaction between two or more people, the behaviour of one person affecting the behaviour of another (Janzen, 2009).
There are four approaches to this study which are relevant in teaching autistic children comprising: the neurophysiological approach, the information-processing approach, the cognitive/developmental approach and the behavioural approach (Wolery, Bailey & Sugai, 1988). The neurophysiological approach studied learning as it involves the brain structures and the central nervous system and results formed the foundation for early intervention.

The information-processing approach investigated the sensory systems and the processes that are involved in learning. The knowledge gained from this research has informed the design of instruction to accommodate the processing styles of individual children to create strategies that exploit their processing strengths to compensate for their weaknesses.

According to the cognitive/developmental approach an individual’s behaviour is influenced by environmental conditions and what he/she knows or believes to be true about his/her environment based on the cognitive stage he/she has mastered. When cognitive teaching strategies are used to intervene in autism they capitalise on the child’s visual strengths to make up for his/her inability to analyse and make accurate sense of environmental events, solve problems or make judgements.

The final principle of learning theory is a behavioural approach where psychologists study the effects of various conditions on learning and develop strategies which will either build or eliminate specific behaviours. Some of the most effective intervention programmes for children with ASDs have integrated information from all four of these approaches to learning (Janzen, 2009).

### 2.5 Social Competence

Many regard impairments in social competence as the core feature of ASD. The extent of the deficits in socialisation varies from child to child and correlates with the child’s developmental level. The most severe characteristics include lack of social and emotional reciprocity, limited eye contact, not sharing an interest in object or people through facial expressions or by pointing, and lack of play skills such as turn taking and imaginative play. These features seriously hinder the child’s ability to enter into and maintain peer and adult relationships and his/her ability to function appropriately in the school environment (Ben-Arieh & Miller, 2009).
Since children with ASDs are unable to develop social skills or interpret the social nuances around them (Smith Myles et al, 2004) there is a strong agreement among practitioners that development and practice of age-appropriate social skills and opportunities for positive social interaction are essential for children with autism (Simpson et al, 2012). The need for caregivers to tackle the issue of social competence is crucial if children are to achieve academic success, find fulfilling employment and enjoy a good quality of life. However teaching the complex conventions and customs connected to social expectations and rules is not an easy task (Simpson et al, 2012).

2.5.1 Social Skills Interventions for Children with ASDs

As autism emerges, parents are faced with children whose characteristics are strange and confusing. They cannot understand why their children act as they do and what they should be doing to help them. Consequently, parents experience stress and often a degree of helplessness. Results from recent research and early intervention studies suggest that caregivers can have substantial and positive impact on their children’s cognitive, language and behaviour development. It is therefore important to offer parents assistance in the form of intervention programmes so that they can create safe and predictable social environments for their children to discourage them from developing and utilizing maladaptive coping mechanisms which alienate them from those around them (Whitman & DeWitt, 2011).

Early intervention may be especially critical in preventing a cascade of effects that result from early deficits in joint attention, gaze and eye contact, and early emerging social interest and routine as these appear to have important implications for emerging skills in other areas (Volkmar et al, 2005). Therefore the success of intervention may partly depend on the success with which one can identify infants and young children at risk for autism (Coonrod & Stone, 2005). For an intervention to be worthy of initial consideration for use with children with ASDs, caregivers need to be confident that the intervention agrees with current thinking in the field of autism. Rather than merely diagnosing the condition by identifying clusters of behaviours, current approaches attempt to understand the thinking and emotional processes that underlie the way in which children with autism perceive the world and behave (Smith, 2003).

Several prominent theories of autism seek to explain the underlying mental acts which lead to autistic behaviours described in the triad of impairments (an absence of social
interaction, communication and development of imagination) (Wing & Gould, 1979). These theories include the theory of mind (Happé & Frith, 1994; Baron-Cohen, 2000); central coherence (Frith, 1989); executive function (Ozonoff et al, 2005); joint attention (Bigelow et al, 2004; Dawson et al, 2004; Mundy & Burnette, 2005); and personal autobiographical memory (Jordan & Powell, 1995).

There are two major groups of interventions: focused intervention practices and comprehensive treatment models. The first group are designed to cope with specific behavioural or developmental goals for individual children and can be added to individual education programmes (IEPs) and typically last three months or less. They include strategies such as prompting, reinforcement (providing rewards for appropriate responses), social stories and peer-mediated interventions (Volkmar et al, 2005). The second group consist of systematic practices that address the core symptoms of ASD over an extended period of time (a year or more) with intensive treatment. UCLA Young Autism Program and TEACCH come under this category.

Many of the social and communication skills that typical children learn easily by observation and experience must be taught to children with ASDs through direct instruction. A number of programmes established in special centres for research and treatment to provide this type of training have been quite effective including the following:

2.5.1.1 Applied Behaviour Analysis

Applied Behaviour Analysis (ABA) can be defined as a way to ‘understand, predict and change human behaviour’ (Alberto & Troutman, 2011). ABA is a research procedure used by behaviour psychologists to study the effects of different applications of these behavioural principles to teach important skills and/or to change or eliminate inappropriate behaviour (Janzen, 2009). Skinner (1957) studied how events that happen before (antecedents) and after (consequences) a behaviour can influence the likelihood that the behaviour will occur again or be altered in some way and he developed the term, ‘contingency of reinforcement’ to describe the relationship between antecedents, behaviours and consequences (ABCs) (Kearney, 2008). According to Skinner, learning is best achieved by the thoughtful use of certain consequences for particular skills (Skinner, 1968).
These behaviour modification techniques have been used by teachers and caregivers for the past thirty years. They provide the foundation for designing and implementing effective instruction by advocating that teachers pay attention to (a) the clarity of cues, (b) the type of prompts, (c) the type of consequences and (d) how to deliver prompts and consequences in the most effective manner (Janzen, 2009). For instance, the Pyramid Approach to Education in Autism (Bondy & Sulzer-Azaroff, 2002) was founded on Skinner’s principles and deals with issues about what skills to teach (including functional skills, motivational factors, functional communication skills, critical social skills and challenging behaviours). It also focuses on how to teach them (comprising generalization, designing effective lessons, using prompts [vocal, verbal, gestural, visual or physical], shaping, and planning to minimize errors).

Weiss & Harris (2001) stress that an essential element of good ABA teaching is keeping track of children’s progress to ensure that they have mastered each skill before moving on to the next step of the programme and they recommend combining discrete trial instruction (DTI) with other ABA procedures (Table 2.2).

<table>
<thead>
<tr>
<th>Table 2.2 Some ABA Teaching Methods (Weiss &amp; Harris, 2001)</th>
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</thead>
<tbody>
<tr>
<td><strong>Motivating Behaviour</strong></td>
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<tr>
<td>• Reinforcement</td>
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<tr>
<td>• Incentive Systems</td>
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<tr>
<td>• Programming for Success</td>
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<tr>
<td><strong>Shaping Behaviour and Facilitating Generalization</strong></td>
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<tr>
<td>• Shaping</td>
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<td>• Chaining</td>
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<tr>
<td>• Programming for Generalization</td>
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<tr>
<td><strong>Providing Models, Roles, Stories, and Scripts</strong></td>
</tr>
<tr>
<td>• Modelling</td>
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<tr>
<td>• Observational Learning</td>
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<td>• Analog Situations</td>
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<td>• Role-Plays</td>
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<tr>
<td>• Social Stories</td>
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<tr>
<td><strong>Naturalistic Instruction</strong></td>
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<tr>
<td>• Incidental Teaching</td>
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</table>

ABA programmes use a variety of strategies to help individuals with autism acquire and generalise new skills including:
1. Strategies for shifting control over a child’s responses from stimuli used in training to naturally occurring stimuli and events he/she meets in his/her environment
2. Alternative forms of communication such as Picture Exchange Communication System (PECS)
3. Functional analyses of verbal behaviour
4. Peer-mediated interventions
5. Self-management tactics

Teaching methods derived from ABA have formed the basis for a number of training programmes for children with ASDs including:

2.5.1.2  Lovaas – UCLA Young Autism Project
This programme uses the principles of ABA to teach many discrete skills which are then chained into functional routines. There is intensive one-to-one interaction for forty hours per week with trained students or parents. The child is rewarded when he/she behaves correctly and in this way learns to pay attention to adults, to imitate what he/she is shown and to use language for social purposes (Kirk et al, 2012). The work of Lovaas and his colleagues represents a landmark accomplishment in the education of children with ASDs because they discovered and validated some of the factors that can be controlled in order to help these children achieve normal functioning in a general classroom situation (Heward, 2009).

2.5.1.3  TEACCH – University of North Carolina
Treatment and Education of Autism and Related Communication-Handicapped Children (TEACCH) has devised an extensive curriculum which includes domestic skills such as cleaning and cooking and independent living skills such as using calendars, hygiene and handling money. The use of pictures and other visual symbols to communicate with the children is encouraged.

2.5.1.4  LEAP – University of Colorado
The Learning Experiences, And Alternative Program for Pre-schoolers and Their Parents (LEAP) attempts to improve the social behaviour of children with autism. Social skills are taught as discrete skills and then the children practise these skills in
integrative settings with typical children who have been taught peer-mediation skills (Kirk et al, 2012).

2.5.1.5 Pivotal Response Model – University of California

This program starts off with discrete trial behaviour and then the focus moves on to skills such as self-management, motivation, multiple cues and self-initiation which can be transferred from one situation to another (Kirk et al, 2012). Pivotal Response Training has been successfully used to teach verbal communication (Henry & Smith Myles, 2007).

2.5.1.6 Picture Exchange Communication System

PECS is an alternative form of communication that teaches children to use pictures to express themselves (Frost & Bondy, 2002). It is a research-based strategy which is informed by ABA principles (Henry & Smith Myles, 2007).

2.5.1.7 Review of Existing Interventions

A review by the author of over sixty existing social skills interventions programmes indicates that these interventions focus on the teaching of language, pragmatics, and communication skills. These approaches, based on teaching specific social skills without social understanding, seldom produce the desired social outcomes (Appendix V).

The analysis was conducted to find out which teaching strategies were being applied in each case and what learning outcomes were achieved. The results of the analysis highlighted that a common set of teaching strategies was adapted in the interventions to take account of cognitive, emotional and social capabilities (Mitchell, 2008). This study also revealed that certain strategies were effective in teaching particular social interaction skills (Table 2.3).
<table>
<thead>
<tr>
<th>Intervention</th>
<th>Learning Outcomes</th>
<th>Teaching Strategies</th>
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<tbody>
<tr>
<td>- Response to Intervention (RTI)</td>
<td><strong>Social Interaction</strong>&lt;br&gt;Communication&lt;br&gt;Initiating Interactions&lt;br&gt;Conversation&lt;br&gt;Reading Nonverbal Cues</td>
<td><strong>Communicative</strong>&lt;br&gt;- Exchange&lt;br&gt;- Visual Cues&lt;br&gt;- Feedback&lt;br&gt;- Interactive Play&lt;br&gt;- Observing&lt;br&gt;- Flexibility&lt;br&gt;- Reinforcement&lt;br&gt;- Motivation&lt;br&gt;- Turn-taking&lt;br&gt;- Rewarding&lt;br&gt;- Scaffolding&lt;br&gt;- Prompting&lt;br&gt;- Modelling&lt;br&gt;- Imitation&lt;br&gt;- Fading</td>
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<tr>
<td>- Pivotal Response Training (PRT)</td>
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<td>- Didactic Instruction</td>
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<tr>
<td>- Behavioural Approaches</td>
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<tr>
<td>- Joint Action Routine (JAR)</td>
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<tr>
<td>- Cognitive Picture Rehearsal</td>
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<td>- Cartooning</td>
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<tr>
<td>- Comic Strip Conversations</td>
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<tr>
<td>- Social Narratives</td>
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<tr>
<td>- LEAP - Naturalistic Instruction</td>
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<td>- Behavioural Support Plan</td>
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<tr>
<td>- Reinforcement/Contingency</td>
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<td>- Priming Social Behaviour</td>
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<tr>
<td>- Mind Reading</td>
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<tr>
<td>- Social Skills Groups</td>
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<tr>
<td>- Circle of Friends</td>
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<tr>
<td>- Intensive Interaction</td>
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<tr>
<td>- Role Playing/Behavioural Rehearsal</td>
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<td>- Play-Drama Training</td>
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<tr>
<td>- Musical Interaction</td>
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<td>- Video Instruction</td>
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<tr>
<td>- Videotape Discourses</td>
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<tr>
<td>- Video Self-Modelling (VSM)</td>
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<td>- Special Interests</td>
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<td>- CAPS</td>
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<tr>
<td>- SOCCSS / SOLVE / SODA</td>
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<tr>
<td>- Self-Monitoring</td>
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<td>- Power Card Strategy</td>
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<td>- Think Bubble Activity</td>
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<td>- If-Then Statements</td>
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<tr>
<td>- Interaction/Conversation Plan</td>
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<tr>
<td>- Peer-Mediated Instruction</td>
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<tr>
<td>- Direct Instruction</td>
<td><strong>Reciprocation</strong>&lt;br&gt;Give and Take Mind Reading</td>
<td><strong>Communicative Exchange</strong>&lt;br&gt;- Feedback&lt;br&gt;- Interactive Play&lt;br&gt;- Flexibility&lt;br&gt;- Reinforcement&lt;br&gt;- Motivation&lt;br&gt;- Turn-taking&lt;br&gt;- Rewarding&lt;br&gt;- Scaffolding&lt;br&gt;- Modelling&lt;br&gt;- Imitation</td>
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<tr>
<td>- Social Narratives</td>
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<td>- Priming Social Behaviour</td>
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<td>- Mind Reading</td>
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<td>- Integrated Play Groups</td>
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<td>- Social Skills Groups</td>
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<td>- Video Self-Modelling (VSM)</td>
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<td>- Self-Monitoring</td>
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<td>- Thought Bubble Activity</td>
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<td>- If-Then Statements</td>
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<td>- Interaction/Conversation Plan</td>
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<tr>
<td>- Peer-Mediated Instruction</td>
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<tr>
<td>- Social Autopsies</td>
<td><strong>Cause &amp; Effect</strong>&lt;br&gt;Problem Solving&lt;br&gt;Hidden Curriculum</td>
<td><strong>Interactive Play</strong>&lt;br&gt;- Flexibility&lt;br&gt;- Reinforcement&lt;br&gt;- Motivation&lt;br&gt;- Turn-taking&lt;br&gt;- Rewarding&lt;br&gt;- Modelling&lt;br&gt;- Imitation</td>
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<tr>
<td>- Behavioural Support Plan</td>
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<td>- Priming Social Behaviour</td>
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<td>- SODA</td>
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<tr>
<td>- Self-Monitoring</td>
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</tbody>
</table>
Based on these findings the author designed a framework for caregivers to help them teach essential social interaction skills to children with ASDs. The technologies which had been found to have been successfully implemented in the special education area were also integrated into this design (Appendix VI). This framework in turn informed the learning content in STAK.

2.5.2 Social Skills Training Programmes

Numerous studies have emphasised the importance of structure in teaching children with ASDs (Jordan & Powell, 1995). It has been shown that highly structured teaching programmes underpinned by consistency, predictability, stability, and simplicity have had a positive impact on the learning abilities of children with ASDs (Howlin, 1998). It is important, therefore, that these children receive instruction that is carefully planned, meticulously delivered and individualised to suit their learning styles (Heward, 2009).

It has been found that children younger than eight and those with a verbal IQ below average can benefit from strategies that utilise visual aids, a hierarchical system of physical prompts and direct modelling rather than widespread approaches that rely primarily on verbal explanation (Kerr et al, 2002; Baker, 2003).

Programmes have been designed to teach specific required skills leading to the development of social competence including: initiating interactions, conversation, play,
reciprocal, problem solving, reading non-verbal cues, mind reading, self-control, self-awareness and behaviour management. However research has demonstrated that small-group social skills training (SST), to be effective, needs to follow a structured teaching plan (Table 2.4) which matches instructional strategies to the skill deficits exhibited (Sansosti, 2010).

<table>
<thead>
<tr>
<th>Steps</th>
<th>Purpose</th>
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<tbody>
<tr>
<td>Identify/Target Specific Social Skills</td>
<td>Tells you what you need to teach</td>
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<tr>
<td>Distinguish between Skill &amp; Performance</td>
<td>Determines the focus of your intervention</td>
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<tr>
<td>Deficit</td>
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<tr>
<td>Provide Direct, Systematized Instruction</td>
<td>Teaches skills in a meaningful and</td>
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<tr>
<td></td>
<td>purposeful manner</td>
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<tr>
<td>Monitor Student Progress</td>
<td>Determines whether the instruction is</td>
</tr>
<tr>
<td></td>
<td>effective</td>
</tr>
</tbody>
</table>

2.6 Supporting Caregivers

Due to their neuro-developmental condition children with ASD are difficult to teach so it is essential to plan in advance, deliver the content meticulously and devise individualised education programmes (Heward, 2009). Thus caregivers will need to be made aware of certain guidelines when educating their children including (a) systematic planning of activities with specific objectives, (b) use of hybrid strategies, (c) strategic adjustment of resources to meet the particular needs of their children, (d) active engagement of children in learning activities and (e) on-going evaluation of their progress (NRC, 2001). Sansosti (2010) argues that a structured approach is more effective: breaking down skills into small chunks of information, modelling the skill steps, asking the child to role play the skill in relevant scenarios, commenting on the child’s skill performance, giving the child positive reinforcement via tokens or other appropriate rewards, helping to increase the child’s concentration employing motivational games and offering the child a range of opportunities to practise the skill he/she has just learnt in order to achieve fluency and expertise.

2.6.1 Teaching Strategies

Bellini (2008) maintains that often it is a combination of strategies from a behavioural, cognitive, cognitive-behavioural and social-learning theory perspective that proves to be
most effective rather than one single intervention when teaching autistic children how to be successful socially. He recommends that caregivers should have a large repertoire of tools and strategies available to choose from. These strategies can be used either to promote skill acquisition or enhance social performance or both and comprise: reciprocal interaction strategies, social stories, role play, behavioural rehearsal, video modelling, social problem solving and social rules, self-monitoring, relaxation techniques, emotional regulation, prompting, interaction and conversation planning, reinforcement, and contingency.

According to Baker (2003), younger children with ASDs benefit from teaching strategies that rely on pictures, physical prompts and direct modelling whereas social skills training for older children may also include explanations of why they should act in certain ways. He uses the direct trial method to help children learn basic words so that they are able to respond to verbal instructions and questions. Each trial consists of four components: cue, prompt, behaviour and reinforcement. He also uses the following strategies in his social skills programme:

- incidental teaching to help students pick up on social cues, rules, others’ feelings and perceptions as a situation unfolds
- social skill picture stories to demonstrate various social skills
- cognitive picture rehearsal to deal with a specific problem situation by displaying on index cards the antecedents to the problem, the target desired behaviour and a positive reinforcer
- social stories to help children gain an understanding of what is happening and guide them to behave more appropriately
- structured learning consisting of four teaching components: didactic instruction (ie explanation of skill steps), modelling of skill steps, role-playing skills with feedback and practice

### 2.6.2 Educational Resources

Teaching social skills with social understanding to those who have weaknesses in the intuitive development of these skills is one of the most complex and challenging things to teach. The key to success is to break down those skills and teach them step by step using a number of interventions that complement the teaching strategies employed. The following resources have been used successfully in social skills training programmes:
2.6.2.1 Discrete Trial

Weiss & Demiri (2011) define discrete trial training (DTT) as a teaching strategy that involves breaking skills down into separate (discrete) components and then teaching them over the course of many attempts (trials). For instance an item of instruction is presented: ‘Touch the chair’, the child responds, and reinforcement is provided for a correct response. Each sequence of antecedent stimulus, child response and consequence (or feedback) is a trial. Baer (2005) maintains that DTT is as old as teaching and much older than education and is the method whereby children learn games and parents teach children language.

2.6.2.2 Steps to Success

Super Skills uses many of the teaching strategies found in traditional social skills training programmes such as modelling, role play, reinforcement and rehearsal. It is very structured with each social skill divided into a list of concrete and tangible steps called Steps to Success which children find simple to visualise and understand (Coucouvanis, 2005).

2.6.2.3 Social Skills Picture Story

Social Skill Picture Stories are designed to model general social skills. Each skill is accompanied by several pages of pictures to illustrate each skill step. The stories come in the form of mini-books that depict, step by step, children demonstrating various social skills Each skill is presented like a cartoon strip, composed of digital pictures of actual children combined with text and cartoon bubbles to denote what the children are saying – and sometimes thinking – as they engage in the skill. Included is the correct (and sometimes the incorrect) way to act with accompanying text that explains what the children are doing (Baker, 2003).

2.6.2.4 Cognitive Picture Rehearsal

Cognitive Picture Rehearsal always includes cartoon-like drawings or pictures of the three components: the antecedents to a problem situation, the targeted desired behaviour, and a positive reinforcer. The pictures are displayed on index cards with positive reinforcement principles (Groden & Lavasseur, 1995). A script describing the desired sequence of events is typed on the top of each card (or on the back of the card). Children are shown the sequence of cards until they can repeat what is happening in
each picture, and the sequence is reviewed just before the child enters the potentially problematic situation (Baker, 2003).

### 2.6.2.5 Social Story™

Gray defines a Social Story 'as a process that results in a product' for a child with an ASD. As a process, a Social Story requires consideration of, and respect for, the perspective of the child diagnosed with an ASD. The product is a short story which is defined by specific characteristics that describes a situation, concept, or social skill, using a formula that is meaningful for people with ASDs. *'A Social Story describes a situation, skill or concept according to ten defining criteria. These criteria guide Story development to ensure an overall patient and supportive quality, and a format, “voice”, and relevant content that is descriptive, meaningful, and physically, socially, and emotionally safe for the Audience. The criteria define what a Social Story™ is, and the process that researches, writes, and illustrates it'* (Gray, 2010, page xxv).

The Social Story™ intervention was devised by Carol Gray in 1991 to help children to develop social understanding as they are being taught appropriate social skills (Howley & Arnold, 2005). The aim of a social story is to share accurate social and emotional information in a reassuring manner that is easily understood by the child (Attwood, 2007). By following Gray’s ten criteria (2010) one can describe social situations, contexts and the likely behaviour of others and provide a suitable behavioural response cue that an individual can use (Sansosti, 2010). The stories address the ‘theory of mind’ impairment (Baron-Cohen, 2000) by giving individuals some perception on the thoughts, emotions, and behaviours of others while revealing the ‘hidden social code’ through the use of perspective sentences (Howley & Arnold, 2005). The stories are written in the first person and describe situations to remind children of the roles that they play to help develop personal autobiographical memory (Smith, 2003). The language used in the stories is precise and unnecessary details are omitted to avoid confusing children with weak central coherence (Frith, 2003). Social Stories can also help children with ASDs begin to cope with executive dysfunction (Ozonoff et al, 2005) by prompting good behaviour in a given social situation (Smith, 2003).
2.6.2.6 Motivational Games

Gage & Berliner (1998) argue simulations and games motivate students, promote interaction, present relevant aspects of real-life situations, and make possible direct involvement in the learning process. It is important to keep children ‘in the game’ by framing the activities in positive, exciting or enjoyable terms and raising the bar gradually by tying rewards to increasingly independent social performance (Loomis, 2008).

2.6.2.7 Video Modelling

Video modelling is defined as an instructional tool in which an individual imitates a behaviour or a skill that has been demonstrated in a video. In video self-modelling (VSM), the child is videotaped performing a behaviour and is then given the opportunity to practise the behaviour by further imitation (Mills & Marchant, 2011). A caregiver or child can pause and replay the videotaped scene repeatedly. This can be helpful for a child who requires repeated viewing in order to learn new material. In addition to teaching new skills video modelling may be used as a priming strategy to reduce anxiety where a child is worried about a particular event eg a doctor’s visit.

2.7 Adaptive Learning Systems

Personalised eLearning is defined as a means “to achieve a more effective, efficient and satisfying learning experience by offering e-learning content, activities and collaboration, adapted to the specific needs and influenced by specific preferences and context of the person, based on the sound pedagogic strategies” (Conlan & Wade, 2004). The active learning strategy employed by personalised eLearning can empower learners to take control of the context, pace and scope of their learning experience. Learners can achieve a greater level of satisfaction by personalising that experience through the application of the tools and mechanisms provided (Dagger et al, 2007).

2.7.1 Personalisation

Architectures combine techniques from the fields of information retrieval, semantic search as well as adaptive hypermedia in order to enable efficient adaptive retrieval as well as personalised compositions (Steichen, B & Wade, VP, 2010). In order to supply tailored content and services to individuals based on knowledge about their preferences
and behaviour, a number of techniques are employed such as user profiling, including behaviour preference and intention modelling; content modelling comprising content representation, analysis and classification; and filtering methods categorised as rule-based, content-based, collaborative and hybrid (Gao et al, 2009).

2.7.2 Adaptive Techniques

Adaptive hypermedia systems (AHS) can be described using an abstract model consisting of four main components: a domain model, a user model, an adaptation model and an adaptive engine (O’Keeffe et al, 2006). Research has focused on adapting and personalizing computing systems to users’ characteristics, preferences, knowledge, and tasks through the creation and updating of the student/user model to provide a customised experience (Mazzola & Mazza, 2009). The current or third generation of adaptive hypermedia systems (AHS) uses individual services for the sourcing of learning content, the personalization of the material and its presentation. By implementing a content service, which allows open corpus content to be used to supply suitable learning content to an AHS, it is possible to reuse content and thereby increase the quantity and variety of material available to the user (Lawless & Wade, 2006).

Intelligent adaptive eLearning systems are able to diagnose relevant learner characteristics and utilize the respective information on needs and aptitudes to create personalized learning experiences. These learning systems can also be tailored to take the learner’s prior knowledge, learning progress, growth of expertise and desired learning outcomes into account. Different methodologies have been proposed to identify dependencies among learning objects, problems or skills of a knowledge domain in order to devise structures on which intelligent web-based learning technologies can be based. Prerequisite structures on learning objects, assessment problems and skills are effective in discovering the competence level of the learner and for creating personalized learning paths (Steiner & Albert, 2008).

From an educational perspective, sound pedagogic approaches need to be integrated with the adaptivity features in systems in order to support higher cognitive skills (eg analysis, synthesis and evaluation) (Dagger et al, 2004). Although research continues to focus on the adaptive selection of multimedia content at run-time which merely supports lower cognitive aspects of learning (eg recall and understanding) there is a growing movement towards the integration of pedagogical strategies in eLearning which would
provide cognitively richer learning experiences through the use of interactive activities to engage the learner. It is believed that this could be achieved by combining web service technology and associated service composition approaches with AH navigation and presentation techniques (O’Keeffe et al, 2006). Already web services provide a solution to a major problem (ie interoperability) by allowing different applications from different sources to communicate with each other via standards, networks and protocols (Thyagarajan & Nayak, 2007).

Current adaptive hypermedia systems (AHS) focus on providing two main adaptive behaviours ie the adaptive selection and sequencing of content (adaptive navigation) and the adaptive presentation of resources to the user. Direct guidance, link sorting, link hiding, and link annotation are used to build adaptive navigation (Figure 2.3). Techniques such as conditional text and stretch text are used to expand text as necessary. More recent AH systems have combined the use of adaptive navigation and presentation in order to provide more advanced personalisation behaviours; for example, the application of learning styles as adaptive axes (O’Keeffe et al, 2006).
2.7.3 Dual Adaptivity

In general AESs cater for single users although some systems have been developed that foster collaboration among students (Kumar et al, 2007; Walker et al, 2008). However Lahart (2008) developed a web-based AES, Parent and Child Tutor (PACT), for home-based tuition using Java servlets and Java Server Pages technology to cater for tutor and tutee simultaneously. Aside from the student, domain, pedagogical and presentation models which are common to many AESs, Lahart added a number of other features to PACT: dual domain models and dual user models and a novel adaptive engine which comprised a set of rules and the use of the Talent Education philosophy to define tutoring best practice (Figure 2.4).
The components of this system are as follows:

- The **domain model** was a representation of the material to be studied – the **parent domain model** comprised an instantiation of the Talent Education philosophy to improve parents’ teaching skills and the **child domain model** provided support for learning violin and mathematics.

- The **parent model** maintained a log of parents’ self-efficacy values as they progressed through the tutoring process. It also recorded parents’ interactions with the PACT system. The **child model** represented the affective experience – a record of the child’s affective states such as happy, sad, fearful and angry as they progressed through the system. It also maintained information on the child’s knowledge level.

- The **presentation model** monitored the interactions between the user and the system and handled the flow of information.

- The **adaptive engine** comprised a set of pedagogical rules – tutoring rules, content rules and efficacy rules.

- The **pedagogical model**, informed by the adaptive engine, used adaptive presentation and adaptive sequencing techniques to determine what next to display to the parent and to the child.
The domain model in this system (Figure 2.5) was stored in multimedia format and individualised user models were stored dynamically and continually within a MySQL database. The adaptive engine was developed using Java and relied on a complex rule system i.e., tutoring, content, and efficacy. The pedagogical manager was implemented in Java and was responsible for analyzing feedback from users, updating user models, retrieving information from user models, communicating with the adaptive engine and making decisions about which instructional strategy to use. The presentation model received input from the pedagogical manager and managed the presentation of information through the use of cascading style sheets. This model observed, monitored, and handled all feedback from the user in the form of links activated, buttons pressed, and text entered.

![Figure 2.5 Tutoring Tactics (Lahart, 2008)](image)

2.8 ICT and Special Needs Students
Information and communications technology (ICT) has been transforming the entire education system over the past thirty years. In particular, digital and interactive technologies have been used to achieve a more personalized approach to learning.

Special education has been at the forefront in the acceptance and use of these technologies. Often it was in a special-needs context that new ideas have been tried out as teachers worked together to understand the benefits and find solutions to meet the unique challenges that they faced (Sparrowhawk & Heald, 2007). Since these carers are
educating children with special requirements they are willing to experiment with new devices and programmes which will allow children to gain access to information and thus enable them to reach their full potential (Kirk et al, 2012). ICT permeates many aspects of their lives and helps to dissolve boundaries so that every child is given the maximum opportunity to succeed, whatever their particular learning needs (Florian & Hegarty, 2004).

According to Hardy et al (2002) children with ASDs show an affinity to technology and so it has been used widely to support their development of social communication skills by manipulating social interactions in order to simplify them and make information more relevant to them. One fast growing area of research is technology enhanced learning (TEL) which supports the development of social communication skills in children diagnosed with autistic spectrum disorders (ASDs) and encompasses psychology, design and computer science (Avramides et al, 2012). Three broad directions have shaped this research: pedagogical foundations, technology, and learner involvement in the design process. TEL systems can be categorized according to four pedagogical approaches: (a) training component skills of social communication such as facial expressing recognition; (b) using contextualized frameworks for understanding children’s behaviour that aims to deliver interventions through structured activities; (c) immersing children in creative play and (d) applying tools for visual communication. The four approaches use technology in different ways to support social interaction: helping children to interpret social interactions, scaffolding the children while they learn to navigate social cues, acting as a medium to engage the child in the learning experience or facilitating communication with others (Avramides et al, 2012).

2.9 Discussion

The review of the literature describes the condition of autism which affects an estimated one in every sixty-eight children today (CDC, 2014) and in particular the social-cognitive learning disabilities which makes it difficult for individuals diagnosed with this condition to develop social skills or interpret the social nuances around them without assistance (Smith Myles et al, 2004). The importance of tackling this issue of social competence is stressed for without social interaction skills children with ASDs are unable to participate fully in family or school life (Marans et al, 2005) and this inevitably impacts on their overall development (Howley, 2001), reduces their quality of life, and limits their prospects for employment in the future.
A review of reports on over sixty existing interventions reveals that many of these programmes are focussed on teaching specific social skills in isolation from other aspects of social development and consequently do not deal adequately with the social deficit in ASDs. However evidence suggests that success can be achieved by taking a structured approach when educating children with autism and by delivering individualized content in a meticulous fashion (Heward, 2009).

Since caregivers are familiar with the distinctive nature of these children’s problems and the varying levels of difficulty children experience when interacting with the people around them they are best placed to help this group. However caregivers require assistance in acquiring the expertise to teach social skills and also in personalising the learning experience for individual children in order to help them to achieve a degree of social understanding, which will enable them to apply and generalise learnt social skills in a meaningful way in society.

As technology has effectively supported learners in many other domains, it would suggest that some of the techniques used in existing adaptive learning systems could be applied to personalise the learning experience for caregivers and children with ASDs, by providing them with the level of support and educational resources that match their individual profiles simultaneously and thus bridge the gap in current interventions.
Chapter 3  Research Methodology

3.1 Introduction
This chapter sets out the research methodology of the thesis within the framework of naturalistic, ethnographic research. In particular, it presents the rationale for the case study methodology adopted. It discusses issues in relation to validity, reliability, and trustworthiness, and aspects of data collection and analysis. The chapter outlines the research methodology of the present study detailing its stages, procedures, sites, participants, data collection instruments, and data analysis approach.

As outlined in Chapter 1, the objective of the present study was to design, implement and evaluate a dual-adaptive learning system for caregivers to help them meet the challenge of teaching social interactions skills to children diagnosed with ASDs. To this end, the previous chapter presented a review of the literature which provides the theoretical background to inform the design of the learning system.

The researcher’s approach was to conduct a qualitative multiple case study which explored:

- how a dual-adaptive learning system matches child profiles with appropriate educational resources and teaching strategies, while providing caregivers with support using those recommended strategies at levels consistent with their own profiles, to enable them to develop social skills in children with ASDs.

In particular the thesis investigated how technology could be of benefit:

- by matching teaching strategies to the child’s learning stage (novice, intermediate, advanced and acquired) in each social skill
- by linking the support level consistent with a caregiver’s prior knowledge of teaching social skills to the teaching strategies recommended for a given child
- by matching educational resources to the child’s learning style, language ability, comprehension ability and special interests.
It also examined the following subset of questions:

1. how can a framework based on best practice in social skills training inform the learning content recommended by a dual-adaptive system?
2. how can a dual-adaptive learning system enhance the learning experience for both caregiver and child?
3. how does STAK use technology to assess the child’s individual needs and the caregiver’s support requirements for the purposes of selecting appropriate resources?
4. what are the design implications for the building of dual-adaptive learning systems to support caregivers teaching social skills to children with ASDs, arising from this study?

This thesis uses the opinions of caregivers to evaluate the STAK learning system. A comprehensive analysis of caregivers’ opinions was conducted using MS Excel on the data extracted from responses to open and closed questions posed on the online feedback questionnaire. Further data was collected through semi-structured interviews, database logs, telephone conversations and field notes and later analysed for common themes.

Postmodernism is a concept that is widely used in education research. It recognises that the world is a complex place full of contradictions in which people and organisations can play several sometimes contradictory roles and where understanding of all action is affected by the context in which these actions occur (Newby, 2010). Naturalistic, qualitative, and interpretative approaches have been devised to understand this world in its natural state from the standpoint of the individuals who are part of the action under investigation (Cohen et al, 2011). The central focus of each of these approaches is what differentiates them according to Creswell (2007) for: a) the narrative studies the life of an individual, b) phenomenology studies a concept or phenomenon and the true meaning of the experiences of people living through those phenomena; c) in grounded theory the aim is to advance a theory while d) in ethnography it is to describe a culture-sharing group and lastly, e) in a case study the purpose is to examine a specific case often with the goal of investigating a complex issue which the case illuminates. Some researchers identify the case study with a postmodern approach because it looks at particular instances but does not seek general truths (Newby, 2010).
Denzin & Lincoln (2000) define qualitative research as ‘a situated activity that locates the observer in the world. It consists of a set of interpretative, material practices that makes the world visible. These practices...turn the world into a series of representations including field notes, interviews, conversations, photographs, recordings and memos to the self. At this level, qualitative research involves the interpretative, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of meanings people bring to them’ (2000:3).

Patton (1990) suggested using qualitative methods when the research fulfils the following conditions:

a. the program emphasises individualised outcomes  
b. detailed, in-depth information is required about certain clients or programs  
c. the focus is on diversity among, idiosyncrasies of, and unique qualities exhibited by individuals  
d. no standardised instrument is available that can validly and reliably measure program outcomes

According to Patton (1990) many of the criteria that establish the appropriateness of choosing qualitative methods parallel the conditions in special education. For instance, low incidence rates of children with ASDs cause sample sizes to be either restricted or small. The subjects are unique with diversity across categories of disabilities as well as within them. Qualitative studies tend to provide more detail about the uniqueness of the students’ disabiling conditions than quantitative studies do. Each student’s program is deliberately designed to be unique in order to satisfy that student’s needs. Therefore the individualized education plan (IEP) and other programs for special education students tend to be diverse and idiosyncratic.

3.2 Case Study Research

Although a case study is considered to be an important type of interpretative ethnography (Creswell, 2012) case study researchers may focus on a programme, event or activity involving a ‘collection of individuals which have similar attributes’ (Grosvenor & Rose, 2001, page 77) rather than the group as a whole. Case studies are used ‘where understanding needs to be holistic, comprehensive and contextualised’
(Ritchie, 2003, page 52). Yin (2009) defines a case study as ‘an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.’ (page 18). The case is separated out for research or ‘bounded’ in terms of time, place or other physical boundaries so that a process or activity can be explored fully and the phenomena within it analysed and interpreted (Creswell, 2012). Case studies offer the opportunity to understand ideas and theories with reference to real people in real situations and enable researchers to establish cause and effect relationships as they happen in particular instances. Cohen et al (2011) also maintain that ‘case studies can penetrate situations in ways that are not always susceptible to numerical analysis’ (Cohen et al, 2011).

The case study is the most appropriate research tool to use when one is trying to answer ‘how’ and ‘why’ questions in contextual conditions (Yin, 2009) and is of particular benefit when the researcher has not had much control over events (Hitchcock & Hughes, 1995). As a research method it provides a comprehensive approach which covers the design rationale, data collection techniques and data analysis procedures (Yin, 2009). Case studies are conducted by educational researchers because the data collected is ‘strong in reality’ and because generalizations can be made either about an instance or from an instance to a class (Cohen et al, 2011).

Stake (1995) explains that one can have an intrinsic interest in a case such as evaluating a programme without using what one has learnt in this particular case to gain insight into other cases or some general problem. The contrary is also true when one conducts an instrumental study of a particular case to gain knowledge about a broader issue (Stake, 1995). According to Yin (2009) case studies can be classified according to the purpose of the investigation: exploratory case studies allow researchers to develop theories for future studies; explanatory case studies give researchers an opportunity to test theories and operational links over time and descriptive case studies may be used to inquire into the prevalence of a phenomenon or help researchers to predict likely outcomes given particular circumstances. This method is suitable for the examination of contemporary events when direct observation of the events is feasible and interviews can be conducted with the people involved in these events (Yin, 2009).
Case studies have a distinctive place in evaluation research for they have at least four applications: a) they can be used to explain the causal links in real-life interventions which are too complex for survey or experiment; b) they can also be used to describe an intervention and the context in which it occurred; c) they can illustrate certain issues within an evaluation and d) they may also be used to enlighten situations where the intervention being evaluated has no clear set of outcomes (Patton, 1990).

Yin (2009) suggests that case studies can be further categorized as: single, multiple, embedded and holistic (Yin, 2009). A single case study is similar to a single experiment. The term may be applied when (a) a case meets all the criteria for testing a specific theory; (b) a case is so rare that it is worth analysing; (c) the object of study is representative of a typical group; (d) an activity hitherto unknown or inaccessible is examined or (e) conditions of a case are studied at different points in time (Yin, 2009).

Correspondingly a multiple case is analogous to multiple experiments, which aim to achieve ‘replication’ by conducting the inquiry under the exact same conditions or by altering conditions which are not relevant to the overall result. The most likely outcomes are literal replication (similar results which highlight trends common to all cases) or theoretical replication (contrasting results explained by anticipated reasons) (Yin, 2009). When replications occur over cases findings are more secure and there is more confidence in the overall results of the study which lead to the development of a rich theoretical framework. Lastly, embedded case studies comprise sub-units which are investigated in their own right while holistic case studies represent single units which are examined as a whole. Yin (2009) suggests that embedded design may be used to focus investigations on particular issues.

Action Research (AR) can inform the iterative design of a case study. Although there are many variations of Action Research (AR) this type of research is recognizable by its ‘spiralling’ cyclical process as in Figure 3.1 which consists of planning, execution and reconnaissance to bring about change (Lewin, 1952).
Kemmis & McTaggart (1988) maintain that this AR structure is more fluid than Lewin’s theory indicates as different stages in the cycle may overlap and initial plans may be altered in the light of discoveries made during the process. Elliott (1991) adapted Lewin’s model of AR to allow the initial general idea to evolve and reconnaissance (ie analysis as well as fact-finding) to recur during the spiral of activities. Creswell (2012) suggests that action researchers engage in a dynamic process involving iterations of activities spiralling backwards and forwards between reflection about a problem, data collection and action and that a number of AR cycles may be running concurrently with different timespans (Coghlan & Brannick, 2010). McNiff and Whitehead (2011) refer to this systematic and disciplined process of ‘observe-reflect-act-evaluate-modify-move in new directions’ as the ‘action-reflection cycle’ and suggest that as soon as things appear to be satisfactory new questions are raised and the cycle begins again. The purpose of this type of research is to learn through action and constantly refine practice so that the emerging evidence-based outcomes will contribute to the participants’ continuing professional development (Koshy, 2010).

AR encourages collaborative group discussion of ideas and practices in order to promote honest reflection (Reason & Bradbury, 2008). Although AR projects may be conducted by individuals in their workplaces many proponents of this type of research emphasize the importance of participation and collaboration – people acting and researching on, by and for themselves (Kemmis & McTaggart, 1992). AR empowers
participants to find solutions to practical problems that they encounter in their daily lives rather than having changes imposed on them by outside authorities without any consultation. Elliot (1991) argues that such empowerment must be at a collective level for it is extremely difficult for individuals reflecting in isolation from each other within rigid organisational structures to effect any change whereas when individuals ‘engage in collaborative reflection on the basis of common concerns and involve their clients [pupils, parents and employers] in the process, they develop the courage to critique the curriculum structures which shape their practice, and the power to negotiate change within the system which maintains them.’ (page 56). This has particularly been found to be the case in special education where collaboration among teachers, parents, and non-teaching professionals has helped participants to move from surface level reflection to deeper levels of pedagogical and critical reflection to expand their knowledge and skills while addressing the complex needs of children with disabilities to the benefit of all concerned (Bruce & Pine, 2010).

3.2.1 Validity, Reliability and Trustworthiness

The research design may be defined as ‘the logical sequence that connects the empirical data to a study’s initial research questions and, ultimately, to its conclusions’ (Yin, 2003, p 20). Throughout this whole process qualitative researchers need to make sure that their findings and interpretations are accurate. Validating findings means that the researcher determines the credibility of the findings through the use of certain strategies such as triangulation, member checking and auditing (Creswell, 2012). Triangulation is the process of corroborating evidence from various individuals, types of data or methods of data collection in descriptions and themes in qualitative research. The researcher examines each information source and finds evidence to support a theme. This ensures the accuracy of the investigation because the information draws on multiple sources of data, people and processes (Creswell, 2012). A case study is known as a triangulated research strategy because the validity of its findings is tested in this way (Yin, 1984). Researchers can also check their findings with participants in the study to determine if their findings are accurate, if the description is complete and realistic, if the themes are correct to include and if the interpretations are fair and representative. Lastly, researchers may ask people outside the case to carry out an external audit on the investigation and report back on any strengths and weaknesses evident.
According to Yin (2009) there are four criteria for judging the quality of research designs: construct validity, internal validity, external validity and reliability. He suggests that one should also establish a chain of evidence and address the internal validity of the study by using analytic tactics such as pattern matching. The mode of generalisation (or external validity) used in qualitative case studies is ‘analytic generalisation’ rather than ‘statistical generalisation’ as an inference is made when two or more cases are shown to support the same theory and are not based on empirical data collected from a sample population (Yin, 2009). To ensure that a case study successfully passes tests common to social science methods Yin proposes that the researcher apply the following tactics (Table 3.1):

<table>
<thead>
<tr>
<th>Tests</th>
<th>Case Study Tactic</th>
<th>Phase of Research in which Tactic occurs</th>
</tr>
</thead>
</table>
| Construct Validity | use multiple sources of evidence 
| | establish chain of evidence 
| | have key informants review draft case study report | Data collection 
| | | Data Collection 
| | | Composition |
| Internal Validity | do pattern matching 
| | do explanation building 
| | address rival explanations 
| | use logic models | Data analysis 
| | | Data analysis 
| | | Data analysis 
| | | Data analysis |
| External Validity | Use replication logic in multiple-case studies | Research design |
| Reliability | Use case study protocol 
| | Develop case study database | Data collection 
| | | Data Collection |

The validity and reliability of a measure are closely interrelated but one cannot predict the other. For instance, a reliable instrument is not necessarily valid – even if an instrument produces the same results every time it is used it does not mean the instrument is measuring what it is supposed to measure (Sarantakos, 2005). To ensure reliability Yin (2009) suggests the researcher documents the case study step by step in order that the same study can be conducted again in exactly the same manner to reach the same findings and conclusions. Errors and biases will be minimized by ensuring that all the instruments used in the study are reliable. Research projects tend to be situation specific and do not aim to create universal knowledge yet certain significant factors may have emerged during the inquiry process which could be relevant to people going through the same change in a different context (Coghlan & Brannick, 2010). Therefore, while the study of one case or a number of small cases may appear at first glance to be a
poor basis for generalization, it is possible to gain insight into a research question through studying a few cases in depth and drawing certain comparisons as the same activities or problems occur over and over again (Stake, 1995). Sarantakos (2005) claims qualitative researchers employ ‘naturalistic generalisation’ and that they use typical cases as their sample to achieve this.

3.2.2 Data Collection and Analysis

A case study uses a range of methods for data collection such as observation, interview, documents, survey, and artefacts to probe beneath the surface of phenomena to find the in-depth data it requires (Cohen et al, 2011). There are two principal types of observation applied – participant observation and non-participant observation. Often the type of observation undertaken by the researcher is linked to the type of setting in which the research takes place (Cohen et al, 2011). Participant-observation can provide the researcher with opportunities to gain access to events or groups that are otherwise inaccessible but one has to be aware of potential biases which can jeopardise the study. That said, observational evidence is useful in gaining additional information about the topic under examination. For instance observations of technology or curriculum at work are important means for understanding the actual uses of that technology or curriculum or any potential issues that are being experienced by users (Yin, 2009). Interviews are also essential sources of case study data according to Yin and may be in-depth, focused or follow the more structured survey style providing important insights into human affairs and behavioural events (2009).

As the case study typically concerns complex events and behaviour occurring within a possibly even more complex real-life context a diverse array of data will be collected and will pose challenges in terms of analysis. Yin (2009) puts forward four strategies which will help the researcher to treat the evidence fairly, produce convincing analytical conclusions and rule out alternative interpretations. These strategies comprise a) relying on theoretical propositions; b) developing a framework for organising the case study; c) using both qualitative and quantitative data; and d) examining rival explanations.

Mills (2010) suggests that a range of data collection techniques should be used to experience, enquire and examine the evidence gathered – the Three E’s. This content analysis involves coding, categorizing, comparing and drawing theoretical conclusions
from the data collected from questionnaires and other documents (Cohen et al, 2011). The process starts by reducing the data into meaningful segments and assigning names to these segments, then combining the codes into broader categories and displaying relationships in data graphs, tables and charts.

### 3.3 Research Methodology of the Study

As outlined earlier in this chapter, the objective of the present study was to design, implement and evaluate a dual-adaptive learning system to match child profiles with appropriate educational resources and teaching strategies, while providing caregivers with support using those recommended strategies at levels consistent with their own profiles, to enable them to develop social skills in children with ASDs. The focus of this investigation was on the caregivers involved and thus their opinions were captured through responses to online questionnaires, semi-structured interviews and data logs. The absence of similar dual-adaptive learning systems and the ambitious objective of the research required that the investigation be conducted in two phases, each of which addressed distinct research questions. Some of these questions fell naturally under one phase or the other but some overlapped both phases. The two phases of the study, and the questions they address are as follows:

#### Iterative Design Process to develop STAK (Social Skills Training for Autistic Kids)

1. how can a framework based on best practice in social skills training inform the learning content recommended by a dual-adaptive system?
2. how can a dual-adaptive learning system enhance the learning experience for both caregiver and child?

#### Implementation and Evaluation of STAK

3. how does STAK use technology to assess the child’s individual needs and the caregiver’s support requirements for the purposes of selecting appropriate resources?
4. what are the design implications for the building of dual-adaptive learning systems to support caregivers teaching social skills to children with ASDs, arising from this study?

The objectives of the research required the investigation of a group of people evaluating a learning system to construct understanding in relation to the research questions through description, interpretation, induction, and generation of propositions. Hence
qualitative ethnographic research was deemed to be the most appropriate method. Since the study aimed to examine an instance in action of a bounded system, comprising the participants, the researcher, an activity and technology to enable the completion of tasks, case study was adopted as a research strategy. This study could help to explain, describe, illustrate and enlighten the intervention being evaluated. This decision was further supported by the fact that the researcher had very little control over the events nor was she in a position to exert control in an experimental fashion on the participants and the many possible complex contextual variables. Moreover the phenomenon under scrutiny involved real individuals in real situations, which also supported a case study approach.

Following Yin’s (2009) case study categorisation, the present thesis can be classified as a revelatory case as it examines an activity hitherto unknown or inaccessible since it arises from the study itself. The research aims: a) to design a dual-adaptive learning system and b) to proceed with its implementation and evaluation and c) to inform future research in this area. Firstly, it was the researcher’s literature informed understanding of how social skills training should be conducted which guided the initial stage of the research. Secondly, feedback acquired at the reconnaissance stage informed subsequent iterations to the design. Although the investigation as a whole qualifies as a revelatory case study, each stage had distinct objects, and they are further divided into: exploratory case study in the initial stage and explanatory case study in the second.

The inquiry, which engaged in an iterative design process to develop the dual-adaptive learning system, STAK, follows the exploratory case study approach because it regards ‘what’ questions driven by statements of intent informed by theory, rather than concrete theoretical propositions. Furthermore the expectation was that these questions would inform further discussion and questions for the succeeding stage of the research similar to cycles in action research. The implementation and evaluation of STAK is considered an explanatory case study as it addresses ‘how’ questions which bring about ‘why’ questions regarding the learning system under scrutiny and its broader implications. Moreover the second stage of the research tried to find cause and effect relationships. A multiple embedded case study design was adopted for both stages. This was judged to be the most appropriate design because multiple versus single cases contribute towards strengthening the trustworthiness of the study and also because multiple cases could counterbalance possible researcher biases. This also facilitated the investigation of the
overall system and at the same time distinct components within it. In summary, the present investigation is a multiple embedded case implemented in two distinct stages: exploratory case studies to address the iterative design of the dual-adaptive learning system, STAK; and explanatory case studies to implement and evaluate the system.

3.3.1 Overview of the Two Stages of the Research

Detailed information regarding the participants, sites, duration, data collection instruments, data sets, and procedures which were followed for each stage of the research are outlined in the relevant chapters (Chapter 4 (first stage) and Chapter 6 (second stage). This is done in an attempt to place the research methodology adopted in this study in context.

The first stage of the research involved 3 exploratory case studies, conducted with 18 caregivers (parents, teachers and key workers) at three distinct periods over six months. The researcher adopted the role of facilitator, gave demonstrations and conducted interviews. Direct observations, video capture, interviews and transcripts were the main data sources. Enhancements to the system design were informed by findings from previous iterations. Data analysis for this stage involved pattern matching (Yin, 2009).

The second stage of the research involved 3 explanatory case studies conducted with 38 caregivers and 36 children in Ireland and Qatar at intervals between December 2014 and February 2015. The researcher facilitated workshops and provided technical support for participants. Two mentors ran workshops in their centres. Video or audio capture of the workshops, direct observation, interviews with participants, responses from questionnaires and data logs were the main data sources. Data analysed for this stage involved relying on theoretical propositions and explanation building (Yin, 2009).

Ethical issues in relation to the research in both stages were dealt with in accordance with research ethics recommendation (Cohen et al, 2011). All participants and parents / guardians were informed of the purpose of the research and their consent (Appendix XXVII) was sought before the commencement of the research. Participants were informed that their involvement was voluntary and that they would be able to withdraw from the research at any stage without prejudice. All data collected by the researcher
will be anonymised and stored on a secure server in accordance with the Data Protection Act 2003 (Ireland) and will be password protected.

### 3.3.2 Trustworthiness and Data Analysis

Internal validity was not a concern during the first stage since there was no attempt to establish a causal relationship in the exploratory case study (Yin, 2009). However during the explanatory case studies the researcher and her assistants maintained a systematic approach during the implementation adhering to the same guidelines and procedures. Since the focus of the two stages of the research were quite different the data collection tools applied varied accordingly. During the first stage the researcher conducted face-to-face interviews and communicated with experts via email, skype and telephone to find out peoples’ opinions on the requirements of the proposed learning system.

Online questionnaires, data logs and audio recordings were the main sources for feedback from participants on the actual experience of using the prototype. Feedback from participants was collated and read through initially to obtain a general sense of the information and to reflect on its overall meaning. Audio recordings of semi-structured interviews and workshops were transcribed for later analysis. Pattern-matching and coding were used to analyse and make sense of the data across multiple cases as suggested by Creswell (2007) in Figure 3.2. Both qualitative and quantitative data were extracted from responses to the questionnaires, data logs and transcripts (Table 3.2).

![Coding Template for Case Study – using multiple case approach (Creswell, 2007)](image-url)
Table 3.2  Breakdown of Feedback from Participants

<table>
<thead>
<tr>
<th>DATA COLLECTED</th>
<th>DATA SETS</th>
<th>Quantitative</th>
<th>Qualitative</th>
<th>PURPOSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration</td>
<td>User IDs</td>
<td>√</td>
<td></td>
<td>Tracking information/Identification</td>
</tr>
<tr>
<td></td>
<td>Caregiver Gender</td>
<td>√</td>
<td></td>
<td>Statistics - Demographic</td>
</tr>
<tr>
<td></td>
<td>Email addresses</td>
<td>√</td>
<td></td>
<td>Tracking information/Identification</td>
</tr>
<tr>
<td></td>
<td>Caregiver Roles</td>
<td>√</td>
<td></td>
<td>Parents/Teachers/Key Workers</td>
</tr>
<tr>
<td></td>
<td>Teaching Strategies</td>
<td>√</td>
<td></td>
<td>Prior Experience using seven Teaching Strategies</td>
</tr>
<tr>
<td></td>
<td>Support Levels</td>
<td>√</td>
<td></td>
<td>Tracking Levels of Support required by Caregivers</td>
</tr>
<tr>
<td>Carer Profile</td>
<td>Child ID</td>
<td>√</td>
<td></td>
<td>Tracking Information/Identification</td>
</tr>
<tr>
<td></td>
<td>Child Gender</td>
<td>√</td>
<td></td>
<td>Statistics - Demographic</td>
</tr>
<tr>
<td></td>
<td>Date of Birth</td>
<td>√</td>
<td></td>
<td>Statistics - Demographic</td>
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<tr>
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<td>Diagnosis</td>
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<td>Statistics</td>
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<td>Learning Stage</td>
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<td>Child’s prior knowledge of social skills</td>
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<td>Learning Style</td>
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<td></td>
<td>Statistics</td>
</tr>
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<td>√</td>
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<td></td>
<td>Comprehension Ability</td>
<td>√</td>
<td></td>
<td>Statistics</td>
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<td>Special Interests</td>
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<td>Child’s Learning Progress</td>
</tr>
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<td>Teaching Strategies selected</td>
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<td>Matching teaching strategies to child’s learning stage</td>
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<td></td>
<td>Support Levels</td>
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<td>Matching support levels to caregiver’s needs</td>
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<td></td>
<td>Support Levels overridden</td>
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<td>Caregiver’s Learning Progress</td>
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<td>Resources downloaded</td>
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<td>Child’s Learning Progress</td>
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<td>Duration of Activity</td>
<td>√</td>
<td></td>
<td>Statistics/correlation with satisfaction/dissatisfaction with STAK</td>
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<td>Child Profile</td>
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<td>Activity Centre</td>
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<td>Preliminary Questionnaire</td>
<td>Social Skills</td>
<td>√</td>
<td>√</td>
<td>Prior Experience of caregivers teaching ten social skills</td>
</tr>
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<td></td>
<td>Teaching Strategies</td>
<td>√</td>
<td>√</td>
<td>Prior Experience/confidence using seven teaching strategies</td>
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<td>Educational Resources</td>
<td>√</td>
<td>√</td>
<td>Prior Experience/satisfaction with existing educational resources</td>
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<td></td>
<td>Teaching social skills to</td>
<td>√</td>
<td></td>
<td>Difficulties encountered by caregivers</td>
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<td>Children with ASDs</td>
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</tr>
<tr>
<td></td>
<td>Identifying Resources to suit</td>
<td>√</td>
<td></td>
<td>Matching Educational Resources to Children’s individual needs</td>
</tr>
<tr>
<td></td>
<td>Children’s needs</td>
<td></td>
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<td></td>
<td>Usability Features</td>
<td>√</td>
<td>√</td>
<td>Intuitiveness of system</td>
</tr>
<tr>
<td></td>
<td>User Interaction with STAK</td>
<td>√</td>
<td>√</td>
<td>Ease of use/accessibility</td>
</tr>
<tr>
<td>Feedback Questionnaire</td>
<td>Matching profiles with Supports</td>
<td>√</td>
<td>√</td>
<td>Effectiveness of assessment tool</td>
</tr>
<tr>
<td></td>
<td>Matching profiles with Resources</td>
<td>√</td>
<td>√</td>
<td>Effectiveness of assessment tool</td>
</tr>
<tr>
<td></td>
<td>Structured Teaching Approach</td>
<td>√</td>
<td></td>
<td>Efficiency of social skills training programme</td>
</tr>
<tr>
<td></td>
<td>Teaching Strategies</td>
<td>√</td>
<td>√</td>
<td>Appropriateness of learning tools</td>
</tr>
<tr>
<td></td>
<td>Reconnaissance, Pilot Study and</td>
<td>√</td>
<td>√</td>
<td>Ease of use/accessibility</td>
</tr>
<tr>
<td></td>
<td>Workshops</td>
<td></td>
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<tr>
<td>Aural Recordings</td>
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</tr>
</tbody>
</table>

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3.4 Summary
This chapter has outlined a theoretical rationale for the research methodology chosen for this study. It presented characteristics of qualitative research and illustrated the suitability of this method for the current investigation. It discussed aspects of the case study approach and its data collection tools and techniques for data analysis. The chapter also provided an overview of the two stages of the research methodology and the exploratory and explanatory cases which formed part of this inquiry. Finally the chapter described how validity, reliability and trustworthiness were addressed in this study and outlined the procedures for data analysis.
Chapter 4  Iterative Design Process towards STAK Learning System

4.1 Introduction
The review of the literature in Chapter 2 establishes the necessity to bridge the gap in social training interventions by designing a learning system which would help caregivers meet the challenge of teaching social skills to children with ASDs by harnessing their knowledge of the children’s needs in order to find appropriate resources to meet those needs. This chapter will explain the steps which the researcher carried out in order to establish a firm technological and pedagogical foundation for a personalised dual-adaptive learning system. It will outline the iterative process which involved three exploratory case studies and which led to the design, development and implementation of the STAK (Social Skills Training for Autistic Kids) learning system which was built to give caregivers and children individualised training as they worked together through a structured learning programme to achieve social skills learning targets.

4.2 Theoretical Framework
After completing the review of reports on over sixty existing interventions for teaching language, communication and social skills to children with ASDs to find out which teaching strategies were being applied in each case and what learning outcomes were being achieved, the researcher set about designing a theoretical framework for developing social interaction skills with social understanding informed by her findings. The analysis of the findings had revealed that certain strategies were effective in teaching particular skills. Thus this framework centred around three core social skills: communication, play and emotion. Their related skills were also included as follows: communication (initiating social interactions, conversation); play (give & take (reciprocation) and cause & effect); and emotion (reading nonverbal cues, mind reading, self-control and self-awareness). It was assumed that caregivers would guide students through the learning stages from communication to emotion using behavioural strategies such as prompting, imitation and reinforcement and material (social narratives, word searches, associations and memory games) to assist them in this skill acquisition progression (Table 4.1).
<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>Required Skills</th>
<th>Learning Stage</th>
<th>Group 1 Activity</th>
<th>Group 2 Activity</th>
<th>Group 3 Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication</strong></td>
<td><strong>Initiating Social Interactions</strong></td>
<td>Greetings</td>
<td>Greeting Someone</td>
<td>How to give a hug</td>
<td>Memory Game</td>
</tr>
<tr>
<td></td>
<td><strong>Conversation</strong></td>
<td>Prompting</td>
<td>Imitation</td>
<td>Reinforcement</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Introducing yourself</td>
<td>Saying ‘Hi’</td>
<td>Getting to know you</td>
<td>Eye Contact</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prompting</td>
<td>Imitation</td>
<td>Modelling</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conversation</td>
<td>Questions</td>
<td>Maintaining Conversation</td>
<td>Ending Conversation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prompting</td>
<td>Role Play</td>
<td>Modelling</td>
<td></td>
</tr>
<tr>
<td><strong>Play</strong></td>
<td><strong>Reciprocation (Give and Take)</strong></td>
<td>Asking to play</td>
<td>Do you want to play?</td>
<td>Sharing</td>
<td>Word Search</td>
</tr>
<tr>
<td></td>
<td><strong>Problem Solving (Cause &amp; Effect)</strong></td>
<td>Prompting</td>
<td>Communicative Exchange</td>
<td>Reinforcement</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Joining in play</td>
<td>At the Seaside</td>
<td>Playing Basketball</td>
<td>Playing Fair</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prompting</td>
<td>Interactive Play</td>
<td>Interactive Play</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Turn Taking</td>
<td>Boris &amp; Bertie’s Story</td>
<td>Playing Video Games</td>
<td>Puzzle (Scooby Doo)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prompting</td>
<td>Turn Taking</td>
<td>Reinforcement</td>
<td></td>
</tr>
<tr>
<td><strong>Emotion</strong></td>
<td><strong>Reading Nonverbal Cues</strong></td>
<td>Empathy</td>
<td>When other children get upset</td>
<td>Helping Myself</td>
<td>Death</td>
</tr>
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<td></td>
<td><strong>Mind Reading</strong></td>
<td>Prompting</td>
<td>Imitation/ Flexibility</td>
<td>Scaffolding</td>
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<td></td>
<td><strong>Self-Control</strong></td>
<td>Observing</td>
<td>Feedback</td>
<td>Feedback</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Self-Awareness</strong></td>
<td>Prompting</td>
<td>Feedback</td>
<td>Feedback</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Keeping Calm</strong></td>
<td>Prompting/ Flexibility</td>
<td>Motivation/ Feedback</td>
<td>Communicative Exchange</td>
<td></td>
</tr>
<tr>
<td><strong>Characteristics</strong></td>
<td>Using positive language with a literal unambiguous style in a meaningful format taking developmental age, cognitive ability, visual learning style, reading and comprehension abilities, short attention span and visuo-spatial strength into account.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Technologies</strong></td>
<td>Graphic images, animated images and characters, sound files, video clips, simulation and role play, and games.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The researcher built a content management system (CMS) based on this framework to explore how this approach might benefit caregivers in their work with children on the autism spectrum. This portal provided caregivers with access to information and a compendium of activities which caregivers could use to help children to learn communication, play and emotion related skills. The aim was to use the CMS to demonstrate to carers (ie teachers, parents) how visual aids including images, simple animation, video and games could help children with ASDs to comprehend the meaning behind abstract concepts (Baker, 2001) and develop a greater understanding of the ‘hidden curriculum’ ie the little rules, the dos and don’ts of everyday life (Smith Myles & Simpson, 2001). Caregivers were also given instructions on how to apply teaching strategies during lessons and how to use authoring tools and a story builder called Reach & Teach (Appendix XIII) to create their own learning content to meet the individual needs of the children they were working with.

A small case study was conducted to investigate teaching strategies and how the use of technology and in particular multimedia such as images, simple animation, video and games could help caregivers to teach social skills to children with ASDs. Three caregivers (all teachers) participated in this study. They were asked to review the activities provided in the CMS and were given a set of instructions to modify content or create their own social narratives in order to personalise content to address the specific needs of particular children.

Feedback from this initial case study revealed that caregivers preferred to be able to take an educational resource and use it as they did not have time to invest in learning authoring tools to create individualised content. It was clear from their comments that caregivers required resources that were practical, which could be retrieved instantly without having to navigate through layers of information and which could be printed out easily or applied directly. Responses from interviews also suggested that the learning content should be expanded to include worksheets which would give caregivers a selection of scenarios to choose from and provide them with a range of games and activities which they could use with certain children depending on the problems they presented with. Since behaviour management seemed to be of particular interest to this group it was recommended that caregivers would benefit in particular from some practical advice on what to do to calm children down during a meltdown.
It was also proposed that the language used in the activities would need to be adjusted to suit the children’s developmental level in order to communicate effectively with these particular children.

Having studied the implications of the findings of this study the researcher decided to design a personalised adaptive learning system (PALS) which would support caregivers by meeting their individual needs and the children’s needs at one and the same time. This learning system design would take on board the suggestions made by participants during the case study and incorporate basic pedagogical and technological principles to harness the powerful learning implications and possibilities of ICTs to provide a more enhanced learning experience for the children involved.

4.2 Validation Study

In an attempt to investigate if the structure followed by recognised social skills training programmes (Sansosti, 2010) is an appropriate basis from which to elicit a set of pedagogical rules for the PALS a validation study was carried out. A representative sample of five caregivers (ie teachers, parents and key workers) was invited to participate in this study. The sample was opportunistic given that the only criterion for inclusion was that participants were currently teaching children who had been diagnosed with autistic spectrum disorders (ASDs). However the five participants either had a proven track record in the special education field or had acquired considerable experience working with their own children and were therefore qualified to conduct an expert assessment of the teaching strategies employed in the system and confirm whether the rules adhered to sound pedagogical and psychological principles.

The researcher conducted a face-to-face semi-structured interview lasting one hour with each participant. During each interview the researcher demonstrated a prototype of the PALS via a PowerPoint presentation (Appendix XIV) and asked each participant to comment on each aspect of the learning system, assess the application and outline what they considered to be the essential components of a learning system that would adapt to the needs of both caregiver and autistic child when completing a social skills training programme. The interviews were recorded, transcribed and analysed by the author (Appendix XV).
Research literature advises that there are seven strategies that have proven to be effective when teaching social skills to children with ASDs: direct instruction, modelling, role play, feedback, positive reinforcement, motivational game and practice (Baker, 2003; Bellini, 2008). When participant responses were analysed no further teaching strategies emerged but it was deemed appropriate to treat modelling and role play as two separate strategies in any future iterations of the learning system although they had tended to go hand in hand in existing social skills training programmes. As direct instruction might be open to several interpretations it was deemed prudent to describe this strategy as didactic instruction instead.

Participants were asked to comment on the proposed pre-test which aimed at determining how much support caregivers would need when using these seven specific teaching strategies. Based on this feedback the learning system design was modified to provide caregivers with full, medium, minimum or no support depending on the results they would achieve in their assessments. Caregivers would also be given an option to enable them to select further assistance at any stage in the tutoring process if they required it.

Evidence from literature suggests that there are ten skills (eg initiating interactions, conversation, play, reciprocation, problem-solving, reading non-verbal cues, mind reading, self-control, self-awareness and behaviour management) that caregivers need to teach children so that they become competent socially (McAfee, 2002; Baker, 2003; Bellini, 2008; Sansosti, 2010). The participants agreed that instructions on developing these required social skills together with specific examples should be included in the learning system.

It became apparent from a study of theory and practice that the starting point for any learning event should be the child’s prior knowledge of the required skill. Therefore it would be vital to find a way to gauge which stage of mastery the child had reached (novice, intermediate or advanced), or indeed, having actually learnt the steps, if the child only needed to be given opportunities to practice them in order to gain fluency of performance.

Caregivers who are familiar with Applied Behaviour Analysis already include observation, monitoring and recording of each lesson as part of their daily routine
In order to comply with school regulations special needs teachers and assistants must assess and record children’s progress over a wide range of skills in verbal and nonverbal children (ABLLS-R Partington, 2008; VB-MAPP Sundberg, 2008). Feedback from this group of participants suggested that the PALS could help caregivers keep accurate records of the children they were teaching by automatically updating the profiles that they had created with data on children’s progress through the different learning stages (novice, intermediate, advanced and acquired) in each social skill.

The literature emphasises the importance of addressing the individual needs of each child with an ASD when teaching social skills (Smith, 2003; Gray, 2010). An analysis of the points raised by participants during interview in relation to this issue revealed that the rule for selecting appropriate educational resources (ie child’s learning styles) was too restrictive as it failed to take into account the unique pattern of each child’s autism (Janzen, 2009). The rule was therefore updated to include resources which would cater for children’s developmental age (language and comprehension abilities and special interests).

### 4.3 Reconnaissance

After completing revisions to the PALS design the researcher conducted a telephone survey with a small number of suitably qualified personnel (five in total) to obtain their views on the overall design, dual-adaptivity, usability features and learning content proposed. A paper prototype of the learning system had been emailed to them in advance of the telephone interview (Appendix XVI). The researcher walked each participant through the steps in the learning process outlined in the document and explained how it was envisaged that caregivers would be able to use the children’s profiles to help them devise the most appropriate lesson plans for individual children and how the system would keep track of both their own progress learning teaching strategies and their children’s development of social skills (Appendix XVII).

The feedback received from this reconnaissance group was analysed and was used to inform the next stage of the iterative design process (XVIII). Based on the findings the overall design of the proposed PALS was not altered. The participants welcomed the structured approach to the development of social skills. They also agreed that the
strategies and the corresponding educational resources chosen to teach children at novice, intermediate, advanced and acquired levels were appropriate in each case. Although this group of experts considered the rating scale used in this design phase was an adequate way to capture information on each child’s skill level, the researcher decided to modify the system design to facilitate caregivers by giving them an opportunity to use their knowledge of their children to answer a series of questions based on Bellini’s (2008) learning stages. The system would then take their responses and apply a set of rules to determine whether their children would fit the novice, intermediate, advanced or acquired stage categories.

Similarly the researcher studied several existing language assessment tools, including ABLLS™ –R, VB-MAPP, ASHA and the University of Michigan developmental guidelines, in order to devise a series of questions to allow caregivers to determine their children’s language and comprehension abilities for the purpose of selecting appropriate educational resources.

Initially it was planned to roll out only two of the ten required skills for social competence (ie initiating interaction and conversation) in the first implementation phase. However the feedback from the reconnaissance group did suggest that the learning system might not be suitable for caregivers working in mainstream schools as the children enrolled in school would already be competent in these two skills. Therefore, in order to make the learning system relevant to this group of caregivers, it was decided to support the teaching of a third social skill (play) in the system.

It was also clear from this feedback that children have difficulty relating to characters in animated sequences and caregivers therefore prefer to use video clips and images of real people in real situations when teaching children with ASDs how to behave in different social situations. This is in line with research literature which recommends the use of video modelling (and self-modelling for older individuals) when teaching social skills to this group (Bellini, 2008; Moyes, 2011). For this reason it was decided that the learning content in the system would include video clips to demonstrate the use of teaching strategies in different contexts (Appendix XXIX). These files would be supplemented by instructional material and examples in pdf format for ease of download.
4.4 Pilot Study
Before undertaking the case studies the researcher conducted a pilot study in June 2013. The researcher recruited seven caregivers (three parents, three teachers and one SNA) who had been working with children diagnosed with ASDs. Between them they had accumulated over forty years of experience. Each participant completed the usability test (Appendix XXII) during a one-to-one session with the researcher. They were each given a list of tasks to complete and a quick start guide to the learning system (STAK) at the beginning of the session (Appendix XXIII). As the researcher wished to capture the users’ key strokes and first impressions of the system, she asked each user to try to ‘think out loud’ during the session: to say what they were looking at, what they were trying to do and what they were thinking. All the participants in the pilot study gave their consent to the recording of these interviews (Appendix XXIV).

The researcher guided the participants as they worked on the learning system and noted their comments. The feedback received during the sessions was analysed later from the recordings and these findings were summarised for the developer (Appendix XXV). On foot of these findings an additional feature was added to the Carer Profile to give the caregiver an opportunity to state the type of role they played in the child’s life: parent, parent with Special Education (SE) experience, parent with general teaching experience, primary school teacher with no SE training, primary school teacher with SE qualification, secondary school teacher with no SE training, secondary school teacher with SE qualification, resource teacher, special needs assistant, psychologist, autism therapist or other professional.

As the participants had also suggested some modifications to the system to make it more user-friendly, it was important to have these changes completed before the case studies got under way. All of these enhancements to the system were implemented and user accepted testing was carried out before recruitment for the case studies commenced in the middle of the following month (ie July 2013).
4.5 Summary

This chapter presented three exploratory case studies conducted as part of the iterative design process to devise the personalised dual-adaptive learning system, STAK (Social Skills Training for Autistic Kids). The cases aimed to examine and identify teaching strategies based on best practice in special education which could be applied successfully in teaching social interaction skills to children with autism and corresponding educational resources to enhance the children’s learning experience. These cases also sought to establish on what basis the learning system could adapt to the needs of both caregivers and children simultaneously, as literature suggests that the more individualised the learning experience the more effective it is going to be (Bellini, 2008; Heward, 2009).
Chapter 5  STAK Learning System

5.1 Introduction

Chapter 2 has described the characteristics of the condition which affects one in every sixty-eight children. It has illustrated how each child diagnosed with an ASD is different because the pattern and severity of the condition and intellectual ability varies from individual to individual. It is clear, therefore, that a ‘one size fits all’ approach, which has been adopted in many of the existing social skills training programmes, tends not to deal adequately with the social deficit in ASDs (Gray, 2010).

Since caregivers are familiar with the idiosyncrasies of their children’s behaviour and the problems they experience interacting with the people around them, it is vital to find a way to harness that knowledge in order to provide an individualised plan to suit the children’s specific needs (Florian, 2004). It is also essential that caregivers familiarise themselves with the range of social skills that children need to learn and that they become competent in the use of effective teaching strategies. This highlights the potential for the design and development of a learning system which adapts to the requirements of both caregivers and children simultaneously.

STAK (Social Skills Training for Autistic Kids) is a personalised dual-adaptive learning system which supports caregivers, by guiding them in the use of appropriate intervention strategies when developing social skills in children who have been diagnosed with ASDs. The aim of this learning system is to match child profiles with appropriate educational resources and teaching strategies, while at the same time providing caregivers when using those recommended strategies, with support at levels consistent with their own profiles, in order to meet their individual needs.

5.2 Theoretical Framework

According to recent research studies ten specific skills are required for successful social interaction with family, teacher, peers, and the wider community. These comprise initiating interactions, conversation, play, reciprocation, problem-solving, reading non-verbal cues, mind reading, self-control, self-awareness and behaviour management (Baker, 2003). The literature also refers to a number of effective intervention strategies
which can be used to promote skill acquisition or to enhance social performance (Weiss & Harris (2001); Bondy & Sulzer-Anaroff (2002); Baker (2003); and Bellini (2008). This learning system (STAK) supports caregivers using seven of these strategies\(^2\) when developing the social competence of children in their care.

The central concept of this intervention is that teaching strategies should correspond to the child’s skill level and should be applied as part of a logical sequence and not in an ad hoc fashion. Therefore it is crucial at the outset to establish the child’s learning stage (whether novice, intermediate, advanced or acquired) in each of the ten social skills in order to build on the knowledge that the child has already acquired in each of these skills. The caregiver is recommended appropriate strategies to use to develop social skills when a child is at a particular learning stage (Figure 5.1).

Establishing the child’s learning stage/skill at the commencement of the learning process is pivotal to achieving a successful outcome. Once this is done the system can select the most appropriate teaching strategies to be used with a particular child.

A structured approach is taken by STAK as it guides caregivers through the steps of breaking down skills into small chunks of information, modelling the skill steps, asking the child to role play the skill in different scenarios, commenting on the child’s performance of the skill, giving the child positive reinforcement via tokens or praise, helping to increase the child’s concentration using motivational games and offering the child many opportunities to practise the skill in order to achieve fluency and expertise (Sansosti, 2010).

\(^2\) didactic instruction, modelling, role play, feedback, positive reinforcement, motivational game and practice
As they were being guided along this structured learning path some caregivers might have believed that STAK has taken on the role of dictator rather than facilitator. Many teachers in particular would be accustomed to choosing whichever teaching strategies or methods that they deemed appropriate from the arsenal that they had been trained to use. STAK provides advice on the use of each strategy in context to demonstrate to caregivers why one method would be more appropriate to use rather than another.

At the same time STAK helps caregivers to teach the children through a number of educational resources that compliment this structured approach: discrete trial, steps to success, social skills picture story, cognitive picture rehearsal, social stories, motivational games and video modelling (Table 5.1).
### Table 5.1  STAK - Social Skills Teaching Programme Structure

<table>
<thead>
<tr>
<th>Social Skills</th>
<th>Learning Stage/ Skill Level (Child)</th>
<th>Teaching Strategies (Carer)</th>
<th>Educational Resources (Child)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>Initiating Interaction, Conversation, Play, Reciprocation, Problem Solving, Reading, Non-verbal cues, Mind-reading, Mind Control, Self-Awareness, Mind Management</td>
<td>Didactic Instruction &amp; Modelling</td>
<td>Discrete Trial &amp; Steps to Success</td>
</tr>
<tr>
<td>Intermediate</td>
<td></td>
<td>Role Play &amp; Corrective Feedback</td>
<td>Social Skills Picture Story &amp; Cognitive Picture Rehearsal</td>
</tr>
<tr>
<td>Advanced</td>
<td></td>
<td>Positive Reinforcement &amp; Motivational Game</td>
<td>Social Story &amp; Games</td>
</tr>
<tr>
<td>Acquired</td>
<td></td>
<td>Practice</td>
<td>Video Modelling</td>
</tr>
</tbody>
</table>

Before a caregiver embarks on the task of teaching a child any social skill the learning system must equip him/her with the appropriate tools for the job. The support required by each caregiver is established at the Carer Profile creation stage when caregivers respond to questions to ascertain their prior experience using seven teaching strategies. Depending on the number of positive responses caregivers give to the questions posed they will be offered full support, medium support, minimum support or no support when they start an activity with a particular child.

Likewise the criteria surrounding the recommendation of educational resources for the children concerned are based on their profiles: learning stages, learning styles, language abilities, comprehension abilities and special interests. Figure 5.2 illustrates how the system takes the concerns of the child and the caregiver into account when recommending support material and educational resources.
Figure 5.2  STAK Content Structure

The learning system is designed in accordance with best practice guidelines for educating children with autism (National Academy of Sciences, 2001) as follows:

- systematic planning of activities with specific objectives
- hybrid strategies
- strategic adjustment of programme to meet needs of individual children
- active engagement of children in learning opportunities
- on-going evaluation of children’s progress.

These features were woven into the design plan which was also informed by autism theories to ensure conformity with the highest pedagogical standards.
5.3 Overall STAK Architecture

Since there was a requirement to cater simultaneously for the individualised needs of both caregiver and child it was decided to build a personalised dual-adaptive learning system based on the architecture devised by Lahart (2008) as illustrated in Figure 5.3. Establishing the child’s learning stage/skill level at the commencement of the learning process is pivotal to achieving a successful outcome.

The learning system contains the following components:

- The **Carer Profile** assesses the caregivers’ prior knowledge of teaching strategies through a series of questions and stores the responses which are used by the system to determine the amount of support particular caregivers require when using certain teaching strategies.

- The **Child Profile** assesses the children’s learning stages in each of ten social skills and stores the responses which are required by the system to determine which teaching strategies to recommend to caregivers working with these particular children. It also maintains details on children’s learning styles, language abilities, comprehension abilities and special interests which are used by the system to select educational resources to meet the specific needs of children.
The **Adaptive Engine** comprises a set of rules based on pedagogical principles which match individual caregiver and child profiles to the most appropriate supports and educational resources.

The **Activity Centre** provides a portal where caregivers can download material (comprising explanations, examples of strategies in practice and review options) to support them when applying the teaching strategies which match the children’s learning stages. Caregivers can also download the educational resources which correspond to the strategies recommended for the children’s level of skill knowledge (novice, intermediate, advanced or acquire). These resources are also categorised according to children’s learning styles, language abilities, comprehension abilities and special interests in order to enhance their learning experience by suiting their individualized needs.

STAK is designed to offer support to caregivers and children in the following manner:

- it adapts to the needs of the caregiver
  - by linking the teaching strategies recommended for a given child at a particular learning stage to the level of support for those specific strategies which is consistent with a caregiver’s prior experience

- it adapts to the needs of the child
  - by matching teaching strategies to his/her learning stage (novice, intermediate, advanced or acquired) in each of the require social skills
  - by matching educational resources to his/her learning style, language ability, comprehension ability and special interests

This complex relationship between caregiver and child is captured in the entity relationship diagram (ERD) which illustrates the entities in the database and the relationships between them (Figure 5.4).
5.4 Implementation of STAK learning system

STAK is divided into five main sections: Introduction, Caregiver Profile, Child Profile, Activity Centre and Administration (Figure 5.5)

1. The Introduction contains the registration and login programs.

2. In the Caregiver Profile section caregivers create their own profiles based on their prior knowledge of teaching strategies.

3. In the Child Profile section caregivers build profiles for the children they are teaching; a record of children’s learning styles, language abilities, comprehension abilities, learning stages and special interests is held in the profiles.

4. For both the carer and child profiles the users can revert to a level below or above during the process if they feel that they have incorrectly answered the questions.

The application also allows for the caregiver to keep a record of the child’s progress and to allocate a child to another caregiver (or several) teaching the same child, so that the child’s profile can be shared between them to obtain a holistic view of the child’s development of skills.
5. In the **Activity Centre** caregivers can access support material and educational resources recommended by the system to suit their own and children’s individualized needs.

### Figure 5.5 STAK Learning System Process

#### 5.5 Carer Profile

It is essential to ascertain the caregivers’ prior knowledge of teaching strategies in order to determine the most appropriate level of support required in each case and to establish a baseline value from which to measure the caregiver’s progress. For many caregivers this may be the first time that their knowledge of teaching strategies has been assessed as there are so few facilities available. While some caregivers might be familiar with the strategies employed in the system others may not actually realise that they know and use them on a ‘daily’ basis.

#### 5.5.1 Assessment of Caregiver’s Prior Knowledge of Teaching Strategies

For the purpose of assessing this knowledge forty-nine questions (seven questions per strategy) have been formulated based on the fundamentals of each strategy included in
the system\(^3\) (Baker, 2003; Bellini, 2008; Sansosti, 2010) (Appendix VIII). For instance, the questions on Didactic Instruction (Table 5.2) were based on discussions in the literature on strategies for teaching social skills to young children and adolescents with autism, Asperger Syndrome and social-communication problems (Weiss & Harris, 2001; Baker 2003). These questions were devised in such a way as to find out if the caregiver has ever broken down a social skill into ‘small chunks of information’ or used prompts or cues to encourage a student to perform the steps in a skill. If the caregiver responds in the affirmative to the questions posed then it follows that he/she has already gained actual experience of using this strategy. Thus the system will determine the level of experience from the responses he/she gives to the questions and will offer the appropriate level of support.

Table 5.2  STAK Questions on Teaching Strategy – Didactic Instruction

<table>
<thead>
<tr>
<th>Didactic Instruction</th>
<th>Response (tick if yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When teaching a child a social skill do you break the skill down into small components for ease of understanding?</td>
<td>□</td>
</tr>
<tr>
<td>2. Do you use visual aids to help you to explain the steps in a social skill?</td>
<td>□</td>
</tr>
<tr>
<td>3. Do you ask the child to repeat the sequence of steps in a skill again and again until he/she can perform it without assistance?</td>
<td>□</td>
</tr>
<tr>
<td>4. Do you use Prompts to encourage children to use a skill in different scenarios?</td>
<td>□</td>
</tr>
<tr>
<td>5. Do you use Cues to help children to understand when it is appropriate to use a skill?</td>
<td>□</td>
</tr>
<tr>
<td>6. Have you ever used didactic instruction before?</td>
<td>□</td>
</tr>
<tr>
<td>7. Would you feel confident applying this strategy in any context?</td>
<td>□</td>
</tr>
</tbody>
</table>

A rubric has also been constructed based on the correlation between positive responses and support level required (Table 5.3). Each question is of equal importance and therefore has been assigned equal weighting. The fewer the positive responses recorded the less the respondent is familiar with the teaching strategy and therefore the more in

\(^3\) didactic instruction, modelling, role play, corrective feedback, positive reinforcement, motivational game and practice
need of support from the learning system. The nature of the questions does not encourage caregivers to give responses in such a way as to obtain an expected end result. The support provided by the system can be broken down into four components: recommendations, explanations, examples and review material.

### Table 5.3  Levels of Support for Caregivers

<table>
<thead>
<tr>
<th>Level of Support (Carer)</th>
<th>Assessment Results</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Support</td>
<td>1-2 positive responses</td>
<td>Recommended Teaching Strategies, Explanation, Example and Review</td>
</tr>
<tr>
<td>Medium Support</td>
<td>3-4 positive responses</td>
<td>Recommended Teaching Strategies, Example and Review</td>
</tr>
<tr>
<td>Minimum Support</td>
<td>5-6 positive responses</td>
<td>Recommended Teaching Strategies and Review</td>
</tr>
<tr>
<td>No Support</td>
<td>7 positive responses</td>
<td>Recommended Teaching Strategies only</td>
</tr>
</tbody>
</table>

#### 5.5.2 Validation of Assessment Questions

All of the questions included in the Carer Profile were based on definitions found in the literature (Weiss & Harris, 2001; Baker, 2003; Sansosti, 2010). The researcher asked a group of five experts who have an average of nine years’ experience working with children with ASDs in Ireland to review the questions. Each question was scrutinised by members of this group and was deemed to be reliable and fit for purpose.

#### 5.6 Child Profile

In order to teach children with ASDs effectively one must be cognisant of their profile: learning stage, learning style, language ability, comprehension ability, and special interests (Smith, 2003; Gray, 2010). One aim of this learning system is to help caregivers to create profiles for the children that they are teaching and thereby tailor educational resources to suit their individual profiles. The process used involves the answering of a series of questions on the child’s capabilities similar to assessment methods currently applied by teachers in primary schools (ABLLSTM-R, VP-MAPP) or by practitioners in their clinics (ADI, ADOS). Some of these protocols are quite complex (eg the ABLLSTM-R model has 93 pages of skills which the caregiver must score) and involve days of intensive and often expensive training. Conscious also of the huge time commitment involved for teachers and Special Needs Assistants (SNAs) in using these instruments to assess children’s abilities, the researcher designed a much
simpler tool, based on best practice, which extracts relevant information sufficient for the purpose of selecting appropriate educational resources for the children concerned. Although the number of questions has been reduced considerably there is no shortcut to profile creation (Table 5.4). In order for the profile to reflect the child’s abilities caregivers will still need to spend some time reflecting on their knowledge of the children before supplying the answers.

However it is possible for caregivers to create a child’s profile based on their prior knowledge of one skill and return to complete the questions on the other skills at a later stage. With regards to language style caregivers are only required to select an option from a dropdown menu. Similarly if children have some special interests these may be added to the profile but this choice is optional.

<table>
<thead>
<tr>
<th>Table 5.4 Child Profiling Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child Profile</strong></td>
</tr>
<tr>
<td><strong>Total Questions</strong></td>
</tr>
<tr>
<td><strong>Learning Stage</strong></td>
</tr>
<tr>
<td>Initiating Interaction</td>
</tr>
<tr>
<td>Conversation</td>
</tr>
<tr>
<td>Play</td>
</tr>
<tr>
<td>Reciprocation</td>
</tr>
<tr>
<td>Problem Solving</td>
</tr>
<tr>
<td>Reading non-verbal cues</td>
</tr>
<tr>
<td>Mind Reading</td>
</tr>
<tr>
<td>Self-Control</td>
</tr>
<tr>
<td>Self-Awareness</td>
</tr>
<tr>
<td>Behaviour Management</td>
</tr>
<tr>
<td><strong>Learning Style</strong></td>
</tr>
<tr>
<td>dropdown menu</td>
</tr>
<tr>
<td><strong>Language Ability</strong></td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td><strong>Comprehension Ability</strong></td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td><strong>Special Interests</strong></td>
</tr>
<tr>
<td>dropdown menu</td>
</tr>
</tbody>
</table>
5.6.1 Assessment of Learning Stage

The system confirms the child’s learning stage from the responses the caregiver gives to twelve questions (Appendix IX) which were based on Bellini’s criteria for skill acquisition (2008). The more affirmative responses recorded the more competent the child is deemed to be using that particular social skill. Thus children are categorized by the system as at either the novice, intermediate, advanced or acquired learning stage as appropriate (Table 5.5).

<table>
<thead>
<tr>
<th>Learning Stage</th>
<th>Value</th>
<th>Characteristics of Learner</th>
</tr>
</thead>
</table>
| **Novice**     | 1 and 2 | 1. Needs a great deal of thinking and working out to complete task  
2. Easily distracted  
3. Requires assistance to complete task  
4. Makes frequent errors  
5. Completes tasks slowly  
6. Requires instant feedback on task performance |
| **Intermediate** | 3 and 4 | 1. Becomes more independent but still requires a great deal of thought when completing tasks  
2. Less easily distracted  
3. May hesitate between steps of the task, as child attempts to recall the procedure  
4. Makes fewer errors than novice learners; fluency is increased  
5. Performs tasks inconsistently  
6. Requires instant feedback on task performance |
| **Advanced**   | 5 and 6 | 1. Completes tasks independently with little thought  
2. Stays focussed on task  
3. Does not hesitate between steps of a task  
4. Typically performs without errors; Fluency is significantly increased  
5. Is able to complete multiple tasks at the same time  
6. Able to complete tasks across various settings and persons |
| **Acquired**   | 7     | Skill has been acquired but practice is required to enhance performance in different contexts |
5.6.2 Assessment of Learning Style

The VARK system developed by Fleming and Mills (1992) has been adopted to gauge whether the child is a visual, aural, read/write or kinaesthetic learner. Caregivers select the child’s learning preference from a dropdown menu. Literature indicates that caregivers can make a key contribution to understanding children’s preferences through observation (Kirk et al, 2012). However it is recommended that caregivers when in doubt select the visual learning style which is the one most commonly associated with this condition, as it is well documented that children with autism have strong visual skills (Weiss & Harris, 2001).

5.6.3 Assessment of Language Ability

In order to ascertain the child’s language ability ten questions were formulated from four existing inventories used to assess expressive language development in typical children4. A rubric was devised based on the milestones that a child with language deficits should be able to achieve by age 7 (Appendix X). Each question is of equal importance and has been assigned equal weighting. Therefore the greater the number of positive responses recorded the higher the child’s language ability (Table 5.6).

<table>
<thead>
<tr>
<th>Language Ability</th>
<th>Value</th>
<th>Characteristics of Learner</th>
</tr>
</thead>
</table>
| Very good        | 9 and 10 | 1. Can Child say quite complex sentences of 5-6 words? 
2. Can Child give directions, instructions or explanations? 
4. Can Child tell simple stories, sing songs and recite nursery rhymes? 
5. Does Child use modulation ie stress and pitch correctly? eg I want the blue pencil now! 
6. Does Child produce most vowel sounds and some consonant sounds correctly? 
7. Can Child apply rules of grammar? eg plural of boy is boys 
8. Can Child combine words to form acceptable phrases? eg transform the sentence Mammy is working to Is Mammy working? 
9. Does Child have a good vocabulary? ie 1500-2000 words 
10. Can Child use four prepositions (eg in, out on and under), pronouns (eg I, you, me, mine), adjectives (eg big, little, long, short) and adverbs (eg fast, slow, quietly, gently)? |
| Good             | 7 and 8  | 
| Average          | 5 and 6  | 
| Poor             | 3 and 4  | 
| Very poor        | 1 and 2  | 

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4 ASHA, University of Michigan, VB-MAPP and ABLLS™-R Protocols
5.6.4 Assessment of Comprehension Ability

Similarly the system determines the child’s comprehension ability from responses that caregivers give to ten questions (Table 5.7) formulated from tests conducted by the same four professional bodies\(^5\) to measure receptive language ability in children (Appendix XI).

<table>
<thead>
<tr>
<th>Comprehension Ability</th>
<th>Value</th>
<th>Characteristics of Learner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>9 and 10</td>
<td>1. Does Child listen to what is being said and understand everything without difficulty?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Can Child understand and interpret complex instructions?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Can Child listen to the content of questions and respond appropriately?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Can Child listen to a story and then relate the contents of the story in his/her own words?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Does Child understand abstract concepts eg love, freedom, happiness, sadness and hope?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Does Child understand figures of speech eg it is raining cats and dogs?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7. Does Child use the context to derive the meaning of words eg plane/plain, pair/pear?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8. Does Child understand that objects can be categorised eg things we eat, things that fly, etc?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9. Does Child understand functions and features of items? eg when child is asked to put all his toy animals away that the child understands that a pig, dog, cat and tiger are all in the animal class</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10. Does Child understand a good number of words? ie 15,000-20,000?</td>
</tr>
<tr>
<td>Good</td>
<td>7 and 8</td>
<td>1. Does Child listen to what is being said and understand everything without difficulty?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Can Child understand and interpret complex instructions?</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>10. Does Child understand a good number of words? ie 15,000-20,000?</td>
</tr>
<tr>
<td>Average</td>
<td>5 and 6</td>
<td>1. Does Child listen to what is being said and understand everything without difficulty?</td>
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<tr>
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<tr>
<td></td>
<td></td>
<td>9. Does Child understand functions and features of items? eg when child is asked to put all his toy animals away that the child understands that a pig, dog, cat and tiger are all in the animal class</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10. Does Child understand a good number of words? ie 15,000-20,000?</td>
</tr>
<tr>
<td>Poor</td>
<td>3 and 4</td>
<td>1. Does Child listen to what is being said and understand everything without difficulty?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Can Child understand and interpret complex instructions?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Can Child listen to the content of questions and respond appropriately?</td>
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<td>5. Does Child understand abstract concepts eg love, freedom, happiness, sadness and hope?</td>
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<tr>
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<td>6. Does Child understand figures of speech eg it is raining cats and dogs?</td>
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<td>8. Does Child understand that objects can be categorised eg things we eat, things that fly, etc?</td>
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<tr>
<td></td>
<td></td>
<td>9. Does Child understand functions and features of items? eg when child is asked to put all his toy animals away that the child understands that a pig, dog, cat and tiger are all in the animal class</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10. Does Child understand a good number of words? ie 15,000-20,000?</td>
</tr>
<tr>
<td>Very poor</td>
<td>1 and 2</td>
<td>1. Does Child listen to what is being said and understand everything without difficulty?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Can Child understand and interpret complex instructions?</td>
</tr>
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<td>9. Does Child understand functions and features of items? eg when child is asked to put all his toy animals away that the child understands that a pig, dog, cat and tiger are all in the animal class</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10. Does Child understand a good number of words? ie 15,000-20,000?</td>
</tr>
</tbody>
</table>

5 ASHA, University of Michigan, VB-MAPP and ABLLSTM™-R Protocols
5.7 Activity Centre

The Activity Centre is designed to give caregivers ready access to appropriate supports and resources that the system has matched to specific profiles. STAK caters for several different resource types: video clip, pdf file, website URL, sound file, animation, simulation, image, text-based activities-resource, demonstration, movie, media, and DVD media. Supports for caregivers are categorised into explanations, examples and reviews.

Educational resources for children are also divided into several different categories: discrete trial, steps to success, pecs, social skills picture story, cognitive picture rehearsal, social story, games, video modelling, verbal repetition discrete trial, steps to success - pecs verbal repetition, oral social skills picture story, video cognitive picture rehearsal, audio recording of social story and games with music and sounds.

Resources were sourced from respected websites, agencies and publications. Permission was sought where necessary from copyright holders to reproduce resources to make them available as downloadable resources in STAK (Appendix XVII). Where samples of resource types were not readily available the researcher produced her own articles, video clips and PowerPoint presentations based on instructions found in the literature (Baker 2006; Smith Myles, 2004).

The system has the facilities to cater for vast quantities of resources. However due to time constraints, file storage limits and cost implications it was only possible to include approximately three hundred resources in this prototype. Since there are currently 7,000 possible child profiles [10 social skills x 7 teaching strategies x 4 learning styles x 5 language abilities x 5 comprehension abilities] in the system many of the resource files had to be reused and recycled to cater for as many individual needs as possible.

After the caregiver selects the child identifier, and indicates the particular social skill which he/she wishes to teach the child, the child’s learning stage (novice, intermediate, advanced or acquired) in this skill is displayed on the screen. Accordingly the system will recommend two appropriate strategies to the caregiver to use to teach this particular skill at this particular level to the child (Table 5.8). However, the system only recommends practice to be used with children at the acquired level since these children
are only required to repeat the skills that they have already learned in order to achieve fluency and improve performance in those skills.

### Table 5.8 Child Learning Stages with corresponding Teaching Strategies

<table>
<thead>
<tr>
<th>Learning Stage (Child)</th>
<th>Teaching Strategies (Carer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>Didactic Instruction &amp; Modelling</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Role Play &amp; Feedback</td>
</tr>
<tr>
<td>Advanced</td>
<td>Positive Reinforcement &amp; Motivational Game</td>
</tr>
<tr>
<td>Acquired</td>
<td>Practice</td>
</tr>
</tbody>
</table>

#### 5.7.1 Matching of Support Material to Carer Profile

When the caregiver selects a recommended strategy the system will then offer the caregiver full support, medium support, minimum support or no support based on his/her own personal profile (i.e. initial responses to questions posed at the profile creation stage). Caregivers are given the facility to override the level of support the system recommends for them.

There are four different support components to guide caregivers when using seven different teaching strategies\(^6\) (Table 5.9).

### Table 5.9 Carer Support Levels with corresponding Support Components

<table>
<thead>
<tr>
<th>Carer Support Levels</th>
<th>Support Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Support</td>
<td>Recommended Teaching Strategies, Explanation, Example and Review</td>
</tr>
<tr>
<td>Medium Support</td>
<td>Recommended Teaching Strategies, Example and Review</td>
</tr>
<tr>
<td>Minimum Support</td>
<td>Recommended Teaching Strategies and Review</td>
</tr>
<tr>
<td>No Support</td>
<td>Recommended Teaching Strategies only</td>
</tr>
</tbody>
</table>

---

\(^6\) didactic instruction, modelling, role play, feedback, positive reinforcement, motivational game and practice
For instance, full support as illustrated in Figure 5.6 comprises:

- recommended **teaching strategies** to use with the individual child at a specific learning stage
- a detailed **explanation** of the teaching strategy selected by the caregiver from the strategies recommended by the system and a demonstration of how this particular strategy can be used to develop social competence
- **examples** of how this intervention strategy has been used successfully in different situations
- **instructions** on how to review (observe, monitor, record) the lesson to encourage caregivers to carry out continuous assessment of their own learning and the impact of this intervention strategy on the children involved

![Figure 5.6 Full Support for Caregiver using Corrective Feedback to teach Child](image)

### 5.7.2 Matching of Educational Resources to Child Profile

When the system receives a request for ‘Resources’ it is programmed to display files on the screen (text, images, videos etc) which will complement the particular teaching strategies that have been recommended to caregivers to use when helping children to achieve competence in social skills from a particular learning stage.
Educational resources include discrete trial, steps to success, social skills picture stories, cognitive picture rehearsals, social stories, games and video modelling examples.

A resource profile is completed for each educational resource which takes into account the children’s learning stages, learning styles, language abilities, comprehension abilities and special interests in order to adapt to their individual preferences and engage the children in the activities (Figure 5.7).

5.7.2.1 Discrete Trial

Discrete trial examples were supplied to illustrate how each skill should be broken down by the caregivers into separate (discrete) components (small chunks of information) so that children can assimilate them easily (Weiss & Demiri, 2011). The caregivers repeat these steps with the children using didactic/direct instruction over and over again until the children understand what they should do or how they ought to behave in a particular situation.
5.7.2.2 Steps to Success

Each social skill is divided into a list of concrete steps which children find easy to understand and visualise (Coucouvanis, 2005). Caregivers model these steps for the children and then ask them to imitate the actions that they have seen (Figure 5.8).

Steps to Success: Joining In
(Instructions for child)
If you would like to join in when other children are playing you follow these steps:
1. Move close.
2. Watch.
3. Wait.
4. Ask.
5. If “yes”, join in.
6. If “no”, do something else.

Modelling the Skill
- Plan ahead – discussion questions, role-plays, activities, supplies, supports, homework
- Establish a routine in class
- Give clear, precise directions when modelling the skill
- Use visual supports as much as possible – copy the Steps to Success onto a flipchart or blackboard and place it in full view of the class
- Start off with a discussion on the skill or an activity involving the skill
- Keep up the pace
- Emphasize what the children have done correctly with enthusiasm
- If appropriate, mention an aspect of the skill that you think they might be able to improve upon
- Use positive reinforcement – set up an award system that the children appreciate

Figure 5.8 Steps to Success – Joining In (Judith Coucouvanis, 2005)

5.7.2.3 Social Skills Picture Story

Social Skill Picture Stories are used when children have reached the intermediate learning stage and are thus able to role play the skill. The researcher has designed some stories (Figure 5.9) using digital pictures of actual children combined with text and cartoon bubbles to denote the correct (and sometimes the incorrect) way to act in a given situation (Baker, 2003).
5.7.2.4 Cognitive Picture Rehearsal

Cognitive Picture Rehearsals has been included to help caregivers to give corrective feedback to the children they are teaching. These illustrations encourage caregivers to discuss specific problem situations with children and work out a solution and a plan of action together. Pictures of the three components: the antecedents to a specific problem situation, the targeted desired behaviour, and a positive reinforcer are fixed to index cards (Groden & Lavasseur, 1995). Caregivers are advised to show the cards in sequence to the children until they can repeat what is happening in each picture. Children are encouraged to look at these cards just before they enter similar situations to help them to cope and to avoid meltdowns (Baker, 2003).
5.7.2.5  **Social Stories™**

Social stories are introduced to reinforce the skill steps at the advanced learning stage and to ensure that children understand why they should behave in certain ways at certain times (Gray, 2010). These stories are written from the first-person perspective and use positive language to describe a particular situation and to identify suggested responses (or choices of responses to a given situation) and conform to a set of ten criteria (Gray, 2004).

5.7.2.6  **Motivational Games**

Games are included to motivate children to persevere in their attempt to achieve fluency in each skill by helping them to interact with their peers and to engage with the learning process (Gage & Berliner, 1998; Lahart, 2008). Caregivers can use games as ice-breakers to facilitate interaction between children and their peers and also to help develop the children’s problem-solving skills.

5.7.2.7  **Video Modelling**

A video modelling intervention involves watching a video demonstration of a skill and then imitating the behaviour of the model. Video modelling allows the caregivers to combine a broad range of strategies to deal with complex social interactions, promote skill acquisition, enhance skill performance and also reduce problem behaviours. It also provides children with opportunities to practise skills they have already acquired (Mills & Marchant, 2011).

5.8  **Technical Implementation**

The STAK learning system is launched through a Joomla! content management system (CMS) and requires users to register before accessing the program files.

The programs in the STAK learning system were written in PHP (Hypertext Preprocessor) which is a widely-used general-purpose scripting language that is especially suited for web development and can be embedded into HTML. A MySQL database stores data generated during the learning process. The software was developed by a fellow student at Trinity College (Appendix XXI).
The rules are based on the ‘strategy learner profile’ (linking teaching strategy to caregiver profile) and the ‘resource learner profile’ (linking educational resource to child profile). The caregiver profile contains a record of the caregiver’s experience using seven particular teaching strategies and the child profile consists of the individual’s learning stage, learning style, language ability, comprehension ability and special interests. AJAX is used to call up some of these PHP programs eg fetch, list, delete and save resources and front-end data is validated by javascripts. A user-friendly interface uses cascading style sheets which complements the Joomla! CMS template. This process is outlined in Figure 5.10 overleaf.

5.9 Summary

This chapter describes how the STAK personalised dual-adaptive learning system has been designed to bridge the gap in existing interventions by giving caregivers the level of support they require when developing social skills while at the same time adapting to the individualised needs of the children concerned. The system does this by harnessing the knowledge and experience of caregivers in individual profiles and matching these profiles to educational content in an innovative manner that assists both the caregiver and child involved in the learning experience.

The following chapter will outline the research methodology applied in this case study to answer the research question.
Figure 5.10  STAK Process
6.1 Introduction
The previous chapter described the personalised dual-adaptive learning system, STAK, which was designed and developed through an iterative process involving the three exploratory case studies discussed in Chapter 4. This chapter provides an account of the six case studies conducted to evaluate STAK. The chronological narrative of events is outlined and the procedures followed in each case are discussed. Further discussion and analysis of these cases will follow in Chapter 7.

6.2 Recruitment
The researcher organised five workshops between July and November 2013 to demonstrate the learning system to potential participants and to recruit caregivers (parents, teachers and key workers) to help her evaluate the learning system. Details of the two workshops in July were circulated via email to caregivers known to the researcher and her colleagues and also to members of the Irish Society for Autism and Irish Autism Action via social media. Unfortunately these workshops were not well attended as some caregivers had prior commitments on those dates or were unable to engage specialised child minding services. However, on seeing the workshops advertised by the Society, Sligo HSE and Western Care Association contacted the researcher and offered her the opportunity to demonstrate the learning system to employees who provided advice on interventions for children diagnosed with ASDs to parents in their catchment areas.

Later in the year Sligo HSE invited the researcher to give a talk to a parents group from the Sligo-Donegal catchment area and demonstrate the learning system to parents who were interested in participating in case studies. The workshop schedule is outlined in Table 6.1.
Table 6.1  Workshop Schedule 2013

<table>
<thead>
<tr>
<th>Date</th>
<th>Venue</th>
<th>Time</th>
<th>Caregivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 July 2013</td>
<td>Recital Hall, RIAM, Dublin 2</td>
<td>7.00 pm - 9.00 pm</td>
<td>0</td>
</tr>
<tr>
<td>20 July 2013</td>
<td>Recital Hall, RIAM, Dublin 2</td>
<td>11.00 am - 1.00 pm</td>
<td>4</td>
</tr>
<tr>
<td>29 July 2013</td>
<td>Sligo Health Service Executive</td>
<td>11.00 am - 1.00 pm</td>
<td>7</td>
</tr>
<tr>
<td>20 Aug 2013</td>
<td>Western Care Association Castlebar</td>
<td>12.00 pm - 1.30 pm</td>
<td>7</td>
</tr>
<tr>
<td>19 Nov 2013</td>
<td>Sligo Park Hotel</td>
<td>9.00 am - 3.00 pm</td>
<td>13</td>
</tr>
</tbody>
</table>

Over the succeeding months the researcher emailed the information sheet together with consent forms to approximately one hundred special schools and primary schools and secondary schools in the Dublin area known by the Society to cater for ASD students. Similarly the researcher contacted course directors running ABA classes and administrators in branches of the Carers Association of Ireland in an effort to find potential recruits. This recruitment drive unfortunately coincided with a period when the number of special needs personnel and resource hours in schools was being reduced. This meant that already stretched staff members were unable to take on any extra commitments. For this reason, although many of these caregivers registered and checked out the learning system, it was not possible for them to proceed with the evaluation process.

Information on this study continued to be publicised over the coming months by emailing registered users and through an information site that the researcher had created at URL: www.stakmate.com and the researcher’s contact details were also posted regularly on the Irish Autism Action’s Facebook page. The researcher also took the opportunity to meet parents and teachers attending the Autism Expo 2014 in November and distributed information on STAK to fifty interested parties on that day.

Since the numbers of potential recruits was still small at that stage the researcher decided to create online versions of all the forms and upload the links to the CMS so that the participants would be able to find everything they needed for the evaluation at a ‘one stop shop’. This proved to be a turning point in the study as participants became more engaged with the process as it no longer involved them having to download files and return completed questionnaires to the researcher by email or snail mail. Besides the
online forms had a more user-friendly look and feel than their paper-based equivalents and so filling out the forms seemed less of a chore for them.

This adjustment to the online experience for caregivers also meant that the net could be cast wider to make it easier for participants living outside Ireland to take part in the case studies. At this point a member of the KDEG research group working in Qatar introduced some of his contacts in the autism service sector to the learning system through information days and workshops. This resulted in a number of these professionals and parents registering and agreeing to participate in the study. Around the same time another colleague in KDEG got permission from the principal of his primary school for the researcher to work with teachers and SNAs in the autism unit attached to the school.

After a long and difficult recruitment period thirty-eight registered users of the system agreed to participate in the case studies. All of these users either worked with or cared for a child who had been diagnosed with an ASD.

### 6.2.2 Ethical Considerations

Participants were given an outline of the research aims and the contents of the SCSS ethics policy which would be adhered to throughout the study. They were told that their participation would be completely voluntary and that they could withdraw from the study at any time without penalty. In the event that they withdrew from the study the researcher promised to remove all data relating to them from the study and not to include any reference to their data in the research documentation.

Participants were informed that there were no anticipated risks to their involvement in this research. Instead it was envisaged that they would benefit through being given the opportunity to experience new technologies which would be helpful to them in their work.

Each participant was asked to provide their own consent in writing by signing a consent form provided by the researcher (Appendix VII). It was also made clear to them that it was their responsibility to obtain consent from parents if they wished to include images of their pupils in any activities and to inform the researcher if he/she was employed by a school. In that event the permission would have to be obtained from the school principal.
or the board of management before the teacher and his/her pupils could take part in the case study.

The researcher confirmed that the data collected would be anonymised and an assurance was given that neither their own identities nor those of the children they were working with would be made known. Participants were also advised that the data would be stored in compliance with the Data Protection Act 2003 (Ireland). Participants were also informed that any data collected during the course of this project (and which might be entered into the dissertation of the researcher) would be held in the libraries of Trinity College Dublin for up to and exceeding seven years.

The researcher also made the participants aware that the documentation of the findings would be published and disclosed to a body of examiners in Trinity College Dublin as well as external examiners and that there might be lectures, PhD theses, conference presentations and peer-reviewed journal articles written as a result of this project. However they were assured that under no circumstances would identities of the caregivers or the children be revealed.

The researcher offered to hold a debriefing session after the findings of this project had been published to provide participants with the opportunity to examine how their contributions to the study have been used and interpreted, and to ensure that their contributions had not been used inaccurately or out of context.

Participants were informed that the researcher would be obliged to report any illegal activity that might be uncovered during the course of the study to the appropriate authorities. They were also advised that the researcher was not cognisant of any conflicts of interest regarding this research. However assurances were given that data collected during the project would not be used against any of the participants involved.

After fully informing the participants about the background to the research study and outlining the commitment involved, each person was asked to sign a consent form.
6.3 Case Studies

Three case studies were conducted in three different locations: an assistive technology centre in Qatar, a special autism unit attached to a primary school in West Dublin and various homes and schools around Ireland (Table 6.2). A total of 38 participants evaluated the learning system: 18 at the Mada Center (Qatar), 10 at St Ultan’s Primary School (Autism Unit) and 10 random participants who were recruited from around Ireland. Between them these participants worked with a total of 36 children.

<table>
<thead>
<tr>
<th>Case Study Ref</th>
<th>Group</th>
<th>Number of Participants</th>
<th>Caregiver Role</th>
<th>Caregiver Gender</th>
<th>Number of Children</th>
<th>Age Children</th>
<th>Gender Children</th>
<th>Case Location</th>
<th>Education Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQ 1.1</td>
<td>3</td>
<td>K</td>
<td>1 f, 2 m</td>
<td>1</td>
<td>15</td>
<td>1 m</td>
<td>Qatar</td>
<td>Mada Assistive Technology Center</td>
<td></td>
</tr>
<tr>
<td>MQ 1.2</td>
<td>13</td>
<td>P</td>
<td>7 f, 6 m</td>
<td>5</td>
<td>5 - 16</td>
<td>5 f</td>
<td>Qatar</td>
<td>Mada Assistive Technology Center</td>
<td></td>
</tr>
<tr>
<td>MQ 1.3</td>
<td>2</td>
<td>T</td>
<td>1 f, 1 m</td>
<td>1</td>
<td>5</td>
<td>1 f</td>
<td>Qatar</td>
<td>Mada Assistive Technology Center</td>
<td></td>
</tr>
<tr>
<td>RP 2.1</td>
<td>0</td>
<td>K</td>
<td>0 f, 0 m</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Various in Ireland</td>
<td>Secondary and Primary Schools and homes</td>
<td></td>
</tr>
<tr>
<td>RP 2.2</td>
<td>6</td>
<td>P</td>
<td>6 f, 0 m</td>
<td>10</td>
<td>9 - 12</td>
<td>7 f, 3 m</td>
<td>Various in Ireland</td>
<td>Secondary and Primary Schools and homes</td>
<td></td>
</tr>
<tr>
<td>RP 2.3</td>
<td>4</td>
<td>T</td>
<td>4 f, 0 m</td>
<td>9</td>
<td>2 - 15</td>
<td>5 f, 4 m</td>
<td>Various in Ireland</td>
<td>Secondary and Primary Schools and homes</td>
<td></td>
</tr>
<tr>
<td>SU 3.1</td>
<td>6</td>
<td>K</td>
<td>6 f, 0 m</td>
<td>6</td>
<td>3 - 7</td>
<td>4 f, 2 m</td>
<td>Cherry Orchard Dublin</td>
<td>Special Autism Unit St Ultan’s Primary School</td>
<td></td>
</tr>
<tr>
<td>SU 3.2</td>
<td>0</td>
<td>P</td>
<td>0 f, 0 m</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Cherry Orchard Dublin</td>
<td>Special Autism Unit St Ultan’s Primary School</td>
<td></td>
</tr>
<tr>
<td>SU 3.3</td>
<td>4</td>
<td>T</td>
<td>4 f, 0 m</td>
<td>4</td>
<td>5 - 11</td>
<td>3 f, 1 m</td>
<td>Cherry Orchard Dublin</td>
<td>Special Autism Unit St Ultan’s Primary School</td>
<td></td>
</tr>
</tbody>
</table>

MQ = Mada Center Qatar; RP = Random Participants, Ireland; SU = St Ultan’s Primary School, Cherry Orchard

K = Key Worker; P = Parent; T = Teacher  f = female   m = male

6.3.1 Duration of Case Studies

The time that participants could commit to evaluating the learning system varied from case to case depending on the context. The system was permanently available online to
give participants an opportunity to download support material and educational resources whenever they were free to see if these recommended resources were appropriate for the children’s individual needs. It was envisaged that the learning system would be incorporated into the children’s homework/schoolwork and general educational program on a number of occasions during that period. It was suggested to participants that they would select one social skill to teach at a time and work through the supports and educational resources recommended by the system to see if they matched the profiles that they had created. However this plan was not always feasible for participants so a more flexible approach had to be taken to accommodate teachers and key workers in school environments and special education facilities.

6.3.2 Location of Case Studies

Participants implemented STAK either in their own homes or in schools or special needs facilities. One of the aims of this project was to make the intervention accessible to everyone, anywhere and on any device whether running Windows or Mac operating systems. Since the application is web-based it was essential that participants had access to the Internet via a broadband connection.

6.3.3 Technological Issues

The researcher was available to offer technical support to participants whenever assistance was required via email or telephone. Since some participants were trying to implement STAK in their own homes it was important to sort out any technical problems quickly for them in order that they could continue to participate fully in the project. For instance, it was important to explain that the browsers that they were using would have to be configured to allow popups and that JavaScript would have to be enabled in the browsers so that the support and resource files would open and the contents would be displayed on the screen.

6.4 Case Study Procedure

Regardless of whether the evaluation was taking place during normal home or school-day routine or as part of a workshop programme, participants were asked to familiarise themselves with the CMS and to read the guidelines that were available to download in
the ‘Overview’ section (Appendix XXIX). Participants were encouraged to take a ‘Quick Tour’ of the system so that they would understand the profile creation process from beginning to end (Appendix XXX) before they launched the application.

The following steps were adhered to when participants evaluated STAK:

**Step 1**
Participants were given access to a CMS at URL: [www.staklearn.com](http://www.staklearn.com) which contained the STAK learning system, guidelines on how to use the application and a quick demonstration of registration, carer profile creation, child profile creation and retrieval of recommended support material and educational resources.

**Step 2**
Participants were asked to download the consent form, sign it and return it to the researcher via email or post. They were then invited to complete the online preliminary questionnaire before registering their details in the STAK and creating a Carer account.

**Step 3**
Participants were then invited to create their Carer Profile by indicating their carer roles eg parent, teacher, etc and by answering questions relating to the seven teaching strategies included in the system.

**Step 4**
Participants were then requested to create a Child Profile by entering the child’s gender, date of birth, diagnosis and by selecting the learning style that best described the child’s learning preference. The system did not attempt to validate the learning style chosen by the caregiver from the four options available. Rather caregivers’ opinions were used to influence the selection of the educational resources to find the right fit for visual learners, aural learners, read/write learners or kinaesthetic learners.

To complete the Child Profile participants then answered a series of questions so that the system could determine the child’s language and comprehension abilities.

Participants could then select the social skills they wanted to teach the child and answer the corresponding questions to each skill selected so that the system could determine the child’s learning stage in that skill.
Participants could then add any special interests the child had to the profile from a choice of thirty-two topics in the system.

**Step 5**
Participants were then invited to enter the Activity Centre to start an activity for a particular child by selecting a social skill from his/her profile created earlier, choosing one of the recommended teaching strategies, accepting or overriding the recommended support level, selecting a special interest, opting either to display recommended Supports on the teaching strategy chosen or Resources recommended for the particular child.

**Step 6**
Participants were then asked to download some supports and resources to find out if they matched the carer and child profiles respectively.

**Step 7**
Participants were then requested to complete an online questionnaire to provide feedback on their experiences using the system to create individual profiles and to evaluate the effectiveness of the learning system in matching those profiles to appropriate support material and educational resources for the carer and child for the purpose of teaching social skills.

### 6.5 Data Sources and Analysis
Data was obtained from the profiles created by the participants, from records of user interactions with the system, from responses to the two online questionnaires and from an audio recording. All responses to open questions and transcripts were coded and themed while data from the profiles and logs was analysed using MS Excel and pivot tables.
6.6 Summary

This chapter describes how participants who took part in the case studies were able to implement the learning system in their own homes, schools and special needs facilities and apply tools devised by the researcher to create profiles. It outlines how the learning system matched the profiles created with appropriate teaching strategies and educational resources to help to meet the individual needs of children who had been diagnosed with ASDs, while simultaneously supporting the participants teaching social skills to this group.
7 Findings & Discussion

7.1 Introduction

This chapter discusses the main findings from a comprehensive analysis of data collected from questionnaires, semi-structured interviews, database logs, telephone conversations and field notes. It addresses the overall meaning of these findings in light of the relevant literature and the research questions determined at the commencement of this case study.

The principle themes emerging from the data concerned the caregivers’ opinions on their use of the personalised dual-adaptive learning system, STAK, to build individual profiles by assessing the caregivers’ prior knowledge of strategies and the children’s capabilities; and by then matching these profiles with appropriate support material and educational resources for the purpose of scaffolding caregivers when developing social skills in children, who had been diagnosed with ASDs.

7.2 Explanatory Cases

During the implementation and evaluation stages of the investigation three explanatory case studies were conducted to address the following ‘how’ questions:

1. how does STAK use technology to assess the child’s individual needs and the caregiver’s support requirements for the purposes of selecting appropriate resources?

2. what are the design implications for the building of dual-adaptive learning systems to support caregivers teaching social skills to children with ASDs, arising from this study?

A total of thirty-eight caregivers participated in these case studies and followed the STAK implementation plan. The majority of these participants were Irish and were based in various cities and towns in Ireland. The remainder of the participants lived in Qatar and either worked or followed courses in the Mada Assistive Technology Center.

The participants in each case study were broken down by their roles: key workers, parents and teachers. The Mada Center case study included representatives of all three roles while the Random Participants case study comprised parents and teachers and St
Ultan’s Primary School involved key workers and teachers. Each participant evaluated the STAK learning system at intervals over a three-month period. After registering and using the system to create Carer Profiles and Child Profiles for the thirty-six children they were working with, participants were then asked to complete an online feedback form to indicate their experience of using the STAK learning system (Appendix XXXI) and give their opinions on each aspect of the application: carer profile, child profile, teaching strategies, educational resources and the structured learning approach adopted.

The three cases comprised the following:

- Case 1 Mada Assistive Technology Center (Qatar)
- Case 2 Random Participants (Ireland)
- Case 3 Autism Unit, St Ultan’s Primary School, Cherry Orchard (Dublin West)

### 7.2.1 Case 1: Mada Center (Qatar)

Eighteen participants took part in the evaluation of STAK during a number of workshops between December 2014 and February 2015. This group comprised 9 females and 9 males and included 3 Key Workers, 13 Parents and 2 Teachers (Table 7.1). A total of seven Child Profiles were created during the course of this study as parents and colleagues shared in this exercise and combined their knowledge of the children’s particular requirements when responding to the questions posed.

<table>
<thead>
<tr>
<th>Case Study Ref</th>
<th>Group</th>
<th>Number of Participants</th>
<th>Caregiver Role</th>
<th>Caregiver Gender</th>
<th>Number of Children</th>
<th>Age Children</th>
<th>Gender Children</th>
<th>Case Location</th>
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<td>13</td>
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<td>7 f, 6 m</td>
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<td>5 – 16</td>
<td>5 f</td>
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<tr>
<td>MQ 1.3</td>
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<td>T</td>
<td>1 f, 1 m</td>
<td>1</td>
<td>5</td>
<td>1 f</td>
<td>Qatar</td>
<td>Mada Assistive Technology Center</td>
<td></td>
</tr>
</tbody>
</table>

The first language of most of the participants in this group is Arabic. The findings will reflect the fact that non-English speakers could not benefit fully from using STAK because material (including instructions, assessments, supports and educational...
resources) provided in the system were not available with Arabic sub-titles or translations. Aside from the obvious language difference there were other cultural differences between participants based in Qatar and Ireland which may have had an impact on the results. Recent studies have shown that there was a growing awareness of the condition and its increase in incidence and prevalence in the Arab world (Eldin et al, 2008). There was also recognition of the requirement for cultural sensitivity in importing knowledge and practices from one culture (such as Ireland) into societies with very diverse cultural backgrounds, as different cultures could have different opinions about appropriate intervention and treatment of children with disabilities (Samadi & McConkey, 2011).

According to Pitten (2008) cultural mores determine which treatment goals families of a child with autism accept and which goals they decide to work towards. For instance, some parents follow their religious beliefs with regard to autism and delay seeking professional help while others deliberately choose to ignore the symptoms altogether and instead send their children to mainstream schools to avoid the stigma which still attaches to this condition in some societies (Samadi & McConkey, 2011). Many families simply are not in a position to afford the costs of the professional services available so must provide much of the specialist care which their children require themselves. It is possibly for this reason that the majority of the participants in the Mada group welcomed a learning system which could give them access to the knowledge and resources they urgently required to help their children develop social competence.

### 7.2.1.1 Mada Center - STAK User Experience

For Question 2 participants were asked to indicate their experience of using STAK under a number of headings: ease of access, registration and login, navigation, ease of use, performance and efficiency. They were asked to select an option from a five-point scale ranging from ‘excellent’ to ‘very poor’ and to suggest any changes that would improve their user experience.

An analysis of the findings revealed that the group of key workers in the Mada Center appeared to have had a good user experience overall. (MQ.K 1) commented that it would be an ‘excellent website for the parents of children’ while (MQ.K 2) found ‘setting up the child profile and the carer profile was a little confusing’ and it was
evident from her response to question 2 that this participant was not as satisfied with the system’s performance and efficiency as her colleagues had been.

The majority of the parents at the Mada Center expressed satisfaction with access to the system and the user experience generally (Figure 7.1). (MQ.P 7) felt that experienced users would find the site easy to navigate but that the process ‘might be unclear for novices to the Internet.’ Certainly those parents, who took the time to view the video provided on the home page before registering, seemed to have had a much better user experience for as (MQ.P 12) remarked ‘...the video explained everything properly’. (MQ.P 11) also remarked that ‘the video was really helpful’ and more importantly he added that ‘without the video [he] would have struggled to set up [his] profile.’

Some of the parents including (MQ.P 5) found the registration process ‘was too long for most parents to do.’ This participant (MQ.P 5) also suggested that it should be ‘easier to get to the resources.’ (MQ.P 8) suggested that there were ‘too many steps in the process for possible teachers to use’ and that this could prove to be a deterrent as ‘the current generation of technology users have a short attention span and will not engage with any website which involved them being any more than 3 short clicks from their target destination!’ (MQ.P 13) recommended that ‘more home page information’ should be made available to ensure that users would have a good user experience.

![Mada Center Parents - Stak User Experience](image)

**Figure 7.1** Mada Center Parents – STAK User Experience (Question 2)

While one of the teachers based at the Center (MQ.T 17) had an excellent user experience, the second teacher (MQ.T 18), who described himself as ‘a web surfer with
a visual impairment using magnification and text to speech software,’ found the overall experience of the site challenging. This was evident from his feedback as he considered that ‘numerous design errors’ made it difficult for potential users like him to utilise the STAK learning system.

7.2.1.2 Mada Center – STAK Carer Profile

It is as important for the caregiver to be aware of their own capabilities in relation to teaching the child as it is for them to know the needs of the child. For this reason users were required to build a profile of their own knowledge of the various teaching strategies available. Question 3 on questionnaire 2 (Appendix XXXI) addressed the experience of the caregivers in creating this profile and asked participants whether STAK’s caregiver profiling tool correctly assessed their prior knowledge of the seven strategies employed in the system. Research has shown that these particular strategies may be used effectively either to promote skill acquisition or enhance social performance or both (Baker, 2003; Bellini, 2008). Part of the reasoning behind this profile is to determine the level of support required by the user so the participants were also asked for their opinions on whether the application had provided them with sufficient resources for their own requirements.

Thus the third question was divided into sub-questions concerning the Carer Profile and asked participants to consider four statements based on their experience of using STAK: (a) the learning system’s assessment of caregivers’ prior knowledge of teaching strategies; (b) whether the level of support offered reflected their own needs; (c) whether the instructions on teaching strategies provided by the system were simple and (d) whether one strategy could be used on its own to teach a child to be successful socially. They were asked to indicate their choice on a five-point Likert scale ranging from ‘strongly agree’ to ‘strongly disagree’.

It was evident from the responses to Question 3 (Appendix XXXI) that key workers at the Center either strongly agreed or agreed with all four statements. (MQ.K 2) liked having ‘information contained in one, single location.’ and (MQ.K 3) believed that the system ‘contains lots of information that a person will be looking for’ but personally, as this key worker was new to this field of study, he found that the information could ‘be

---

7 didactic instruction, modelling, role play, feedback, positive reinforcement, motivational game and practice
complicated for new people working with Autism.’ Similarly the two teachers participating in the Mada Center case study either strongly agreed or agreed with all four statements. However, while 7 out of 13 of parents in the Mada group agreed that STAK accurately assessed their prior knowledge of teaching strategies and 6 out of 13 agreed that the support provided by the system adequately reflected caregivers’ needs five parents disagreed that this support catered for their needs (Figure 7.2).

As English is the language used throughout the system (MQ.P 7) maintained that this could prove a barrier for caregivers based in Qatar where adults and children speak Arabic as their first language. Therefore this participant strongly disagreed that the system offered simple instructions on teaching strategies as he maintained that ‘non-English speakers will get confused with how much language is used.’

![Mada Center Parents - STAK Carer Profile](image)

Figure 7.2 Mada Center Parents – STAK Carer Profile (Question 3)

7.2.1.3 Mada Center – STAK Child Profile

The fourth question in the Feedback Questionnaire (Appendix XXXI) contained four sub-questions which asked participants to consider statements concerning the creation of the Child Profile. The sub-questions ranged from assessment of the children’s needs, recommendation of suitable strategies, matching resources to individual profiles and
offering assistance to children with their social skills development. Participants were requested to indicate their agreement or otherwise on a similar five-point Likert scale.

Creating the child’s profile required caregivers to reflect on what they knew about specific children’s learning stages, learning styles, language abilities, comprehension abilities and special interests before they could answer the questions posed. This would back up the remark that current resources and education addresses the condition and not the child.

An analysis of the findings revealed that the majority of key workers in the Mada Center either strongly agreed or agreed that STAK asked the right questions to correctly assess children’s needs and recommended suitable strategies for children with ASDs (Figure 7.3). While a number of the respondents remarked that building up profiles was a worthwhile and beneficial process others found the procedures time-consuming and frustrating and (MQ.K 2) observed that ‘setting up the child profile ... was a little confusing’ for her.

![Figure 7.3](image)

While the two teachers in the Center also responded positively to the first two sub-questions (MQ.T 18) gave a neutral response to questions on whether STAK offers resources that match children’s profiles or help children develop social skills. This was
due in no small part to the fact that he had found it ‘difficult to identify positives because of the limited progress’ he had made. He attributed this issue to ‘the lack of operability’ with his third party assistive software.

Further analysis of the findings revealed that 7 out of 13 of parents agreed that STAK asked the right questions to assess children’s needs accurately and recommended strategies that were suitable for children with ASDs (Figure 7.9). However three parents strongly disagreed with this statement with (MQ.P 8) maintaining that ‘Technology can never replace a professional team to support children with special needs’ and (MQ.P 9) queried the fact that the system made ‘an assumption ... that the person completing the form is in the best position to make those judgments.’ He also pointed out that ‘there is a validity assumed on the part of the person completing the forms.’ (MQ.P 11) remarked that for ‘parents there is an assumption that you can provide an evaluation of your child in a whole range of skill domains.’

Some parents found the process of setting up the profile time consuming as there was ‘...too much information to enter for ...the child’ (MQ.P 13) while other parents found the experience beneficial overall. For instance (MQ.P 7) remarked that: ‘The fact that you are required to reflect on a child as you are completing their profile is useful.’ (MQ.P 7) expressed concern that the profiling tools would be used by caregivers to make formal medical diagnoses. He made the point that ‘a computer cannot make the same judgments as a person, for children with ASD there is a risk that the computer acts as a replacement for a qualified professional.’

There were mixed responses from the parents to the other sub-questions with one parent strongly disagreeing that the system provided resources that would help children develop social skills (Figure 7.4). (MQ.P 8) believed that ‘social stories and other interventions are best introduced following multi-disciplinary team [assessment/review] and supervised by a suitably qualified Speech and Language Pathologist who can build it into the child's daily program.’ (MQ.P 11) stated that he found ‘after entering all of the information the presented resources are sometimes just a word document. This is not worth choosing from a number of drop down lists to eventually access a resource that is not what I was looking for.’ As parents in the research group had been attending a workshop on social stories when they were introduced to the STAK learning system for the first time, some of them appeared to believe that system had been designed
exclusively to teach social stories. Consequently this led to an element of confusion which was evident in some of their commentary. For instance (MQ.P 9) ‘expected less general resources and more specific support on creating a narrative for social stories for the child’ he worked with and (MQ.P 11) observed that any resources he looked at ‘teach little about creating or using social stories.’

Figure 7.4  Mada Center Parents – STAK Child Profile (Question 4)

7.2.1.4  Mada Center – STAK Teaching Strategies

For Question 5 (Appendix XXXI) participants were asked to rate seven statements and sub-questions from -3 (least helpful) to +3 (most helpful) on a seven-point scale concerning teaching strategies (Figure 7.5).

An analysis of the responses received from key workers in the Mada Center revealed that they found that the teaching strategies recommended by STAK matched children’s learning stages and that the system provided a combination of strategies and support material to caregivers to help them teach children to be successful socially. However one of the key workers (MQ.K 2) remarked that she felt that the system had not guided her in the use of the resources in her own practice.
One of the teachers participating in the study was visually impaired (MQ.T 18) so he was not in a position to judge if STAK provided appropriate teaching strategies or not. His colleague on the other hand considered that STAK had matched teaching strategies to children’s profiles and provided sufficient support for caregivers’ needs and guided them satisfactorily through the structured training programme.

There were mixed responses to this range of questions from the parents participating in the study in the Mada Center (Figure 7.6). Although most parents felt that the teaching strategies recommended by the system were appropriate and that the support provided was adequate some parents including (MQ.P 9) ‘found the resources too general’ as they were ‘expecting something that would be very specific’ to their needs. (MQ.P 8) suggested that ‘more practical resources would be quite attractive to teachers.’
The second part of Question 5 (Appendix XXXI) is concerned with the information that STAK provides to caregivers for each of the seven strategies in the system: didactic instruction, modelling, role play, corrective feedback, positive reinforcement, motivating games and practice. In general the key workers found that the information supplied on the basic teaching strategies was helpful but MQ.K 3 commented that ‘the information can be complicated for new people working with Autism’ (Figures 7.7).

The second part of Question 5 (Appendix XXXI) is concerned with the information that STAK provides to caregivers for each of the seven strategies in the system: didactic instruction, modelling, role play, corrective feedback, positive reinforcement, motivating games and practice. In general the key workers found that the information supplied on the basic teaching strategies was helpful but MQ.K 3 commented that ‘the information can be complicated for new people working with Autism’ (Figures 7.7).
The teachers in the case study seemed satisfied with the support offered by the system as indicated by their positive responses to the series of sub-questions. While some of the parents found the information adequate for their needs, other parents struggled with the terminology used in the material supplied and thus found the explanations given less than helpful (Figure 7.8). (MQ.P 10) ‘Some of the descriptive terms for some concepts could also be difficult to interpret, I felt that I had to know what complex concepts were like dyadic etc.’

![Mada Center Parents - Sufficient Information on Teaching Strategies](image)

**Figure 7.8** Mada Center Parents – STAK Teaching Strategies (Question 5 (g) 1 to 7)

### 7.2.1.5 Mada Center – STAK Educational Resources

Question 6 (Appendix XXXI) asked participants to rate seven statements relating to the educational resources STAK provided on a similar seven-point scale from 3 (least helpful) to +3 (most helpful). In general key workers in the Mada case study agreed that STAK selects educational resources to suit children’s individual profiles (Figure 7.9). (MQ.K 2) commented that she ‘...could see some use for these in practice.’ However it was also apparent from their responses that these resources would have limited benefit.
It was also evident from the findings that the teachers in the Mada Center concurred with this viewpoint as they agreed STAK recommends educational resources that suit individual profiles. However an analysis of the feedback received from parents in the group showed a wide divergence of opinions. The majority agreed with the statement that STAK selects educational resources to suit a child’s learning stage and that the resources matched children’s profiles (learning style, language ability, comprehension ability and special interests) (Figure 7.10). Nevertheless some parents seemed less convinced that STAK had individualised resources to meet their children’s needs as it seemed to (MQ.P 5) that ‘some of the resources were mixed up for different needs.’ (MQ.P 11) found that ‘… the resources are too general and nothing new…’
7.2.1.6 Mada Center – STAK Structured Training Approach

Question 7 (Appendix XXXI) was concerned with the structured approach to teaching which the system has adopted. Participants were asked to rate seven statements on the effectiveness of using seven particular teaching strategies as part of the structured social skills training programme which underlines the STAK learning system.

It is evident from their feedback that key workers found this approach to be effective. Key workers emphasised the importance of giving children encouraging feedback after the children had role played the skill steps and then reinforcing the skill knowledge learned by using the social stories intervention (Figure 7.11).
Further analysis of the findings revealed that the two teachers participating in this case study also found this approach to be most effective when teaching children with autism.

In general the parents participating in this case study found STAK’s structured approach to be most effective when demonstrating skill steps, giving positive feedback and organizing practice opportunities (Figure 7.12).

However one parent (MQ.P 13) ranked the structured approach on the low end of the scale because she had not had sufficient time to fill in all the required fields and commented that the system would suit only those parents who had time to complete all the work for it.
7.2.1.7 Mada Center – Learning Styles

The literature and data show children with ASDs are predominantly visual learners and anecdotal evidence gathered during this research would corroborate this. An analysis of the data relating to the seven profiles created by the participants in the Mada Center case study showed that they believed that the children they worked with understood concepts more easily when visual aids were used (Table 7.2). It is in this area that ICT can be especially supportive to caregivers by making suitable educational resources available online.
Table 7.2  Mada Center - Children’s Learning Styles (Child Profiles)

<table>
<thead>
<tr>
<th>Case Studies</th>
<th>No of Children</th>
<th>Gender of Children</th>
<th>Learning Styles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Visual</td>
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<tr>
<td>Totals</td>
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<td>1m; 6f</td>
<td>6</td>
</tr>
<tr>
<td>Key Workers</td>
<td>1</td>
<td>1m; 0f</td>
<td>1</td>
</tr>
<tr>
<td>Parents</td>
<td>5</td>
<td>0m; 5f</td>
<td>4</td>
</tr>
<tr>
<td>Teachers</td>
<td>1</td>
<td>0m; 1f</td>
<td>1</td>
</tr>
</tbody>
</table>

7.2.1.8  Mada Center – Language Ability

In designing the child profile tool questions were phrased in a non-medical manner in an attempt to minimize bias which may be introduced where respondents would answer questions based on their knowledge of the child’s diagnosis. Children diagnosed with classic autism generally present with language delay while children with Asperger Syndrome usually experience no such delay (Baron-Cohen, 2008). The term ASD may be applied to children who are at either the higher-functioning or lower functioning ends of the spectrum (DSM-5, 2013) and so there is a wide diversity in language ability evident in this group.

It is evident from the data collected from the child profiles created by the caregivers participating in the Mada Center case study that the language ability determined by the profiling tool for each child is in line with his/her official diagnosis. Assessment results revealed that the children’s language abilities were in the range from average to very poor as expected (Table 3).
Table 7.3  Mada Center - Children’s Diagnoses and Language Abilities (Child Profiles)

<table>
<thead>
<tr>
<th>Case Studies</th>
<th>Children</th>
<th>Diagnosis</th>
<th>No</th>
<th>Language Ability</th>
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</thead>
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<tr>
<td>Key Workers</td>
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<tr>
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<td></td>
<td>Asperger</td>
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<td></td>
<td></td>
<td>ASD</td>
<td></td>
<td></td>
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<td></td>
<td>RETT</td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td>ASD</td>
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<td>1</td>
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<tr>
<td>Teachers</td>
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<td>Autism</td>
<td>1</td>
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</tr>
<tr>
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<td>Asperger</td>
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<td>ASD</td>
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<td></td>
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</table>

7.2.1.9  Mada Center – Comprehension Ability

A study of the data extracted from the child profiles revealed that STAK’s profiling tool classified the children with ASDs as having average to very poor comprehension ability (Table 7.4). These assessment results are in line with received opinion. Further analysis showed that where a child diagnosis was provided by the respondents the profiling tool correctly assessed the child’s comprehension ability.
Table 7.4  Mada Center - Children’s Diagnoses and Comprehension Abilities (Child Profiles)

<table>
<thead>
<tr>
<th>Case Studies</th>
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<th>Diagnosis</th>
<th>No</th>
<th>Comprehension Ability</th>
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</thead>
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<td></td>
<td></td>
<td></td>
<td>Very Good</td>
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<td></td>
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<td>ASD</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>RETT</td>
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<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents</td>
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<td>Autism</td>
<td>3</td>
<td>2</td>
</tr>
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<td>Teachers</td>
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<td>Autism</td>
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</tr>
</tbody>
</table>

7.2.1.10 Mada Center - Special Interests

Literature shows how it is in getting inside a child’s way of thinking and sharing their special interests that one can begin to expand those activities beyond their current confines and help them to develop more flexible patterns of thought (Hanbury, 2012). It is therefore necessary to include these interests when devising any social skills training programme. A variety of activities covering areas from games to animals and nature were included in STAK. An analysis of the child profiles created in the Mada Center revealed that the children had a keen interest in television, family, school and sports. Their choice of topic might have been influenced by their ages which ranged from 5 to 16 years (Figure 7.13).
7.2.1.11 Mada Center – STAK Learning Content

An analysis of the data collected through the Child Profiles revealed the range of files downloaded by the participants complemented the teaching strategies recommended and provided some practical advice on teaching social skills using games and visual aids (Figure 7.14).
7.2.1.12 Mada Center – STAK Carer Support

An analysis of the data collected through the database logs revealed that teachers at the Mada Center had overridden the support levels which the system had determined from their responses to be most appropriate support level for them (Figure 7.15).

However it was also apparent that some parents accepted the support that the system had assigned to them and others opted sometimes for more and sometimes less support than the system had originally provided for them (Figure 7.16).
An analysis of the data collected through the Carer Profiles revealed that the range of files downloaded by parents in the Mada Center case study group contained information on how to use didactic instruction and modelling in their work with the children, how to manage the classroom and how to observe and gather data on children’s activities (Figure 7.17). The two teachers downloaded observation sheets and an overview of the modelling strategy while the three key workers did not download any support material during the course of the research study.

**Figure 7.17** Mada Center Support Material downloaded – STAK Carer Profile
7.2.2 Mada Center Findings Summary

Evidence suggests that the eighteen participants in the Mada Center case study had a good user experience overall. An analysis of the findings indicates that two-thirds of these participants gave a positive rating to ease of access, registration and login, navigation through the application, ease of use, performance and efficiency of the learning system. The majority of the Mada participants found that the Carer profiling tool accurately assessed caregivers’ prior knowledge of teaching strategies and that STAK offered support commensurate with caregivers’ needs and provided basic guidelines for using each teaching strategy. More than half of these participants strongly agreed that there is no single strategy that will teach a child with autism to be successful socially. Regarding the Child Profile only two-thirds of the participants strongly agreed or agreed that STAK had asked the right questions to correctly assess children’s needs, recommended strategies that were suitable for children with ASDs and matched educational resources with individual profiles to help in the development of their social skills (Figure 7.18). There was some evidence to suggest that participants were confused as to the purpose of the child profiling tool, believing that the researcher was asking parents to build profiles as part of a diagnostic process. Wary of technology some parents failed to understand that the profiling tool was being used to assess children’s difficulties for the sole purpose of selecting the most suitable educational resources to meet their individual needs.

Figure 7.18 Mada Center – STAK Child Profile

<table>
<thead>
<tr>
<th>Mada Center - STAK Child Profile</th>
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</thead>
<tbody>
<tr>
<td>PARTICIPANT RESPONSE COUNT</td>
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<tr>
<td>9</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>STAK asks the right questions to correctly assess children’s needs</td>
</tr>
<tr>
<td>STAK recommends strategies that are suitable for children with ASDs</td>
</tr>
<tr>
<td>STAK offers resources that match individual children’s profiles</td>
</tr>
<tr>
<td>STAK provides resources that help children to develop social skills</td>
</tr>
</tbody>
</table>

Figure 7.18 Mada Center – STAK Child Profile (Question 4)
Over half of the participants agreed that STAK matched appropriate teaching strategies to children’s learning stages (novice, intermediate, advanced or acquired) and provided sufficient guidance to caregivers as they worked through the personalised training programme with their children. Not surprisingly only half of the participants felt that STAK had provided them with satisfactory information on each teaching strategy, as this material was only available through English and no Arabic translations were included in the current prototype. Nevertheless two-thirds of Mada participants agreed that STAK matched educational resources to suit children’s profiles (learning stages, learning styles, language and comprehension abilities and special interests) and 8 out of 10 participants considered that the structured training approach would be effective in teaching social skills to children with ASDs (Figure 7.19).

![Mada Center - STAK Structured Approach](image)

**Figure 7.19** Mada Center – STAK Structured Approach (Question 7)
Table 7.5 presents the statements from all the questionnaires and reflects the number of positive participant responses from the Mada Assistive Technology Center, Qatar.

Table 7.5  Mada Center Qatar – Positive Responses to Feedback Questionnaire

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Mada Center Qatar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role</td>
<td>Key Workers</td>
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<td>Sample</td>
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<td>Questionnaire Sections</td>
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<tr>
<td>User Experience</td>
<td></td>
</tr>
<tr>
<td>Ease of Access</td>
<td>3/3</td>
</tr>
<tr>
<td>Registration / Login</td>
<td>3/3</td>
</tr>
<tr>
<td>Navigation through application</td>
<td>3/3</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>3/3</td>
</tr>
<tr>
<td>Performance</td>
<td>3/3</td>
</tr>
<tr>
<td>Efficiency</td>
<td>3/3</td>
</tr>
<tr>
<td>Carer Profile</td>
<td></td>
</tr>
<tr>
<td>STAK accurately assesses Carers’ prior knowledge of teaching strategies</td>
<td>3/3</td>
</tr>
<tr>
<td>STAK offers support that adequately reflects Carers’ needs</td>
<td>3/3</td>
</tr>
<tr>
<td>STAK offers simple instructions for using each teaching strategy</td>
<td>3/3</td>
</tr>
<tr>
<td>There is no single strategy that will teach a child with autism to be successful socially</td>
<td>3/3</td>
</tr>
<tr>
<td>Child Profile</td>
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<tr>
<td>STAK asks the right questions to correctly assess children’s needs</td>
<td>3/3</td>
</tr>
<tr>
<td>STAK recommends strategies that are suitable for child/children with ASDs</td>
<td>3/3</td>
</tr>
<tr>
<td>STAK offers resources that match individual children’s profiles</td>
<td>3/3</td>
</tr>
<tr>
<td>STAK provides resources that help children to develop social skills</td>
<td>3/3</td>
</tr>
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<td>Teaching Strategies</td>
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<tr>
<td>STAK matches appropriate teaching strategies to children’s learning stages (novice, intermediate, advanced or acquired)</td>
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</tr>
<tr>
<td>STAK recommends a combination of strategies to teach children to be successful socially</td>
<td>3/3</td>
</tr>
<tr>
<td>STAK provides adequate support to Carers when they use the strategies recommended</td>
<td>3/3</td>
</tr>
<tr>
<td>Carers requiring Full Support are given access to clear explanations of teaching strategies</td>
<td>3/3</td>
</tr>
<tr>
<td>STAK provides examples illustrating the use of teaching strategies in different contexts</td>
<td>3/3</td>
</tr>
<tr>
<td>Carers are guided satisfactorily through a structured programme to teach social skills</td>
<td>2/3</td>
</tr>
</tbody>
</table>

K = Key Workers  T = Teachers  P = Parents
### Case Study

**Mada Center Qatar**

<table>
<thead>
<tr>
<th>Role</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>3</td>
<td>2</td>
<td>13</td>
</tr>
</tbody>
</table>

### Questionnaire Sections

**Support provided to Carers on Teaching Strategies**

<table>
<thead>
<tr>
<th>Section</th>
<th>K</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information on Didactic Instruction is sufficient</td>
<td>2/3</td>
<td>1/2</td>
<td>9/13</td>
</tr>
<tr>
<td>Information on Modelling is sufficient</td>
<td>2/3</td>
<td>1/2</td>
<td>10/13</td>
</tr>
<tr>
<td>Information on Role Play is sufficient</td>
<td>2/3</td>
<td>1/2</td>
<td>10/13</td>
</tr>
<tr>
<td>Information on Corrective Feedback is sufficient</td>
<td>1/3</td>
<td>1/2</td>
<td>9/13</td>
</tr>
<tr>
<td>Information on Positive Reinforcement is sufficient</td>
<td>1/3</td>
<td>1/2</td>
<td>10/13</td>
</tr>
<tr>
<td>Information on Motivating Games is sufficient</td>
<td>1/3</td>
<td>1/2</td>
<td>8/13</td>
</tr>
<tr>
<td>Information on Practice is sufficient</td>
<td>1/3</td>
<td>1/2</td>
<td>8/13</td>
</tr>
</tbody>
</table>

**Educational Resources provided to complement Teaching Strategies**

<table>
<thead>
<tr>
<th>Resource Description</th>
<th>K</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAK selects educational resources to suit a child’s learning stage</td>
<td>3/3</td>
<td>1/2</td>
<td>8/13</td>
</tr>
<tr>
<td>STAK chooses educational resources which correspond to a child’s learning style</td>
<td>2/3</td>
<td>1/2</td>
<td>9/13</td>
</tr>
<tr>
<td>STAK picks educational resources which suit a child’s language ability</td>
<td>3/3</td>
<td>1/2</td>
<td>8/13</td>
</tr>
<tr>
<td>STAK selects educational resources which suit a child’s comprehension ability</td>
<td>3/3</td>
<td>1/2</td>
<td>7/13</td>
</tr>
<tr>
<td>STAK chooses educational resources based on a child’s special interests</td>
<td>3/3</td>
<td>1/2</td>
<td>10/13</td>
</tr>
<tr>
<td>STAK provides educational resources which motivate children to learn</td>
<td>3/3</td>
<td>1/2</td>
<td>6/13</td>
</tr>
<tr>
<td>STAK offers sufficient educational resources</td>
<td>1/3</td>
<td>1/2</td>
<td>7/13</td>
</tr>
</tbody>
</table>

**STAK Structured Approach**

<table>
<thead>
<tr>
<th>Activity</th>
<th>K</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breaking down information into small chunks</td>
<td>2/3</td>
<td>2/2</td>
<td>10/13</td>
</tr>
<tr>
<td>Demonstrating the steps in each skill</td>
<td>2/3</td>
<td>2/2</td>
<td>11/13</td>
</tr>
<tr>
<td>Asking children to role play using skill steps</td>
<td>2/3</td>
<td>2/2</td>
<td>10/13</td>
</tr>
<tr>
<td>Giving child encouraging feedback</td>
<td>3/3</td>
<td>2/2</td>
<td>13/13</td>
</tr>
<tr>
<td>Reinforcing skill steps using social stories</td>
<td>3/3</td>
<td>2/2</td>
<td>11/13</td>
</tr>
<tr>
<td>Introducing skills through games</td>
<td>1/3</td>
<td>2/2</td>
<td>9/13</td>
</tr>
<tr>
<td>Providing practice opportunities</td>
<td>2/3</td>
<td>2/2</td>
<td>10/13</td>
</tr>
</tbody>
</table>

K = Key Workers  T = Teachers  P = Parents
7.2.3 Case 2: Random Participants (Ireland)

Ten participants took part in the evaluation of STAK between December 2014 and February 2015 using computers or laptops in their own homes or schools. They comprised 10 females and included 6 parents and 4 teachers (Table 7.6).

<table>
<thead>
<tr>
<th>Case Study Ref</th>
<th>Group</th>
<th>Number of Participants</th>
<th>Caregiver Role</th>
<th>Caregiver Gender</th>
<th>Number of Children</th>
<th>Age Children</th>
<th>Gender Children</th>
<th>Location</th>
<th>Education Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>RP</td>
<td>2.1</td>
<td>0</td>
<td>K</td>
<td>0 f, 0 m</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Various in Ireland</td>
<td>Secondary and Primary Schools and homes</td>
</tr>
<tr>
<td>RP</td>
<td>2.2</td>
<td>6</td>
<td>P</td>
<td>6 f, 0 m</td>
<td>10</td>
<td>9 - 12</td>
<td>7 f, 3 m</td>
<td>Various in Ireland</td>
<td>Secondary and Primary Schools and homes</td>
</tr>
<tr>
<td>RP</td>
<td>2.3</td>
<td>4</td>
<td>T</td>
<td>4 f, 0 m</td>
<td>9</td>
<td>2 - 15</td>
<td>5 f, 4 m</td>
<td>Various in Ireland</td>
<td>Secondary and Primary Schools and homes</td>
</tr>
</tbody>
</table>

7.2.3.1 Random Participants – STAK User Experience

Participants were asked to indicate their experience of using STAK under a number of headings: ease of access, registration and login, navigation, ease of use, performance and efficiency in Question 2 (Feedback Questionnaire (Appendix XXXI). They indicated their selection on a five-point Likert scale ranging from ‘strongly agree’ to ‘strongly disagree’ and suggested any changes that would enhance their user experience (Figure 7.20).

Evidence from their feedback suggests that the majority of the parents had a positive user experience overall as it gave them ‘access to different ideas’ for resources for ASD are badly needed in Ireland generally (RP.P 4). However one of the parents (RP.P 1) commented that ‘not being very computer literate it took [her] some time to get to grips with using it.’ (RP.P 6) also noted the system did not always work on her computer and she had to return to it later but added, ‘That’s probably not STAK’s fault but did impact on the accessibility.’ One of the other participants (RP.P 6) found the registration process was very long. ‘I could understand the purpose of going through all the items afterwards, but I can imagine some people may not be as motivated to stick with it.’
(RP.P 4) remarked that she often gave up in frustration because she found that the system was ‘too long winded, the pop up boxes under the ? were time consuming and that the terminology used was ‘too complex’. This parent would have preferred to answer ‘a straight forward questionnaire all on one page.’

Further analysis of the feedback revealed that three of the four female teachers in this case study had an average to poor user experience. While access to the website and the registration process did not seem to pose any problems for them their scores indicate that ease of use, performance and efficiency could be improved (Figure 7.21). As (RP.T 9) explained she ‘found having to give a user name of a minimum of 8 letters annoying as it meant that she was unable to use her regular username and consequently she ‘promptly forgot it [the new one she had created].’ This teacher ‘also could not find a way to recover the information easily.’ (RP.T 10) ‘found it difficult to navigate and figure out where [she] should be going.’

(RP.T 8) observed that ‘STAK is too cumbersome to use ... as a teacher.’ This participant believed that STAK ‘may be more useful to a parent who is attempting to teach just one child.’
The third question with sub-questions (Appendix XXXI) concerned the Carer Profile and asked participants to consider four statements in relation to their prior knowledge of teaching strategies, level of support reflecting their needs, instructions on teaching strategies provided by the system and whether one strategy could be used on its own to teach a child to be successful socially. They were asked to indicate their choice on a similar five-point scale (Figure 7.22).

An analysis of the data revealed that the majority of the parents strongly agreed or agreed with these statements. One parent (RP.P 5) commented that ‘It took a long time to read and access all the different parts but when I got through them it was easy. Now that I have input all the information. It’s great.’ In particular parents strongly agreed with the statement that ‘there is no single strategy that will teach a child with autism to be successful socially’.

The four teachers in this study either agreed or were ambivalent in their responses with one exception where there was strong agreement that no single intervention would help a child to be successful socially.
7.2.3.3 Random Participants – STAK Child Profile

The fourth question in the Feedback Questionnaire (Appendix XXXI) contained four sub-questions which asked participants to consider statements concerning the Child Profile. The sub-questions ranged from assessment of the children’s needs, recommendation of suitable strategies, matching resources to individual profiles and offering assistance to children with their social skills development. Participants were requested to indicate their agreement or otherwise on a similar five-point scale. An analysis of their feedback revealed that the majority of parents either strongly agreed or agreed with all of the statements. (RP.T 9) remarked that ‘Once you had completed the profile you were provided with a good range of activities. I think this would be a good resource for a learning support or resource teacher.’ On the other hand (RP.P 6) recalled that it was difficult for her to find a fit for her son and so she had to choose the nearest option available. She suggested that ‘questions might be better phrased to give more response options.’ Two out of four of the teachers agreed that STAK asked the right questions to correctly assess the children’s needs (Figure 7.23). However (RP.T 8) remarked that she did not find that her ‘children fit neatly into any profile [she] can create on STAK (or possibly in any website).’ This participant also observed that the Child Profile was not sufficiently flexible as ‘one child may be a visual and kinaesthetic learner - not limited to one type.’
7.2.3.4 Random Participants – STAK Teaching Strategies

For Question 5 (Appendix XXXI) participants were asked to rate seven statements and sub-questions from -3 (least helpful) to +3 (most helpful) on a seven-point scale concerning teaching strategies (Figure 7.24).

The findings suggest that the majority of parents in this case study found STAK teaching strategies to be very helpful and that STAK matches appropriate teaching strategies to children’s learning stages, recommends a combination of strategies to teach children to be successful socially, provides adequate support to caregivers when they use the recommended strategies by giving clear explanations and illustrations of strategies, and guides caregivers through a structured training programme. **(RP.P 1)** seemed pleased with the way one can use the learning system ‘*according to your own child's individual needs.*’ **(RP.P 6)** observed that STAK enabled her to support her child’s learning at home. This made her feel ‘*less isolated as a parent with a child with Autism*’ as she found it ‘*very empowering to log on to the website and choose an exercise to complete with him [her son].*’
It is evident from feedback received from the four teachers in this case study that they were used to organising their own lesson plans and were not accustomed to the way in which STAK recommended specific strategies according to children’s learning stages (novice, intermediate, advanced or acquired). For instance one teacher (RP.T 10) did not seem to have grasped the dual-adaptive concept behind the learning system for she stated that when she tried to start an activity ‘for some reason it only gave [her] the option of didactic or modelling’ and she ‘couldn’t figure out how to get up practice, role modelling or the others.’ One of the other teachers (RP.T 9) ‘didn’t like the way you had to complete profiles before you could start to investigate the resources available.’ She would have preferred to view the resources first to help her to ‘decide on the strategy to use.’ Similarly (RP.T 8) found STAK ‘limiting in its assessment of carer’s teaching methodologies’ and would have preferred to have been given the opportunity to choose what she thought would be the most appropriate method to use to teach social skills from the support material available to download in STAK (Figure 7.25).
The second part of Question 5 (Appendix XXXI) is concerned with the information that STAK provides to caregivers for each of the seven strategies in the system: didactic instruction, modelling, role play, corrective feedback, positive reinforcement, motivating games and practice.

An analysis of their feedback indicated that the six parents in the case study agreed that the information provided on each of the seven teaching strategies was sufficient for their needs and (RP.P 1) remarked that STAK ‘provides a lot of information that [she] wasn’t aware of before using it.’ While the majority of teachers considered that the information provided on strategies was adequate for their needs, some teachers found that the material supplied on didactic instruction and modelling in particular was insufficient. (RP.T 10) remarked that she had found ‘some useful suggestions for working with ASD students’ (Figure 7.26).
7.2.3.5 Random Participants – STAK Educational Resources

Question 6 (Appendix XXXI) asked participants to rate seven statements relating to the educational resources STAK provided on a similar seven-point scale from 3 (least helpful) to +3 (most helpful).

The majority of parents participating in this case study found that STAK selected educational resources that suited children’s learning stages, learning styles, language abilities, comprehension abilities and special interests. They also strongly agreed that STAK provided resources that motivated children to learn and that there were sufficient resources available to support caregivers (Figure 7.27). One of the parents (RP.P 3) commented that ‘the programs are simple to use.’ Everything that she has tried before this ‘came with an instruction book.’ This parent made the point that ‘when you have an autistic child you need something that's easily explained and easy to implement.’ While some of the resources ‘were better laid out than others’ and some ‘were more academic and others more practical’ (RP.P 6) considered that the concept worked and stated that the resources she ‘employed gave [her] some new approaches and reinforced [her] use of others.’
Teachers involved in this case study were much more undecided when asked their opinions on the educational resources selected by STAK to match children’s requirements (Figure 7.28). Although some remarked that there was a good variety of resources available for different areas (RP.T 9) commented that she was not sure how much she would ‘use the resources in a mainstream classroom situation.’ As a primary school principal she would ‘be more likely to get the resource teacher to use the resources in a small group situation.’ One of the secondary school teachers (RP.T 10) observed that ‘some of the resources were just a discussion about a programme without giving access to the programme itself’ and that ‘some of them are repeated or too simple a description without any solid examples.’ She also made the comment that ‘a lot of it was very primary-school based and wouldn’t work with secondary-school students...’ However this teacher (RP.T 10) conceded that there were probably ‘some good suggestions in there if [she] had the time to read them or if [she] could access them all.’
7.2.3.6 Random Participants – STAK Structured Training Approach

Question 7 (Appendix XXXI) was concerned with the structured approach to teaching which the system has adopted. Participants were asked to rate seven statements on the effectiveness of using these particular seven teaching strategies as part of the structured social skills training programme which underlines the STAK learning system.

An analysis of the feedback received from parents in this group indicated that they found this structured learning programme to be very effective especially when using corrective feedback and games to motivate the children to learn social skills. Further analysis of the findings revealed a mixed response to question 7 from the four teachers in this case study.

One of the two secondary school teachers (RP.T 10) did not find the approach suitable for the age group she was teaching so consequently she did not consider modelling, role
play or social stories to be effective strategies (Figure 7.29). (RP.T 8) remarked that she ‘would prefer to see all resources listed and summarized for the teacher to choose amongst.’ Used to searching for resources on the Internet she felt ‘using it that there may be a better resource just around the corner all the time.’ Similarly (RP.T 9) ‘...didn't like the way you had to complete profiles before you could start to investigate the resources available.’ This teacher would have ‘liked to have been able to look at the resources more’ as ‘it is useful to do some research to help decide the strategy to use next’ when a strategy has not worked with a particular child.

![Diagram](Figure 7.29 Random Participants Teachers – STAK Structured Approach)

7.2.3.7 Random Participants – Learning Styles

An analysis of the data relating to the nineteen child profiles created by the parents in this case study showed that the children (twelve females and seven males aged between two and fifteen years) had either visual, read/write or kinaesthetic learning styles (Table 7.7). Notably the parents in this group appeared to be fully cognizant of their children’s learning styles.
Table 7.7  Random Participants – Children’s Learning Styles (Child Profiles)

<table>
<thead>
<tr>
<th>Case Studies</th>
<th>No of Children</th>
<th>Gender of Children</th>
<th>Learning Styles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Visual</td>
</tr>
<tr>
<td>Totals</td>
<td>19</td>
<td>7m; 12f</td>
<td>12</td>
</tr>
<tr>
<td>Key Workers</td>
<td>0</td>
<td>0m; 0f</td>
<td>0</td>
</tr>
<tr>
<td>Parents</td>
<td>10</td>
<td>3m; 7f</td>
<td>4</td>
</tr>
<tr>
<td>Teachers</td>
<td>9</td>
<td>4m; 5f</td>
<td>8</td>
</tr>
</tbody>
</table>

7.2.3.8 Random Participants – Language Ability

Further analysis of the data extracted from the Child Profiles revealed that the children had been diagnosed with a number of ASDs including Asperger’s Syndrome (DSM-IV) and that the profiling tool had determined that their language abilities ranged from very good to poor which was consistent with their diagnoses. It would appear that the tool gave a more accurate assessment of language ability when used by parents, as they seemed more aware of their children’s everyday use of language (Table 7.8). For instance a child at the lower functioning end of the spectrum would typically have poor language ability and yet responses given by a teacher to questions on a child’s language skills resulted in an unexpected outcome.

Table 7.8  Random Participants – Children’s Diagnoses and Language Abilities (Child Profiles)

<table>
<thead>
<tr>
<th>Case Studies</th>
<th>Children</th>
<th>Diagnosis</th>
<th>No</th>
<th>Language Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very Good</td>
</tr>
<tr>
<td>Key Workers</td>
<td>0</td>
<td>Autism</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asperger</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASD</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RETT</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Parents</td>
<td>10</td>
<td>Autism</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asperger</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASD</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RETT</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Teachers</td>
<td>9</td>
<td>Autism</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asperger</td>
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<td></td>
<td>ASD</td>
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<td>RETT</td>
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</tr>
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<td></td>
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</tbody>
</table>
7.2.3.9 Random Participants – Comprehension Ability

There is also evidence to suggest from these findings that the profiling tool produces an assessment of children’s comprehension abilities which is in line with current thinking in the field (Table 7.9). However the same child, whose language ability had been determined by the system to be very good, was also assessed to have good comprehension ability which is consistent even if it did not adhere to the normal capabilities of children diagnosed with classic autism.

Table 7.9 Random Participants – Children’s Diagnoses and Comprehension Abilities

<table>
<thead>
<tr>
<th>Case Studies</th>
<th>Children</th>
<th>Diagnosis</th>
<th>No</th>
<th>Comprehension Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very Good</td>
</tr>
<tr>
<td>Key Workers</td>
<td>0</td>
<td>Autism</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asperger</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>ASD</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td>10</td>
<td>Autism</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asperger</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASD</td>
<td>2</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>Unknown</td>
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<td>3</td>
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<tr>
<td>Teachers</td>
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<td>Autism</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asperger</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASD</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RETT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7.2.3.10 Random Participants - Special Interests

Literature shows how it is in getting inside a child’s way of thinking and sharing their special interests that one can begin to expand those activities beyond their current confines and help them to develop more flexible patterns of thought (Hanbury, 2012). It is therefore necessary to include these interests in developing the necessary teaching strategies. A variety of activities were included in STAK covering areas from games to animals and nature. Similar to the Mada results an analysis of the children’s profiles showed that they shared an interest in television, games, books and cars (Figure 7.30).
7.2.3.11 Random Participants – STAK Learning Content

An analysis of the data collected through the Child Profiles revealed that the information contained in the range of files downloaded by the participants complemented the support material already provided on teaching strategies such as cognitive picture rehearsal and also offered some practical advice on using these strategies (Appendix A32.54).
7.2.3.12 Random Participants – STAK Carer Support

An analysis of the data collected through the database logs revealed that teachers in this case study had overridden the support level determined for them by the system in many instances. Sometimes teachers sought full support (modelling, positive reinforcement and practice) but reduced the level of support recommended when using didactic instruction (Figure 7.31).

![Figure 7.31 Random Participants Teachers – STAK Carer Support Levels](image)

Similarly it was apparent that many parents accepted the support that the system had assigned to them although in a few instances they sought more or less support than the system had originally allocated to them (Figure 7.32).
Further analysis of the data collected through the Carer Profiles revealed that the range of files (text and videos) downloaded by teachers and parents in this case study contained advice on dealing with challenging behaviour, effective communication techniques, and accommodating learning styles, managing the learning environment, observing the children’s learning experiences and using a range of different strategies in their work with the children (Appendix A32.55).
7.2.4 Random Participants Findings Summary

The analysis of the feedback from the Random Participants case study revealed that only 65% of the participants gave a positive rating to ease of access, registration and login, navigation through the application, ease of use, performance and efficiency of the learning system (Figure 7.33). This result could be attributed to a number of factors including their lack of training and experience using computer equipment and software.

However, it was apparent that all the participants successfully used the application and that 83% found that the Carer profiling tool accurately assessed caregivers’ prior knowledge of teaching strategies and that STAK offered support that matched caregivers’ needs and provided simple guidelines for using teaching strategies. A large majority of the participants also strongly agreed that there is no single strategy that will teach a child with autism to be successful socially. With regard to the Child Profile 83% of the participants also strongly agreed or agreed that STAK had asked the right questions to correctly assess children’s needs, recommended strategies that were suitable for children with ASDs and linked educational resources to individual profiles in order to assist in the development of their social skills (Figure 7.34).
Over three-quarters of the participants (78%) agreed that STAK matched appropriate teaching strategies to children’s learning stages (novice, intermediate, advanced or acquired) and offered appropriate to caregivers as they worked through the personalised training programme with their children. Eighty per cent of the participants felt that STAK had provided them with satisfactory information on the seven teaching strategies employed in the system. Some participants would have preferred more control over the selection of teaching strategies and quicker access to the full range of material available in the system. Seven out of ten participants agreed that STAK matched educational resources to suit children’s profiles (learning stages, learning styles, language and comprehension abilities and special interests) and 81% of the participants considered that the structured social skills training approach adopted by the system would be effective in teaching social skills to children with ASDs.

Table 7.10 presents the statements from all the questionnaires and reflects the number of positive participant responses from the Random Participants (Ireland).
## Table 7.10 Random Participants – Positive Responses to Feedback Questionnaire

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Random Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Role</strong></td>
<td><strong>Key Workers</strong></td>
</tr>
<tr>
<td>Sample</td>
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</tr>
</tbody>
</table>

### Questionnaire Sections

#### User Experience

<table>
<thead>
<tr>
<th>Section</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of Access</td>
<td>n/a</td>
<td>3/4</td>
<td>5/6</td>
</tr>
<tr>
<td>Registration / Login</td>
<td>n/a</td>
<td>2/4</td>
<td>5/6</td>
</tr>
<tr>
<td>Navigation through application</td>
<td>n/a</td>
<td>1/4</td>
<td>5/6</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>n/a</td>
<td>1/4</td>
<td>5/6</td>
</tr>
<tr>
<td>Performance</td>
<td>n/a</td>
<td>1/4</td>
<td>5/6</td>
</tr>
<tr>
<td>Efficiency</td>
<td>n/a</td>
<td>1/4</td>
<td>5/6</td>
</tr>
</tbody>
</table>

#### Carer Profile

<table>
<thead>
<tr>
<th>Statement</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAK accurately assesses Carers’ prior knowledge of teaching strategies</td>
<td>n/a</td>
<td>3/4</td>
<td>6/6</td>
</tr>
<tr>
<td>STAK offers support that adequately reflects Carers’ needs</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>STAK offers simple instructions for using each teaching strategy</td>
<td>n/a</td>
<td>2/4</td>
<td>5/6</td>
</tr>
<tr>
<td>There is no single strategy that will teach a child with autism to be successful socially</td>
<td>n/a</td>
<td>4/4</td>
<td>5/6</td>
</tr>
</tbody>
</table>

#### Child Profile

<table>
<thead>
<tr>
<th>Statement</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAK asks the right questions to correctly assess children’s needs</td>
<td>n/a</td>
<td>2/4</td>
<td>4/6</td>
</tr>
<tr>
<td>STAK recommends strategies that are suitable for child/children with ASDs</td>
<td>n/a</td>
<td>4/4</td>
<td>6/6</td>
</tr>
<tr>
<td>STAK offers resources that match individual children’s profiles</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>STAK provides resources that help children to develop social skills</td>
<td>n/a</td>
<td>3/4</td>
<td>6/6</td>
</tr>
</tbody>
</table>

#### Teaching Strategies

<table>
<thead>
<tr>
<th>Statement</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAK matches appropriate teaching strategies to children’s learning stages (novice, intermediate, advanced or acquired)</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>STAK recommends a combination of strategies to teach children to be successful socially</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>STAK provides adequate support to Carers when they use the strategies recommended</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Carers requiring Full Support are given access to clear explanations of teaching strategies</td>
<td>n/a</td>
<td>2/4</td>
<td>5/6</td>
</tr>
<tr>
<td>STAK provides examples illustrating the use of teaching strategies in different contexts</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Carers are guided satisfactorily through a structured programme to teach social skills</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
</tbody>
</table>

*K = Key Workers  T = Teachers  P = Parents*
<table>
<thead>
<tr>
<th>Case Study</th>
<th>Random Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Role</strong></td>
<td><strong>Key Workers</strong></td>
</tr>
<tr>
<td><strong>Sample</strong></td>
<td>0</td>
</tr>
</tbody>
</table>

**Questionnaire Sections**

<table>
<thead>
<tr>
<th>Support provided to Carers on Teaching Strategies</th>
<th><strong>Key Workers</strong></th>
<th><strong>Teachers</strong></th>
<th><strong>Parents</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Information on Didactic Instruction is sufficient</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Information on Modelling is sufficient</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Information on Role Play is sufficient</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Information on Corrective Feedback is sufficient</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Information on Positive Reinforcement is sufficient</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Information on Motivating Games is sufficient</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Information on Practice is sufficient</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
</tbody>
</table>

**Educational Resources provided to complement Teaching Strategies**

| STAK selects educational resources to suit a child’s learning stage       | n/a                 | 0/4          | 6/6         |
| STAK chooses educational resources which correspond to a child’s learning style | n/a                 | 2/4          | 6/6         |
| STAK picks educational resources which suit a child’s language ability     | n/a                 | 1/4          | 6/6         |
| STAK selects educational resources which suit a child’s comprehension ability | n/a                 | 1/4          | 6/6         |
| STAK chooses educational resources based on a child’s special interests    | n/a                 | 1/4          | 6/6         |
| STAK provides educational resources which motivate children to learn       | n/a                 | 0/4          | 6/6         |
| STAK offers sufficient educational resources                              | n/a                 | 2/4          | 6/6         |

**STAK Structured Approach**

<table>
<thead>
<tr>
<th>STAK Structured Approach</th>
<th><strong>Key Workers</strong></th>
<th><strong>Teachers</strong></th>
<th><strong>Parents</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Breaking down information into small chunks</td>
<td>n/a</td>
<td>3/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Demonstrating the steps in each skill</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Asking children to role play using skill steps</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Giving child encouraging feedback</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Reinforcing skill steps using social stories</td>
<td>n/a</td>
<td>1/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Introducing skills through games</td>
<td>n/a</td>
<td>3/4</td>
<td>6/6</td>
</tr>
<tr>
<td>Providing practice opportunities</td>
<td>n/a</td>
<td>2/4</td>
<td>6/6</td>
</tr>
</tbody>
</table>

K = Key Workers  T = Teachers  P = Parents
7.2.5  Case 3: St Ultan’s School (Autism Unit) Cherry Orchard Dublin 10

Ten participants took part in the evaluation of STAK during a number of workshops between December 2014 and January 2015. This all-female group included 6 key workers and 4 teachers (Table 7.11).

<table>
<thead>
<tr>
<th>Case Study Ref</th>
<th>Group</th>
<th>Number of Participants</th>
<th>Caregiver Role</th>
<th>Caregiver Gender</th>
<th>Number of Children</th>
<th>Age Children</th>
<th>Gender Children</th>
<th>Case Location</th>
<th>Education</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>SU 3.1</td>
<td>6</td>
<td>K</td>
<td>6 f, 0 m</td>
<td>6</td>
<td>3 – 7</td>
<td>4 f, 2 m</td>
<td>Cherry Orchard Dublin</td>
<td>Special Autism Unit St Ultan’s School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SU 3.2</td>
<td>0</td>
<td>P</td>
<td>0 f, 0 m</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Cherry Orchard Dublin</td>
<td>Special Autism Unit St Ultan’s School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SU 3.3</td>
<td>4</td>
<td>T</td>
<td>4 f, 0 m</td>
<td>4</td>
<td>5 - 11</td>
<td>3 f, 1 m</td>
<td>Cherry Orchard Dublin</td>
<td>Special Autism Unit St Ultan’s School</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7.2.5.1  St Ultan’s – STAK User Experience

When asked in Question 2 about their user experience a majority of the key workers in St Ultan’s (67%) responded that they did not find STAK easy to use (Figure 7.35). For instance (SU.K 1) found creating a profile to be a ‘a lengthy process’ and would ‘have preferred a quicker profiling period, with fewer questions’ as she sometimes found the process to be ‘counter intuitive.’ Similarly (SU.K 2) found the process very confusing and complained about the length of time it took to complete the profiles. (SU.K 6) had a similar experience for she observed that the system ‘was hard to use, took a long time to fill in profile and [it] asked a lot of questions.’ (SU.K 4) remarked that she ‘found it hard to know where to click etc filling in the profile.’ (SU.K 3) also commented that ‘it took a long time to make the profile and was hard to follow’ and she ‘didn’t know where resources went after [she] clicked on them’ (SU.K 5) admitted that she was ‘not very technological’ and had experienced some difficulties creating the profiles which could
have caused her to abandon the task had she not received assistance from one of her colleagues.

**Figure 7.35 St Ultan’s School Key Workers – STAK User Experience (Question 2)**

Generally the teachers in St Ultan’s School were quite critical of the STAK system with (SU.T 7) in particular judging most aspects of her user experience had been poor to very poor as ‘the profiling system was too time consuming, with too many questions and too many options... The system is simply not intuitive as [she] would like it to be.’ (SU.T 8) observed that she ‘liked the look of the site, even though it was difficult to navigate and figure where to go and what to do next.’ (SU.T 10) found ‘the registration was really difficult, too long and a bit of a barrier.’ One of the teachers (SU.T 8) suggested that a ‘shorter log in and registration’ was required as the present process ‘... was very long!’ for ‘there is a lot for the adult to do; in the same time I would have chosen a few lessons to meet my needs from a book.’ Similarly (SU.T 9) commented that ‘...a lot of people felt that the profiling took too long and it wasn’t very intuitive.’ (SU.T 10) remarked that ‘it’s much more intuitive after you have registered and easy to access the activities time and time again.’ However (SU.T 7) had the opposite experience for when she returned to use the resources she had ‘... found it difficult to access the material’ (SU.T 9) agreed that the system was ‘hard to navigate and the supports hard to download and pick and choose’ and suggested that ‘an outline of the activity before it's downloaded

[150]
would be useful.’ (SU.T 7) also found that ‘the system was difficult to navigate and involved a significant investment of time (1 hour) to set up a profile without really knowing what the gains may be. This teacher also advised that a preview or ‘a sample resource or video of what was on offer might help’ the user to choose which files to download from the recommended display of resources (Figure 7.36).

![Figure 7.36 St Ultan’s School Teachers – STAK User Experience (Question 2)](image)

### 7.2.5.2 St Ultan’s – STAK Carer Profile

The third question asked the participants to consider four statements in relation to their prior knowledge of teaching strategies, level of support reflecting their needs, instructions on teaching strategies provided by the system and whether one strategy could be used on its own to teach a child to be successful socially. They were asked to indicate their choice on a similar five-point Likert scale.

An analysis of the feedback received from the key workers in St Ultan’s revealed that they found that STAK had accurately assessed their prior knowledge of teaching strategies. The majority also agreed that STAK provided them with simple instructions on applying the strategies recommended by the system. For instance, (SU.K 1) affirmed that she had found ‘good information on strategies and how to instruct’ in STAK although (SU.K 3) admitted that she ‘…didn’t understand a lot of the words like some of the teaching strategies’ (Figure 7.37).
However some of the key workers’ responses also suggest that they were not sure whether STAK offered them supports that reflected their needs. One participant (SU.K 4) remarked that she liked the resources but that the carer supports did not make sense to her. In the example she cited she wanted to teach the skill of conversation to the student who was at the novice learning stage. Of the two teaching strategies that STAK had recommended to her she had selected Modelling and was thus presented with some support material on how to use this teaching strategy including some videos. However it was not apparent to her ‘how hand washing and blowing your nose fit in with a conversation support for the carer?’ This uncertainty may have arisen from her confusion between the word ‘support’ and ‘resource’ as there is evidence in their feedback to suggest that this group of key workers interpreted teaching strategies as ‘resources’ and responded to the questions accordingly. Question 3d was based on current research which considers that using a hybrid of teaching strategies to teach social skills to children with autism is more effective than relying on one single intervention. It was quite surprising therefore that all six key workers disagreed with this concept. On further examination of their commentary it is quite possible that the key workers did not perceive this statement in pedagogical terms and had responded to the question simply in light of their experience of using the STAK system.

![ST Ultan’s School Key Workers – STAK Carer Profile (Question 3)](image-url)
Feedback received from the teachers involved in St Ultan’s case study indicated that only half of them believed that the STAK profiling tool had accurately assessed their knowledge of teaching strategies (Figure 7.38). Their responses also suggest that teachers were uncertain as to whether STAK had offered them appropriate supports or if the instructions supplied by the system were sufficiently clear. More importantly most of the teachers appeared to be in disagreement with current thinking on the most effective method of teaching children with ASDs.

![Figure 7.38 St Ultan’s School Teachers – STAK Carer Profile (Question 3)](image)

### 7.2.5.3 St Ultan’s – STAK Child Profile

Participants were also requested to indicate their agreement or otherwise to a number of statements concerning the Child Profile on a similar five-point Likert scale. These statements ranged from assessment of the children’s needs, recommendation of suitable strategies, matching resources to individual profiles and offering assistance to children with their social skills development. An analysis of the feedback received from the key workers revealed that many of them believed that STAK asked the right questions to correctly assess their children’s needs although they were less convinced that the system recommended strategies that suited children with ASDs and still less sure that STAK offered resources that matched their children’s profiles. Only half of the key workers...
considered that STAK provided resources that actually help children to develop social skills (Figure 7.39). One of the key workers (SU.K 2) remarked that STAK afforded her the opportunity to take ‘the time to really think about the child’ and she ‘liked the questions asked.’ Similarly (SU.K 5) found that aspect of STAK interesting as it ‘considers the individual child and attempts to differentiate and meet individual needs… It asks some good questions and it’s good to take the time to profile the child.’ However (SU.K 1) thought that ‘the resources weren’t all that specific, more one size fits all…Some were better matched than others.’

An analysis of the responses received from the teachers in this group indicated that they did not agree that the resources recommended by STAK matched individual profiles or were child specific (Figure 7.40). For instance, one of the teachers (SU.T 9) remarked that ‘the resources were not specific to the child [and] sometimes mis-matched (not age appropriate, language appropriate etc).’ This participant observed that ‘some of the resources really don’t meet the developmental stage of the learner.’ In the example she cited the ‘child was 4, and the pdf on Cars, began with a simple sentence for 4 year olds but quickly began talking about historical dates pitched far too high for children.’
(SU.T 8) stated that she would use the resources (even though they were more general and not really targeting her student) by altering them ‘to make them more suitable.’

![ST ULTAN’S SCHOOL TEACHERS - STAK CHILD PROFILE](image)

**Figure 7.40** St Ultan’s School Teachers – STAK Child Profile (Question 4)

### 7.2.5.4 St Ultan’s – STAK Teaching Strategies

Participants were then asked to rate seven statements and sub-questions concerning teaching strategies on a seven-point scale from -3 (least helpful) to +3 (most helpful). Many of the key workers were undecided on whether STAK matched appropriate teaching strategies to children’s learning stages while finding the strategies themselves and the support provided helpful. One of the key workers (SU.K 5) remarked that ‘STAK makes me choose a learning strategy and be conscious of that strategy, which is often an unconscious decision.’ Similarly the teachers in St Ultan’s were positive about the concept underlining the learning system as (SU.T 9) observed that she liked ‘the emphasis on different teaching styles and its exposure that is good for practice and learning.’ However (SU.T 8) found that ‘there is a LOT of learning for inexperienced carers. It would have been nice to be able to assess the strategy lessons individually as opposed to seeing them as a unit’ (Figure 7.41).
In general the key workers found the information that STAK provided on each of the seven strategies in the system helpful. (SU.K 1) commented that she had found ‘good information on strategies and how to instruct...’ using didactic instruction, modelling, role play, corrective feedback, positive reinforcement, motivating games and practice and (SU.K 6) considered that ‘it's a good reminder of different strategies.’ The four teachers in St Ultan’s gave mixed feedback on STAK’s teaching strategies. (SU.T 8) thought that ‘the carers’ information on the different strategies was mostly very good.’ and (SU.T 10) found that STAK ‘...brings a consciousness of the different approaches.’ However 3 out of 4 found the information on corrective feedback, positive reinforcement, motivating games and practice unhelpful (Figure 7.42).
7.2.5.5 St Ultan’s – STAK Educational Resources

Participants were asked to rate seven statements relating to STAK educational resources under Question 6 (Appendix XXXI) on a similar seven-point scale from 3 (least helpful) to +3 (most helpful).

In general key workers in St Ultan’s case study were undecided whether STAK selects educational resources to suit children’s individual profiles (Figure 7.43). (SU.K 3) found that the resources recommended by the learning system ‘didn't seem to be exactly for my child and didn't match her interests’ but that some resources ‘like clair de lune and being left out …[gave her] … an idea of where to start.’ (SU.K 5) ‘…was disappointed with some of the resources…[and that this made her] doubt the legitimacy of the other resources that I clicked on (which were better).’ However she said that she was able ‘to adapt and alter [the recommended resources] to meet his needs.’ (SU.K 6) remarked that ‘the resources were not very specific and some of them were very weak…although it did give her the idea to use ‘photostories’ in her work. (SU.K 1) remarked that ‘it would have been nice to have resources, strategy and teaching outline all come together.’
An analysis of the feedback received from the teachers in St Ultan’s School indicated that they were harshly critical of the educational resources that STAK provided as they had expected them to be more personalised to exactly meet their children’s needs (Figure 7.44). (SU.T 9) found that ‘It was very dependent on my shaping the lesson to suit the child as opposed to the profile shaping providing a lesson that suits him.’ (SU.T 7) remarked that the resources that the system recommended to her were not specific to her child’s profile. ‘They were not differentiated and had a broad fit for most children, even neurotical children (like the hand washing video)...This would have been fine had I not spent so long creating a child specific profile.’ There also seems to have been some confusion with the definition of ‘resource’ as the video referred to here was in fact a demonstration of modelling as part of caregiver ‘support’ rather than an ‘educational resource’ such as ‘steps to success’ for the children involved in the learning experience. It also was evident from this feedback that the teachers would have liked to have had more control of what resources they used to teach social skills. For instance one of the
teachers (SU.T 7) thought that ‘a single page of resource links that one could click on and decide if it was appropriate or not, would have sufficed.’ Alternatively she suggested that it might help if STAK supplied ‘a sample resource or video of what was on offer…’ (SU.T 10) felt that the resources were not ‘truly child specific - which negates creating the profile in the first place…’ and proposed that each activity be tried and tested by a third party before being included in any future version of the learning system. However she did find merit in some of the resources as they had provided her with ‘…a suitable platform to practice.’ A number of participants gave neutral responses to these questions so it was interesting to find that some teachers like (SU.T 8) felt unable to give a definitive answer as she ‘would have liked to give feedback on each resource as opposed to seeing all resources as "STAK resources". It made the feedback as hard to answer as some resources were good and others were not.’ Unfortunately this meant that this teacher was unable to give ‘feedback either way.’

![Figure 7.44 St Ultan’s School Teachers - STAK Educational Resources](image-url)
7.2.5.6 St Ultan’s – STAK Structured Training Approach

Question 7 was concerned with the structured approach to teaching which the system has adopted. Participants were asked to rate seven statements on the teaching strategies used in the system on a scale from most effective to least effective (Figure 7.45). In general the key workers in St Ultan’s considered that the structured training approach would be effective when teaching children with ASDs social skills. There were mixed responses from the teachers with regard to this type of social skills training programme and surprisingly one of the teachers did not find practice to be an effective component of this approach.

![St Ultan’s School Teachers - STAK Structured Approach](image)

Figure 7.45 St Ultan’s School Teachers – STAK Structured Approach (Question 7)

7.2.5.7 St Ultan’s – Learning Styles

An analysis of the data relating to the ten profiles created by participants in St Ultan’s showed that the majority of the children were visual learners (Table 7.12). Two of the key workers had observed that the children they were teaching learned through listening to explanations of different concepts, using audio recordings for language practice, and working with multimedia applications which incorporated sounds, music, and/or speech.
Table 7.12 St Ultan’s School - Children’s Learning Styles (Child Profiles)

<table>
<thead>
<tr>
<th>Case Studies</th>
<th>No of Children</th>
<th>Gender of Children</th>
<th>Learning Styles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Visual</td>
</tr>
<tr>
<td>Totals</td>
<td>10</td>
<td>7m; 12f</td>
<td>8</td>
</tr>
<tr>
<td>Key Workers</td>
<td>6</td>
<td>2m; 4f</td>
<td>4</td>
</tr>
<tr>
<td>Parents</td>
<td>0</td>
<td>0m; 0f</td>
<td>0</td>
</tr>
<tr>
<td>Teachers</td>
<td>4</td>
<td>1m; 3f</td>
<td>4</td>
</tr>
</tbody>
</table>

7.2.5.8 St Ultan’s – Language Ability

It is evident from the profiles created by the key workers and teachers in St Ultan’s School that the children’s language abilities range from average to very poor (Table 7.13). These results are consistent with the children’s diagnoses of autism and ASD which are at the lower functioning end of the autism spectrum.

Table 7.13 St Ultan’s School - Children’s Diagnoses & Language Abilities (Child Profiles)

<table>
<thead>
<tr>
<th>Case Studies</th>
<th>Children</th>
<th>Diagnosis</th>
<th>No</th>
<th>Language Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very Good</td>
</tr>
<tr>
<td>Key Workers</td>
<td>6</td>
<td>Autism</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asperger</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>ASD</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RETT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td>0</td>
<td>Autism</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asperger</td>
<td></td>
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<td></td>
<td></td>
<td>ASD</td>
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<td></td>
<td></td>
<td>RETT</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teachers</td>
<td>4</td>
<td>Autism</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>ASD</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RETT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7.2.5.9 St Ultan’s – Comprehension Ability

It is apparent from the profiles created by the key workers and teachers in St Ultan’s School that the children’s comprehension abilities range from average to very poor (Table 7.14). These results are in keeping with the diagnoses of the children concerned (classic autism and ASD).

Table 7.14 St Ultan’s School - Children’s Diagnoses & Comprehension Abilities (Child Profiles)

<table>
<thead>
<tr>
<th>Case Studies</th>
<th>Children</th>
<th>Diagnosis</th>
<th>No</th>
<th>Comprehension Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very Good</td>
</tr>
<tr>
<td>Key Workers</td>
<td>6</td>
<td>Autism</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asperger</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASD</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RETT</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td>0</td>
<td>Autism</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asperger</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASD</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RETT</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Teachers</td>
<td>4</td>
<td>Autism</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asperger</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASD</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RETT</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

7.2.5.10 St Ultan’s – Special Interests

An analysis of the data logs indicated that the children taught by the teachers and key workers in St Ultan’s case study shared a variety of special interests from iPads to Thomas the Tank Engine (Figure 7.46).
7.2.5.11 St Ultan’s – STAK Learning Content

An analysis conducted on the data collected through the Child Profiles indicated that the range of files downloaded by the participants in St Ultan’s consisted of material (text and audio/visual) that complemented the strategies recommended to them for teaching children at certain learning stages such as steps to success and cognitive picture rehearsal (Appendix A32.78).

7.2.5.12 St Ultan’s – STAK Carer Support

Data logs indicated that teachers in this case study had selected alternative support levels from those originally assigned to them by STAK which corresponded to their prior knowledge of the seven teaching strategies employed throughout the system (Figure 7.47).
It was also apparent from these data logs that key workers in St Ultan’s school had altered the support level assigned to them by the system to a higher level (Figure 7.48).
Further analysis of the data collected through the Carer Profiles revealed that the key workers and teachers this case study had sought information and advice on ABA techniques and visual aids such as picture cards and schedule boards; using steps to success to teach new skills; develop social interaction skills commencing with ‘making new friends’ and ‘turn taking’; applying strategies including modelling, role play, feedback, and reinforcement; and how to effectively and efficiently record children’s activities to increase one’s awareness of children’s needs (Appendix A32.79).

7.2.6 St Ultan’s Primary School Findings Summary

It was evident from the findings that only 23% of the ten caregivers who took part in St Ultan’s case study had a satisfactory STAK user experience. While 7 out of ten agreed that the Carer profiling tool accurately assessed their prior knowledge of teaching strategies there was very little agreement that STAK offered support that reflected their needs or provided simple instructions for using recommended teaching strategies. Interestingly 8 out of 10 participants disagreed or strongly disagreed with the statement that there was no single strategy that would teach a child with autism to be successful socially (Figure 7.49).

![St Ultan's Primary School - Carer Profile](image)

With regard to their responses to questions on the Child Profile, 7 out of 10 participants agreed that STAK had asked the correct questions to accurately assess children’s needs.
However the majority of the participants (6 out 10) were undecided on whether STAK recommended appropriate strategies for children with ASDs, matched educational resources with individual profiles or provided resources that help children to develop social skills (Figure 7.50).

![St Ultan’s School - STAK Child Profile](image)

**Figure 7.50**  St Ultan’s Primary School – STAK Child Profile (Question 4)

It was also apparent from these findings that only 4 out of 10 participants agreed that STAK matched appropriate teaching strategies to children’s learning stages and still less believed that the learning system recommended a combination of strategies to teach children social understanding or provided caregivers with sufficient support using these strategies. Nearly half of the participants found the information that STAK had provided on each teaching strategy helpful but the majority (76%) could not make up their minds whether STAK had selected educational resources that suited the children’s profiles (learning stages, learning styles, language and comprehension abilities and special interests) (Figure 7.51). (SU.K 5) remarked that she thought ‘…the quality of the resources would really need to improve to make people want to take the time to fill in the forms and to return to the system.’
Further analysis revealed that two-thirds of the participants agreed that STAK’s structured social skills training approach would be effective in teaching children with ASDs. (SU.T 7) seemed to speak for most of the participants when she summed STAK up: ‘It's a great idea for a system, and whilst there are obviously lots of issues with the prototype I really commend you for taking on such a mammoth task. The first port of call must be to make the website more intuitive, profiling process faster and the resources more specific and targeted to the individual child.’

Table 7.15 presents the statements from all the questionnaires and reflects the number of positive participant responses from the Autism Unit, St Ultan’s Primary School (Cherry Orchard Dublin West).
### St Ultan’s Primary School – Positive Responses to Feedback Questionnaire

<table>
<thead>
<tr>
<th>Case Study</th>
<th>St Ultan’s Primary School Autism Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role</td>
<td>Key Workers</td>
</tr>
<tr>
<td>Sample</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Questionnaire Sections

##### User Experience

<table>
<thead>
<tr>
<th>Section</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of Access</td>
<td>1/6</td>
<td>2/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Registration / Login</td>
<td>1/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Navigation through application</td>
<td>1/6</td>
<td>0/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>1/6</td>
<td>0/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Performance</td>
<td>3/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Efficiency</td>
<td>2/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
</tbody>
</table>

##### Carer Profile

<table>
<thead>
<tr>
<th>Section</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAK accurately assesses Carers’ prior knowledge of teaching strategies</td>
<td>5/6</td>
<td>2/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK offers support that adequately reflects Carers’ needs</td>
<td>1/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK offers simple instructions for using each teaching strategy</td>
<td>3/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>There is no single strategy that will teach a child with autism to be successful socially</td>
<td>0/6</td>
<td>0/4</td>
<td>n/a</td>
</tr>
</tbody>
</table>

##### Child Profile

<table>
<thead>
<tr>
<th>Section</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAK asks the right questions to correctly assess children’s needs</td>
<td>4/6</td>
<td>3/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK recommends strategies that are suitable for child/children with ASDs</td>
<td>2/6</td>
<td>0/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK offers resources that match individual children’s profiles</td>
<td>1/6</td>
<td>0/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK provides resources that help children to develop social skills</td>
<td>3/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
</tbody>
</table>

##### Teaching Strategies

<table>
<thead>
<tr>
<th>Section</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAK matches appropriate teaching strategies to children’s learning stages (novice, intermediate, advanced or acquired)</td>
<td>1/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK recommends a combination of strategies to teach children to be successful socially</td>
<td>4/6</td>
<td>2/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK provides adequate support to Carers when they use the strategies recommended</td>
<td>3/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Carers requiring Full Support are given access to clear explanations of teaching strategies</td>
<td>3/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK provides examples illustrating the use of teaching strategies in different contexts</td>
<td>2/6</td>
<td>2/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Carers are guided satisfactorily through a structured programme to teach social skills</td>
<td>4/6</td>
<td>0/4</td>
<td>n/a</td>
</tr>
</tbody>
</table>

K = Key Workers  T = Teachers  P = Parents
### Case Study

#### St Ultan’s Primary School Autism Unit

<table>
<thead>
<tr>
<th>Role</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>0</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Questionnaire Sections

**Support provided to Carers on Teaching Strategies**

<table>
<thead>
<tr>
<th>Support Provided</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information on Didactic Instruction is sufficient</td>
<td>4/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Information on Modelling is sufficient</td>
<td>4/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Information on Role Play is sufficient</td>
<td>4/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Information on Corrective Feedback is sufficient</td>
<td>4/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Information on Positive Reinforcement is sufficient</td>
<td>4/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Information on Motivating Games is sufficient</td>
<td>3/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Information on Practice is sufficient</td>
<td>3/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**Educational Resources provided to complement Teaching Strategies**

<table>
<thead>
<tr>
<th>Educational Resources Provided</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAK selects educational resources to suit a child’s learning stage</td>
<td>4/6</td>
<td>0/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK chooses educational resources which correspond to a child’s learning style</td>
<td>1/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK picks educational resources which suit a child’s language ability</td>
<td>1/6</td>
<td>1/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK selects educational resources which suit a child’s comprehension ability</td>
<td>1/6</td>
<td>0/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK chooses educational resources based on a child’s special interests</td>
<td>2/6</td>
<td>0/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK provides educational resources which motivate children to learn</td>
<td>4/6</td>
<td>0/4</td>
<td>n/a</td>
</tr>
<tr>
<td>STAK offers sufficient educational resources</td>
<td>2/6</td>
<td>0/4</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**STAK Structured Approach**

<table>
<thead>
<tr>
<th>Structured Approach</th>
<th>Key Workers</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breaking down information into small chunks</td>
<td>3/6</td>
<td>3/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Demonstrating the steps in each skill</td>
<td>3/6</td>
<td>3/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Asking children to role play using skill steps</td>
<td>4/6</td>
<td>2/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Giving child encouraging feedback</td>
<td>5/6</td>
<td>2/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Reinforcing skill steps using social stories</td>
<td>4/6</td>
<td>2/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Introducing skills through games</td>
<td>5/6</td>
<td>3/4</td>
<td>n/a</td>
</tr>
<tr>
<td>Providing practice opportunities</td>
<td>5/6</td>
<td>2/4</td>
<td>n/a</td>
</tr>
</tbody>
</table>

K = Key Workers    T = Teachers    P = Parents
7.3 Explanatory Cases Summary

Across all three cases (Mada Center, Random Participants Ireland and St Ultan’s Primary School Cherry Orchard (Dublin)) over half of the participants gave a positive rating on ease of access and on registration and login as either being excellent or good. Some 40% of participants rated the rest of the user experience as being either excellent or good (Figure 7.52).

Prior to working with the learning system potential respondents were asked to complete a questionnaire (Appendix XXVIII). This was intended to determine their comfort teaching the various social skills and their familiarity with the teaching strategies that would be used in the system. Nearly twenty per cent of respondents had little or no knowledge of teaching social skills to this group which was borne out by some of the
comments made in during the case studies. From the responses to Question 3 the participants across all three case studies felt that the STAK profiling tool has accurately assessed the caregivers’ prior knowledge of teaching strategies with 62% of the participants agreeing or strongly agreeing with this statement (Figure 7.53).

![Figure 7.53 Three Case Studies – STAK Assessment of Carers’ Knowledge](image)

Regarding the Child profiling tool the majority of participants felt that STAK correctly assessed the children’s needs with 56% of them either agreeing or strongly agreeing with the statement (Figure 7.54).
The majority across Cases 1 and 2 (Mada Qatar and Random Participants) also believed that the strategies recommended by STAK were suitable for children with ASDs with 73% agreeing or strongly agreeing with this statement. However, the participants of the third Case (St Ultan’s Primary School) did not believe that this was true as only 2 out of 10 agreed with the statement (Figure 7.55).
The analysis of the responses from two of these three cases also revealed that the 48% participants believed that STAK matched appropriate teaching strategies with children’s learning stages. However only 2 out of 10 participants in St Ultan’s case study agreed with this statement. Further analysis of the responses indicated that participants in the first two cases found the educational resources recommended by STAK were slightly helpful with 43% of the participants believing that the educational resources suited the children’s learning stages. The participants from St Ultan’s School had very mixed views on the recommended resources with 67% believing that these resources motivated children to learn although in general they considered the resources to be unhelpful (Figure 7.56).
An analysis of the 1,696 educational resources downloaded during the case studies highlighted the fact that caregivers selected video clips and PowerPoint presentations quite often over text and the subject-matter chosen varied substantially between each group (Table 7.16).
It is evident from literature that there is a long-standing problem of unproven educational interventions in the field of autism which makes it difficult for caregivers to find trustworthy resources that suit their children’s individual social capabilities (Heward, 2009). The results of a survey (Preliminary Questionnaire Appendix XXVIII) conducted by the researcher with 43 caregivers before they commenced using STAK had borne this out.

The majority of the caregivers polled had some experience teaching social skills and had rated their confidence teaching those skills quite high (Table 7.17). Nevertheless a significant number (35%) indicated that they had experienced some problems in the past identifying appropriate interventions to help them develop social skills in children with ASDs and a greater number (63%) had experienced difficulty finding resources that actually suited their children’s particular requirements.
Table 7.17 Caregivers’ experience teaching Social Skills (Survey Question 1)

<table>
<thead>
<tr>
<th>Caregiver Role Description</th>
<th>Caregiver Role Code</th>
<th>Male</th>
<th>Female</th>
<th>Total Caregivers Polled</th>
<th>Caregivers’ Experience Teaching Social Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Needs Assistant</td>
<td>SNA</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Autism Therapist</td>
<td>AT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other Professional</td>
<td>OP</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Psychologist</td>
<td>PS1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Parent</td>
<td>P1</td>
<td>4</td>
<td>15</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>Parent with SE experience</td>
<td>PSE</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Parent with general teaching experience</td>
<td>PTE</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Teacher Primary School with no SE training</td>
<td>TP1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Teacher Primary School with SE qualification</td>
<td>TP2</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Resource Teacher</td>
<td>TR</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Teacher Secondary School with no SE training</td>
<td>TS1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Teacher Secondary School with SE qualification</td>
<td>TS2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Given the uniqueness of each child’s condition it would not be possible for STAK to achieve an exact fit to each individual profile but the system did aim to narrow down the search for appropriate resources that suited individual children based on their learning stage (novice, intermediate, advanced or acquired). Using the results of the Child profiling tool, STAK could direct caregivers towards specific tried and trusted interventions such as discrete trial, steps to success, PECS, social skills picture story, cognitive picture rehearsal, social story, games and video modelling.

Table 7.18 used four categories (0-24%, 25-49%, 50-74% and 75-100%) to present the positive responses across the three case studies.
<table>
<thead>
<tr>
<th>Case Study</th>
<th>Mada Center</th>
<th>Random Participants</th>
<th>St Ultan’s Primary School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role</td>
<td>K</td>
<td>T</td>
<td>P</td>
</tr>
<tr>
<td>Questionnaire Sections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Experience</td>
<td>100</td>
<td>58</td>
<td>53</td>
</tr>
<tr>
<td>Carer Profile</td>
<td>100</td>
<td>100</td>
<td>54</td>
</tr>
<tr>
<td>Child Profile</td>
<td>100</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td>Teaching Strategies</td>
<td>94</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>Information on Teaching Strategies</td>
<td>48</td>
<td>50</td>
<td>52</td>
</tr>
<tr>
<td>Educational Resources</td>
<td>86</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>Structured Approach</td>
<td>71</td>
<td>100</td>
<td>81</td>
</tr>
</tbody>
</table>

K = Key Workers  
T = Teachers  
P = Parents  
% Positive Response to each statement

Overall one sees from the analysis of the case studies that STAK scored high in terms of usability. It is also evident that caregivers agreed that the carer profiling tool accurately assessed carers’ knowledge. Findings also indicate a general agreement that the child profiling tool asked the right questions to correctly assess the children’s needs for the purpose of recommending educational resources to help in the development of their social skills.
Chapter 8  Conclusions

8.1  Introduction

This case study investigated the possibility of caregivers using a dual-adaptive learning system to match child profiles with appropriate educational resources and teaching strategies, while providing them with support using those recommended strategies at levels consistent with their own profiles, to enable them to develop social skills in children with ASDs.

Before teaching a child any skill it is crucial to establish the child’s prior knowledge and build on that knowledge. The researcher designed a learning system around the child’s prior knowledge and competence using ten specific social skills. Moreover seven teaching strategies were applied in the system as part of a logical sequence corresponding to the child’s skill level.

In order to establish the child’s learning stage and his/her individual needs the researcher designed a profiling tool to enable caregivers to use their knowledge of their children’s capabilities to create profiles for them.

Since caregivers required support teaching children with ASDs their needs would also have to be taken into account during the learning experience so a second tool was devised to allow caregivers to assess the level of support they required using teaching strategies linked to specific children’s learning stages.

Furthermore STAK uses the child profiles to adapt educational resources linked to teaching strategies, to individual children’s learning styles, language abilities, comprehension abilities and special interests, in order to create a personalised learning experience for him/her.

The study was conducted with thirty-eight participants over a three-month period: nineteen parents, ten teachers, and nine key workers and thirty-six children who had been diagnosed with ASDs. These participants were based in Ireland and Qatar.
8.2 Deductions

Findings reveal that this learning system assists caregivers to build individual profiles by assessing the caregivers’ knowledge of strategies and the children’s capabilities. The system also matches these profiles with teaching strategies that suit the children’s learning stages and provides support to caregivers, which is consistent with their knowledge of the strategies linked to those learning stages. It also selects educational resources that suit the children’s learning styles, language abilities, comprehension abilities and special interests. Evidence also suggests that the learning tool can give caregivers a good place to start by providing them with information on new techniques or reinforcing their knowledge of strategies that they have used in the past. Results also indicate that the learning system facilitates users by enabling them to narrow their search for the educational resources which best suit the needs and unique characteristics of the particular children they are working with. The results of the study also indicate that this intervention can help to create a positive learning experience for children and their caregivers leading to greater social understanding.

8.3 Limitations of Work

Due to time constraints and financial considerations it was not possible to provide a larger number of resources in this prototype. There were 164 educational resources included in the system to cater for the 36 children involved in the case studies. However it was clear from the findings that many more resources are required to cater for the 7,000 possible child profiles that can be created in the current prototype. Unfortunately due to copyright legislation it was also not possible to include some resources that have proved to be effective when teaching children with autism. Therefore it was necessary for the researcher to create her own. Although advisable it was also not feasible during the short period of this investigation to trial each of these resources before rolling them out in the system. In addition, the study group was not large enough to generalise the results.

8.4 Contributions

This thesis designed, implemented and evaluated a personalised dual-adaptive learning system (STAK) to bridge the gap in existing interventions by helping caregivers meet the challenge of teaching social skills to children diagnosed with ASDs in order that they can reach their full potential in society. One of the major contributions of this
thesis is the development of tools, which harness the knowledge and experience of caregivers in individual profiles and match these profiles to appropriate resources in an innovative way that benefits both caregiver and child involved in tackling the issue of social competence. The second contribution was the design of a novel framework for teaching the ten social skills required for social competence, which applied teaching strategies in a logical sequence corresponding to a child’s prior knowledge of each skill (novice, intermediate, advanced and acquired). This framework was based on existing effective paper-based social skills training programmes and best practice in the field and became the underlying pedagogical structure to the personalised dual-adaptive learning system. The third contribution was the application of dual-adaptive techniques in order to provide educational resources which corresponded to the children’s learning stages, learning styles, language and comprehension abilities and special interests while at the same time scaffolding caregivers by providing the level of support they required using the strategies recommended for children’s learning stages. The fourth major contribution was the evaluation of STAK which offered some valuable insights into the field of personalised learning and assistive technologies. Minor contributions included the creation of educational resources to correspond to each of the seven teaching strategies employed in STAK and the building of two content management systems and a discussion board to facilitate the dissemination of up-to-date information on ASDs to caregivers and the sharing of ideas for collaborative work in this field.

8.5 Directions for Future Research

Further research is clearly necessary to provide additional validity to the practice of using a dual-adaptive learning system to provide an individualised education programme for children with ASDs. Most significantly, research is required which can provide more generalizable results using larger groups and more rigorous experimental and statistical models.

Future studies should examine how the profiling tools could be modified to reduce the time involved in creating profiles without decreasing the quality of the assessment, which is based on best practice in the field.

Research should be conducted to see how the personalised system could be enhanced to allow caregivers more control over the selection of strategies and resources if desired.
Research should also be carried out into providing facilities, such as video conferencing or e-courses, to caregivers who require additional assistance but who are unable due to their circumstances to attend face-to-face tutorials.

Research should also investigate how the learning system, and in particular the profiling tool, could have wider applications for children with other learning difficulties and/or behavioural problems both here in Ireland and abroad.

Future research should elucidate the needs of families with a child with autism and evaluate the impact of culturally tailored interventions designed to promote children’s development and the quality of family life overall.

8.6 Summary

Since adaptive learning systems were used to personalise the learning experience for other groups, STAK was designed to bridge the gap in current interventions for children with ASDs by individualising the content according to the special needs of the children involved and the level of support caregivers require.

The current research does not attempt to provide any answers or definitive claims. It merely adds one more piece to the puzzle of remediating social skills with this group of children by providing caregivers with a personalised dual-adaptive learning system to help children to develop the skills they need to become successful socially and reach their full potential.
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University of Michigan Health System available at: http://www.med.umich.edu/yourchild/topics/speech.htm


Appendix I – DSM-5

Diagnostic and Statistical Manual of Mental Disorders (DSM-5)
American Psychiatric Association 2013

Autism Spectrum Disorder

One of the most important changes in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) is to autism spectrum disorder (ASD). The revised diagnosis represents a new, more accurate, and medically and scientifically useful way of diagnosing individuals with autism-related disorders.

Using DSM-IV, patients could be diagnosed with four separate disorders: autistic disorder, Asperger’s disorder, childhood disintegrative disorder, or the catch-all diagnosis of pervasive developmental disorder not otherwise specified. Researchers found that these separate diagnoses were not consistently applied across different clinics and treatment centers. Anyone diagnosed with one of the four pervasive developmental disorders (PDD) from DSM-IV should still meet the criteria for ASD in DSM-5 or another, more accurate DSM-5 diagnosis. While DSM does not outline recommended treatment and services for mental disorders, determining an accurate diagnosis is a first step for a clinician in defining a treatment plan for a patient.

The Neurodevelopmental Work Group, led by Susan Swedo, MD, senior investigator at the National Institute of Mental Health, recommended the DSM-5 criteria for ASD to be a better reflection of the state of knowledge about autism. The Work Group believes a single umbrella disorder will improve the diagnosis of ASD without limiting the sensitivity of the criteria, or substantially changing the number of children being diagnosed.

People with ASD tend to have communication deficits, such as responding inappropriately in conversations, misreading nonverbal interactions, or having difficulty building friendships appropriate to their age. In addition, people with ASD may be overly dependent on routines, highly sensitive to changes in their environment, or intensely focused on inappropriate items. Again, the symptoms of people with ASD will fall on a continuum, with some individuals showing mild symptoms and others having much more severe symptoms. This spectrum will allow clinicians to account for the variations in symptoms and behaviors from person to person.

Under the DSM-5 criteria, individuals with ASD must show symptoms from early childhood, even if those symptoms are not recognized until later. This criteria change encourages earlier diagnosis of ASD but also allows people whose symptoms may not be fully recognized until social demands exceed their capacity to receive the diagnosis. It is an important change from DSM-IV criteria, which was geared toward identifying school-aged children with autism-related disorders, but not as useful in diagnosing younger children.

The DSM-5 criteria were tested in real-life clinical settings as part of DSM-5 field trials, and analysis from that testing indicated that there will be no significant changes in the prevalence of the disorder. More recently, the largest and most up-to-date study, published by Huerta, et al, in the October 2012 issue of American Journal of Psychiatry, provided the most comprehensive assessment of the DSM-5 criteria for ASD based on symptom extraction from previously collected data. The study found that DSM-5 criteria identified 91 percent of children with clinical DSM-IV PDD diagnoses, suggesting that most children with DSM-IV PDD diagnoses will retain their diagnosis of ASD using the new criteria. Several other studies, using various methodologies, have been inconsistent in their findings.

DSM is the manual used by clinicians and researchers to diagnose and classify mental disorders. The American Psychiatric Association (APA) will publish DSM-5 in 2013, culminating a 14-year revision process.

APA is a national medical specialty society whose more than 36,000 physician members specialize in the diagnosis, treatment, prevention and research of mental illnesses, including substance use disorders.
On May 18th, the American Psychiatric Association (APA) released a new version of the Diagnostic and Statistical Manual of Mental Disorders, or DSM. The DSM is the standard reference that healthcare providers use to diagnose mental and behavioral conditions. The new version is referred to as the “DSM-5.”

DSM-5 Diagnostic Criteria

**Social (Pragmatic) Communication Disorder 315.39 (F80.89)**

Diagnostic Criteria
A. Persistent difficulties in the social use of verbal and nonverbal communication as manifested by all of the following:
1. Deficits in using communication for social purposes, such as greeting and sharing information, in a manner that is appropriate for the social context.
2. Impairment of the ability to change communication to match context or the needs of the listener, such as speaking differently in a classroom than on the playground, talking differently to a child than to an adult, and avoiding use of overly formal language.
3. Difficulties following rules for conversation and storytelling, such as taking turns in conversation, rephrasing when misunderstood, and knowing how to use verbal and nonverbal signals to regulate interaction.
4. Difficulties understanding what is not explicitly stated (e.g., making inferences) and nonliteral or ambiguous meanings of language (e.g., idioms, humor, metaphors, multiple meanings that depend on the context for interpretation).
B. The deficits result in functional limitations in effective communication, social participation, social relationships, academic achievement, or occupational performance, individually or in combination.
C. The onset of the symptoms is in the early developmental period (but deficits may not become fully manifest until social communication demands exceed limited capacities).
D. The symptoms are not attributable to another medical or neurological condition or to low abilities in the domains of word structure and grammar, and are not better explained by autism spectrum disorder, intellectual disability (intellectual developmental disorder), global developmental delay, or another mental disorder.

**Autism Spectrum Disorder 299.00 (F84.0)**

Diagnostic Criteria
A. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history (examples are illustrative, not exhaustive, see text):
1. Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.
2. Deficits in nonverbal communicative behaviors used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication.
3. Deficits in developing, maintaining, and understanding relationships, ranging, for example, from difficulties adjusting behavior to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers.

Specify current severity:
Severity is based on social communication impairments and restricted repetitive patterns of behavior.
B. Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history (examples are illustrative, not exhaustive; see text):
1. Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypes, lining up toys or flipping objects, echolalia, idiosyncratic phrases).
2. Insistence on sameness, inflexible adherence to routines, or ritualized patterns or verbal nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat food every day).
3. Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interest).

4. Hyper- or hyporeactivity to sensory input or unusual interests in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).

Specify current severity:

Severity is based on social communication impairments and restricted, repetitive patterns of behavior.

C. Symptoms must be present in the early developmental period (but may not become fully manifest until social demands exceed limited capacities, or may be masked by learned strategies in later life).

D. Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning.

E. These disturbances are not better explained by intellectual disability (intellectual developmental disorder) or global developmental delay. Intellectual disability and autism spectrum disorder frequently co-occur; to make comorbid diagnoses of autism spectrum disorder and intellectual disability, social communication should be below that expected for general developmental level.

Note: Individuals with a well-established DSM-IV diagnosis of autistic disorder, Asperger’s disorder, or pervasive developmental disorder not otherwise specified should be given the diagnosis of autism spectrum disorder. Individuals who have marked deficits in social communication, but whose symptoms do not otherwise meet criteria for autism spectrum disorder, should be evaluated for social (pragmatic) communication disorder.

Severity levels for autism spectrum disorder

Severity level Social communication Restricted, repetitive behaviors

Level 3 "Requiring very substantial support"
Severe deficits in verbal and nonverbal social communication skills cause severe impairments in functioning, very limited initiation of social interactions, and minimal response to social overtures from others. For example, a person with few words of intelligible speech who rarely initiates interaction and, when he or she does, makes unusual approaches to meet needs only and responds to only very direct social approaches.

Inflexibility of behavior, extreme difficulty coping with change, or other restricted/repetitive behaviors markedly interfere with functioning in all spheres. Great distress/difficulty changing focus or action.

Level 2 "Requiring substantial support"
Marked deficits in verbal and nonverbal social communication skills; social impairments apparent even with supports in place; limited initiation of social interactions; and reduced or abnormal responses to social overtures from others. For example, a person who speaks simple sentences, whose interaction is limited to narrow special interests, and how has markedly odd nonverbal communication.

Inflexibility of behavior, difficulty coping with change, or other restricted/repetitive behaviors appear frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts. Distress and/or difficulty changing focus or action.

Level 1 "Requiring support"
Without supports in place, deficits in social communication cause noticeable impairments. Difficulty initiating social interactions, and clear examples of atypical or unsuccessful response to social overtures of others. May appear to have decreased interest in social interactions. For example, a person who is able to speak in full sentences and engages in communication but whose to- and-fro conversation with others fails, and whose attempts to make friends are odd and typically unsuccessful.

Inflexibility of behavior causes significant interference with functioning in one or more contexts. Difficulty switching between activities. Problems of organization and planning hamper independence.

Diagnostic and Statistical Manual of Mental Disorders (DSM-5) © 2013 American Psychiatric Association
Appendix II – VARK Learning Styles

The VARK Categories

The acronym VARK stands for Visual, Aural, Read/write, and Kinaesthetic sensory modalities that are used for learning information.

Fleming and Mills (1992) suggested four categories that seemed to reflect the experiences of the students and teachers. Although there is some overlap between categories, they are defined as follows:

**Visual (V):**
This preference includes the depiction of information in maps, spider diagrams, charts, graphs, flow charts, labelled diagrams, and all the symbolic arrows, circles, hierarchies and other devices, that people use to represent what could have been presented in words. This mode could have been called Graphic (G) as that better explains what it covers. It does NOT include still pictures or photographs of reality, movies, videos or PowerPoint. It does include designs, whitespace, patterns, shapes and the different formats that are used to highlight and convey information. When a teacher moves to the whiteboard and draws a diagram with meaningful symbols for the relationship between different things that will be helpful for those with a Visual preference. It must be more than mere words in boxes otherwise it is helpful to those who have Read/write as their first and main preference.

**Aural / Auditory (A):**
This perceptual mode describes a preference for information that is "heard or spoken." Students (and teachers) with this as their main preference report that they learn best from lectures, group discussion, radio, email, using mobile phones, speaking, web-chat and talking things through. Email is included here because; although it is text and could be included in the Read/write category (below), it is often written in chat-style with abbreviations, colloquial terms, slang and non-formal language. This preference includes talking out loud as well as talking to oneself. Often people with this preference want to sort things out by speaking, rather than sorting out their ideas and then speaking so in they may say again what has already been said or ask an obvious and previously answered question. They have need to say it themselves and learn through saying it - their way.
**Read/write (R):**
This preference is for information displayed as words. Not surprisingly, many teachers and students have a strong preference for this mode. Being able to write well and read widely are attributes sought by employers of graduates. This preference emphasises text-based input and output - reading and writing in all its forms but especially essays, reports and assignments. People who prefer this modality are often addicted to PowerPoint, the Internet, lists, diaries, dictionaries, thesauri, quotations and words, words, words... Note that most PowerPoint presentations and the Internet, GOOGLE and Wikipedeia are essentially suited to those with this preference as there is seldom an auditory channel or a presentation that uses Visual symbols as described above.

**Kinaesthetic (K):**
By definition, this modality refers to the "perceptual preference related to the use of experience and practice (simulated or real)." Although such an experience may invoke other modalities, the key is that people who prefer this mode are connected to reality, "either through concrete personal experiences, examples, practice or simulation" [See Fleming & Mills, 1992, pp. 140-141]. It includes demonstrations, simulations, videos and movies of "real" things, as well as case studies, practice and applications. The key is the reality or concrete nature of the example. If it can be grasped, held, tasted, or felt it is probably to be included here. People with this as a strong preference learn from the experience of doing something and they value their own background of experiences and less so, the experiences of others. It is possible to write or speak Kinaesthetically if the topic is strongly based in reality. An assignment that requires the details of who will do what and when, is suited to those with this preference, as is a case study or a working example of what is intended or proposed.

**VARK A guide to learning styles available at URL:**
## Appendix III - Speech Milestones

### Milestones in Normal Speech Development

<table>
<thead>
<tr>
<th>Age</th>
<th>Language Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>Cries</td>
</tr>
<tr>
<td>2-3 months</td>
<td>Cries differently in different circumstances; coos in response to you</td>
</tr>
<tr>
<td>3-4 months</td>
<td>Babbles randomly</td>
</tr>
<tr>
<td>5-6 months</td>
<td>Babbles rhythmically</td>
</tr>
<tr>
<td>6-11 months</td>
<td>Babbles in imitation of real speech, with expression</td>
</tr>
<tr>
<td>12 months</td>
<td>Says 1-2 words; recognizes name; imitates familiar sounds; understands simple instructions</td>
</tr>
<tr>
<td>18 months</td>
<td>Uses 5-20 words, including names</td>
</tr>
<tr>
<td>1 to 2 years</td>
<td>Says 2-word sentences; vocabulary is growing; waves goodbye; makes “sounds” of familiar animals; uses words (like “more”) to make wants known; understands “no”</td>
</tr>
<tr>
<td>2 to 3 years</td>
<td>Identifies body parts; calls self “me” instead of name; combines nouns and verbs; has a 450 word vocabulary; uses short sentences; matches 3-4 colours, knows big and little; likes to hear same story repeated; forms some plurals</td>
</tr>
<tr>
<td>3 to 4 years</td>
<td>Can tell a story; sentence length of 4-5 words; vocabulary of about 1000 words; knows last name, name of street, several nursery rhymes</td>
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<tr>
<td>4 to 5 years</td>
<td>Sentence length of 4-5 words; uses past tense; vocabulary of about 1500 words; identifies colors, shapes; asks many questions like “why?” and “who?”</td>
</tr>
<tr>
<td>5 to 6 years</td>
<td>Sentence length of 5-6 words; vocabulary of about 2000 words; can tell you what objects are made of; knows spatial relations (like “on top” and “far”); knows address; understands same and different; identifies a penny, nickel and dime; counts ten things; knows right and left hand; uses all types of sentences</td>
</tr>
</tbody>
</table>

Source: University of Michigan Health System available at URL: [http://www.med.umich.edu/](http://www.med.umich.edu/) accessed 03/06/2013
## Appendix IV – Language Comprehension

### Milestones in Normal Language Comprehension

<table>
<thead>
<tr>
<th>Receptive Language</th>
<th>Hearing and Understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between 2 and 3 years</strong></td>
<td>Understands differences in meaning (&quot;go-stop,&quot; &quot;in-on,&quot; &quot;big-little,&quot; &quot;up-down&quot;).</td>
</tr>
<tr>
<td></td>
<td>• Follows two requests (&quot;Get the book and put it on the table&quot;).</td>
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<tr>
<td><strong>Listener Skills</strong></td>
<td><strong>Hearing and Understanding</strong></td>
</tr>
<tr>
<td><strong>Between 3 and 4 years</strong></td>
<td>Hears and understands most of what is said at home and in school.</td>
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<td></td>
<td>• Hears you when you call from another room</td>
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<td></td>
<td>• Hears television or radio at the same loudness level as other family members</td>
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<tr>
<td></td>
<td>• Answers simple &quot;who?&quot;, &quot;what?&quot;, &quot;where?&quot;, and &quot;why?&quot; questions</td>
</tr>
<tr>
<td><strong>Reading Comprehension</strong></td>
<td><strong>Hearing and Understanding</strong></td>
</tr>
<tr>
<td><strong>Between 4 and 5 years</strong></td>
<td>Listens to and enjoys hearing stories for longer periods of time</td>
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<td></td>
<td>• Pays attention to a short story and answers simple questions about them.</td>
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</tbody>
</table>

Appendix V – Teaching Strategies and Learning Outcomes
### Teaching Strategies for Facilitating Development of Communication and Social Skills

<table>
<thead>
<tr>
<th>Interventions for Exceptional Children</th>
<th>Prompting</th>
<th>Rewarding</th>
<th>Reinforcement</th>
<th>Shaping</th>
<th>Pairing</th>
<th>Chaining</th>
<th>Modeling</th>
<th>Observing</th>
<th>Repeat/Rehearse</th>
<th>Interactive play</th>
<th>Turn-taking</th>
<th>Communicative exchange</th>
<th>Visual Cues</th>
<th>Structure</th>
<th>Scaffolding</th>
<th>Feedback</th>
<th>Flexibility</th>
<th>Fading</th>
<th>Motivation</th>
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<tbody>
<tr>
<td>Applied Behaviour Analysis (ABA)</td>
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<tr>
<td>Lovaas Discrete Trial training (ABA)</td>
<td>✓</td>
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<tr>
<td>Response to Intervention (RTI) model (using ABA)</td>
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<td>TEACCH</td>
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<td>Structured Teaching</td>
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202
<table>
<thead>
<tr>
<th>Teaching Strategies for Facilitating Development of Communication and Social Skills</th>
<th>Learning Outcomes related to Teaching Strategies</th>
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### Teaching Strategies for Facilitating Development of Communication and Social Skills

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<td>Peer-Mediated Instruction</td>
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## Appendix VI – Technical Features & ASD Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Visual Aids</th>
<th>Multimedia Devices</th>
<th>Communication Aids</th>
<th>Language Aids</th>
<th>Planning Aids</th>
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<tr>
<td></td>
<td>Graphic images</td>
<td>Animated Images &amp; Characters</td>
<td>Sound files</td>
<td>Video clips</td>
<td>Voice overs</td>
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<tr>
<td>Difficulties with language and communication</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>Difficulties in social relationships and social understanding</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>A lack of flexibility in thinking and behaviour</td>
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<td>✓</td>
<td>✓</td>
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<td>Weak central coherence</td>
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<td>Reading ability</td>
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<td>Short attention span</td>
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Appendix VII – Informed Participant Consent Form

Trinity College Dublin
Informed Consent Form – Participant

Research Background
This research is being conducted by Theresa Doyle in the School of Computer Science and Statistics and forms part of her Ph D. The purpose of this qualitative study is to explore how a dual-adaptive learning system matches child profiles with appropriate educational resources and teaching strategies, while simultaneously providing carers, using those recommended strategies, with support at levels consistent with their own profiles, to enable them to develop social skills in children with ASDs and meet their individual needs.

As a carer you will be asked to comment on the effectiveness of this learning tool and the suitability of the supports and resources it offers.

During the research the learning system will record your prior knowledge of the seven teaching strategies, and children’s skill levels, learning styles, language and comprehension abilities and special interests but no personal details will be stored. The system will keep a track of all the carers’ interactions with the system to monitor the supports and resources downloaded for use. All of this data will be anonymised so it will not be possible to trace any private personal details back to the individuals involved.

There are no anticipated risks to your involvement in this research. It is envisaged that during the project you will not only experience a learning tool which will be helpful to you in your work but also collaborate and share your experience with other carers. Individual results will be aggregated anonymously and research reported on aggregate results.

The documentation of the findings will be published and disclosed to a body of examiners in Trinity College Dublin as well as external examiners. There may be lectures, PhD theses, conference presentations and peer-reviewed journal articles written as a result of this project. Extracts of data may be used in these lectures etc but under no circumstances will identities of carers or children be made known.

Declaration
- I am 18 years or older and am competent to provide consent
- I have read, or had read to me, this consent form. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction and I understand the description of the research that is being provided to me
- I agree that my data is used for scientific purposes and I have no objection that my data is published in scientific publications in a way that does not reveal my identity
- The researcher will not reuse my data for any other purpose than those outlined in the information sheet
- Any observational sessions will be carried out only with my prior consent
- All recordings (ie audio, video and photographs) will not be identifiable
- Either I must obtain written permission from the parents of the children concerned in advance or, in the case that I am the child’s parent, confirm my permission each time I wish to include any photographs or other personalized material to individualize educational resources
- I freely and voluntarily agree to be part of this research study, though without
prejudice to my legal and ethical rights

- I understand that I may refuse to answer any question and that I may withdraw at any time without penalty
- I understand that my participation is fully anonymous and that no personal details about me will be recorded
- If I decide to withdraw from the project, all collected information from my participation will be removed and will not be included in the research documentation
- I may attend a debriefing where I shall be given an opportunity to examine how my contributions to the study have been used and interpreted, and to ensure that my contributions have not been used inaccurately or out of context
- Alternatively, I may email the researcher requesting a copy of the findings and/or the dissertation after the project has been completed
- I understand that if I or anyone in my family has a history of epilepsy then I am proceeding at my own risk
- I shall declare any conflict of interest with this research
- If any illicit activity is reported during this project that the researcher is obliged to report it to the appropriate authorities
- I understand that everyone concerned in this project will treat the data compiled with confidentiality, including examiners who will be marking this dissertation.
- I have received a copy of this agreement

PARTICIPANT’S NAME:_____________________________________________________

PARTICIPANT’S SIGNATURE:_______________________________________________

Date: _____________________________________________________

Statement of researcher’s responsibility: I have explained the nature and purpose of this research investigation, the procedures to be undertaken and any risks that may be involved. I have offered to answer any questions and fully answered such questions. I believe that the participant understands my explanation and has freely given informed consent.

RESEARCHER’S CONTACT DETAILS:________________________________________

RESEARCHER’S SIGNATURE:_______________________________________________

Date:________________________________________________________

The researcher may be contacted by email at doyleth@tcd.ie or by mobile 086-8069515 should you require further information on any aspect of this action research inquiry.
Appendix VIII – Questions to determine Caregiver Support Level

Carer Profile

Questions to determine level of support Caregiver needs using particular teaching strategies

Didactic Instruction

1. When teaching a child a social skill do you break the skill down into small components for ease of understanding?
2. Do you use visual aids to help you to explain the steps in a social skill?
3. Do you ask the child to repeat the sequence of steps in a skill again and again until he/she can perform it without assistance?
4. Do you use ‘prompts’ to encourage children to use a skill in different scenarios?
5. Do you use ‘cues’ to help children to understand when it is appropriate to use a skill?
6. Have you ever used didactic instruction before?
7. Would you feel confident applying this strategy in any context?

Modelling

1. Do you demonstrate the steps in a skill before asking children to carry them out?
2. Do you ask children to observe you when you perform a task?
3. Do you rehearse the sequence of steps in a skill with the children?
4. Do you invite children to act out the steps in front of a camera?
5. Do you include ‘incorrect steps’ in the lesson?
6. Have you ever used modelling before?
7. Would you feel confident applying this strategy in any context?

Role Play

1. Do you act out different scenarios with the children to show them when and how to use a skill?
2. Do you encourage children to practise skills with other children in the classroom/at home?
3. Do you tend to provide scripts (summaries of what to say) to the children for each scenario?
4. Do you ask the children to repeat the scenarios several times to help them learn the skill?
5. Do you use prompting to ensure that the children participate successfully?
6. Have you ever used role play before?
7. Would you feel confident applying this strategy in any context?
Corrective Feedback
1. Do you encourage children by praising them for performing parts of the skill correctly?
2. After reviewing the steps and role-playing the skill do you provide feedback on the children’s performance?
3. Do you provide children with ‘corrective’ feedback ie after each scenario tell them what they could do ‘even better’?
4. Do you rehearse the steps in the skill with the children until no ‘corrective’ feedback is required?
5. Do you only provide positive feedback for unprompted correct responses?
6. Have you ever used feedback before?
7. Would you feel confident applying this strategy in any context?

Positive Reinforcement
1. Do you provide verbal praise when children get things right?
2. Do you provide reinforcement immediately after the successful performance of a skill?
3. Do you allow children to find another activity of their choosing once they have completed a task?
4. Have you ever introduced a ‘token system’ to encourage children to learn skills eg tokens, pennies, or points which they can use to earn a special reward (snack, privilege)?
5. Do you use Social Stories to help children understand what they are to do in social situations?
6. Have you ever used positive reinforcement before?
7. Would you feel confident applying this strategy in any context?

Motivational Game
1. Do you know where to find out what games are popular with the children you are teaching?
2. Have you ever used a quiz, a memory game or a game show format to engage the children?
3. Do you believe that games can prompt children to recall information on skills?
4. Can games help children to interact with their peers?
5. Do you use puzzles and shape sorters to motivate children to communicate?
6. Have you ever used motivational games before?
7. Would you feel confident applying this strategy in any context?

Practice
1. Do you provide easy to gradually more difficult settings so children can test out new skills?
2. Do you encourage children to practise skills with their family and friends?
3. Do you include fun activities to motivate the children to join in social skills practice?
4. Do you find that social skills flow naturally when enough practice has occurred?
5. Have the children enough opportunities to generalise social skills?
6. Do you include practice sessions for the children as part of the daily routine?
7. Do you include:
   a. quizzing the child about the skill steps
   b. modelling and role playing the steps
   c. prompting the child to act out the steps when appropriate
   d. providing a reward for performing the skill
Appendix IX – Questions to determine Child’s Learning Stage

<table>
<thead>
<tr>
<th>LEARNING STAGE</th>
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<tbody>
<tr>
<td>1. Can Child complete task without a great deal of thinking and working out?</td>
</tr>
<tr>
<td>2. Can Child stay focussed on task without becoming distracted?</td>
</tr>
<tr>
<td>3. Can Child complete task without assistance?</td>
</tr>
<tr>
<td>4. Does Child complete task without making frequent mistakes?</td>
</tr>
<tr>
<td>5. Does Child recall the steps of the task without any hesitation?</td>
</tr>
<tr>
<td>6. Does Child carry out tasks with fluency?</td>
</tr>
<tr>
<td>7. Does Child perform tasks consistently?</td>
</tr>
<tr>
<td>8. Does Child complete tasks independently with little thought?</td>
</tr>
<tr>
<td>9. Is Child able to complete multiple tasks at the same time?</td>
</tr>
<tr>
<td>10. Has Child acquired the Skill?</td>
</tr>
<tr>
<td>11. After acquiring skill, does Child need practice to enhance performance?</td>
</tr>
<tr>
<td>12. Can Child adapt skill in different contexts?</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Rubric</th>
<th></th>
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<tbody>
<tr>
<td>Novice</td>
<td>3 yes answers</td>
</tr>
<tr>
<td>Intermediate</td>
<td>6 yes answers</td>
</tr>
<tr>
<td>Advanced</td>
<td>9 yes answers</td>
</tr>
<tr>
<td>Acquired</td>
<td>12 yes answers</td>
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Appendix X – Questions to determine Child’s Language Ability

<table>
<thead>
<tr>
<th>Language Ability</th>
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</thead>
<tbody>
<tr>
<td>1. Can Child say quite complex sentences of 5-6 words?</td>
</tr>
<tr>
<td>2. Can Child give directions, instructions or explanations?</td>
</tr>
<tr>
<td>4. Can Child tell simple stories, sing songs and recite nursery rhymes?</td>
</tr>
<tr>
<td>5. Does Child use modulation ie stress and pitch correctly? eg I want the blue pencil now!</td>
</tr>
<tr>
<td>6. Does Child produce most vowel sounds and some consonant sounds correctly?</td>
</tr>
<tr>
<td>7. Can Child apply rules of grammar? eg plural of boy is boys</td>
</tr>
<tr>
<td>8. Can Child combine words to form acceptable phrases? eg transform the sentence</td>
</tr>
<tr>
<td>Mammy is working to Is Mammy working?</td>
</tr>
<tr>
<td>9. Does Child have a good vocabulary? ie 1500-2000 words</td>
</tr>
<tr>
<td>10. Can Child use four prepositions (eg in, out on and under), pronouns</td>
</tr>
<tr>
<td>(eg I, you, me, mine), adjectives (eg big, little, long, short) and adverbs (eg fast, slow, quietly, gently)?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rubric</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Very Good</td>
<td>9 and 10 yes answers</td>
</tr>
<tr>
<td>Good</td>
<td>7 and 8 yes answers</td>
</tr>
<tr>
<td>Average</td>
<td>5 and 6 yes answers</td>
</tr>
<tr>
<td>Poor</td>
<td>3 and 4 yes answers</td>
</tr>
<tr>
<td>Very Poor</td>
<td>1 and 2 yes answers</td>
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</table>
Appendix XI – Questions to determine Child’s Comprehension Ability

<table>
<thead>
<tr>
<th>COMPREHENSION ABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does Child listen to what is being said and understand everything without difficulty?</td>
</tr>
<tr>
<td>2. Can Child understand and interpret complex instructions?</td>
</tr>
<tr>
<td>3. Can Child listen to the content of questions and respond appropriately?</td>
</tr>
<tr>
<td>4. Can Child listen to a story and then relate the contents of the story in his/her own words?</td>
</tr>
<tr>
<td>5. Does Child understand abstract concepts eg love, freedom, happiness, sadness and hope?</td>
</tr>
<tr>
<td>6. Does Child understand figures of speech eg it is raining cats and dogs?</td>
</tr>
<tr>
<td>7. Does Child use the context to derive the meaning of words eg plane/plain, pair/pear?</td>
</tr>
<tr>
<td>8. Does Child understand that objects can be categorised eg things we eat, things that fly, etc?</td>
</tr>
<tr>
<td>9. Does Child understand functions and features of items? eg when child is asked to put all his toy animals away that the child understands that a pig, dog, cat and tiger are all in the animal class</td>
</tr>
<tr>
<td>10. Does Child understand a good number of words? ie 15,000-20,000?</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Rubric</th>
<th>9 and 10 yes answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good</td>
<td>7 and 8 yes answers</td>
</tr>
<tr>
<td>Good</td>
<td>5 and 6 yes answers</td>
</tr>
<tr>
<td>Average</td>
<td>3 and 4 yes answers</td>
</tr>
<tr>
<td>Poor</td>
<td>1 and 2 yes answers</td>
</tr>
<tr>
<td>Very Poor</td>
<td></td>
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Appendix XII – Reach & Teach Framework

Research Project
I am a PhD student and I am designing a framework to help carers (teachers and parents) teach social interaction skills to children with autistic spectrum disorders (ASDs). I am introducing this framework through a content management system (CMS) which will be available online. Articles, social narratives and activities are provided in the CMS to teach communication, play and emotion-related skills.

These samples can be adapted to suit children’s particular needs using open source software and the library of images, sound files, animated characters and video clips. Training on the software will be provided and follow-up support. I am hoping to commence a case study shortly which will span several months. It is envisaged that your commitment would be approximately seventy hours broken down as follows:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Time in hours (approx)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Framework</td>
<td>This activity provides you with the necessary navigation skills for the CMS and introduces you to a number of different interventions and teaching strategies.</td>
<td>6</td>
</tr>
<tr>
<td>Homework</td>
<td>This shall support the development of new material which will suit the particular needs of children with learning difficulties.</td>
<td>20</td>
</tr>
<tr>
<td>Main Activities</td>
<td>The activities will focus on different ways of teaching social skills using graphics, simple animation and sound files and will incorporate communication, play and emotion related themes. It will display text-based story narratives, word searches, puzzles and games and will provide feedback and collaboration facilities.</td>
<td>40</td>
</tr>
<tr>
<td>Reports</td>
<td>Online questionnaires and a discussion forum provide an opportunity to record the experiences you have had with the resources and how you have created your own material to suit the particular needs of the children in your care.</td>
<td>4</td>
</tr>
</tbody>
</table>

If you are interested in participating in this study, please contact me at doyleth@tcd.ie or on my mobile 086-8069515.
Appendix XIII – Reach & Teach Story Writer

Installation

The installer has three buttons as follows:
1. The first button installs the Reach and Teach storywriter
2. The second button installs the XP Speech Pro – this is only required if the Reach & Teach storywriter is being installed in a Windows XP system
3. The third button installs Microsoft .NET framework 3.5 – this is only required if the Reach & Teach storywriter is being installed in a Windows XP system

Instructions for using Reach & Teach Storywriter

1. Click on the icon on the desktop to open the application
2. The first screen is the login screen
3. Type Admin to create, edit or delete stories
4. Alternatively, type child's name to read stories
5. Click the 'Start' button to begin
6. The application reads the stories to the children
7. The panel controls the volume, rate and voice used for the speech engine
8. One can mute the speech engine if desired
Create a Story

1. This is the screen that greets a teacher, parent or guardian after logging in as ‘Admin’
2. Click on the first button to create a new story
3. Click on the second button to edit or delete a story
4. Use the back button to return to the sign in screen

1. This is the ‘Create Social Story Screen’
2. Enter a child's name here
3. Note that you may enter a single child's name and only that child will have access to the particular story or stories created under his/her name.
4. Alternatively you may enter ‘All’ for a group of children and all of the children using the application will have access to the story/stories under that username
5. Click on the ‘Add image to Story’ button to add images – ten is the maximum number of images that can be added to each story
6. Images can be in the following formats: .jpeg, .png, .gif, or .bmp
7. Click on the ‘Add Audio to Story’ button to add sound files to the story – ten is the maximum number of sound files that can be added to each story
8. Audio files should be saved in .wav format
9. When image or audio files have been added, they are added to the appropriate list
10. To delete an image or audio file from the story, select the file in the list, right-click it and select delete for the dropdown menu that appears
11. Enter a Title to the Story
12. Enter Content to the Story
13. Test the Story when it has been completed
14. Save the Story when adjustments have been made
15. Click on the back button to return to the Activity Screen

Open Story Screen

1. After entering child’s name this screen appears
2. Select a story from the list provided – only stories specifically for this child appears or stories which can be accessed by ‘All’
3. Click ‘Open Story’ to view a particular story
4. Click on back button to return to login screen
Edit Story Screen

1. Select a child's name from the dropdown menu
2. Select a story from the list
3. Click ‘Edit Story’ to edit the selected story
4. A screen will open displaying the selected story
5. Edit the story and save the changes
6. To delete a story select the one to be deleted and click ‘Delete Story’ to delete the selected story
7. Click on the return button to return to the menu
Read Story Screen

1. This is the read story screen
2. Story Title is displayed over the story content
3. The Image Gallery appears to the right hand side of the screen with forward and back buttons
4. The Audio Gallery appears underneath the images – with icons for each audio file
5. Click on back button to return to the selection screen

(The researcher received assistance with the implementation of this story builder from a third party who wishes to remain anonymous.)
Appendix XIV – Validation Study

The researcher conducted semi-structured interviews with five caregivers (ie three teachers, one parent and one key worker) during August 2011. During each interview the researcher used a PowerPoint presentation to demonstrate the PALS that she proposed to build and asked each participant to comment on each aspect of the learning system, assess the application design and outline what they considered to be the essential components of a learning system that would cater for the needs of both caregiver and child with ASD while completing a social skills training programme. A short questionnaire was devised to obtain their views on the design concept and also their opinions on suitable Educational Resources for children with ASDs.

The interviews were recorded, transcribed and analysed by the author. Statements made by the participants during the course of this validation study are included in this Appendix rather than direct transcriptions.
Overview

- Introduction
- STAKMATE
- Registration
- Child’s Profile
- Selection of Required Skill
- Child’s Learning Style & Prior Knowledge
- Teaching Strategies
- Carer Assessment
- Support – Explanation, Example, Review
- Appropriate Educational Resources

STAKMATE

STAKMATE is a personalised adaptive learning system (PALS) to support Carers teaching social skills to children with autistic spectrum disorders (ASDs). Carers select the required skill that they wish to teach. The system will recommend appropriate teaching strategies to use, and offer suitable educational resources based on the child’s learning style and prior knowledge.
Registration

- Carer registers as member of STAKMATE
- Carer enters personal details
- Title, First Name, Surname, Address, Telephone, etc
- Carer may select username and password
- System may assign Unique ID

Login Screen

Carer logs into STAKMATE to create child's profile

Username: ________________
Password: ________________

Forgotten password?
Edit Profile
Required Skills

Select one of the following areas to work on

- Initiating Interaction
- Conversation
- Play
- Reciprocation
- Problem-Solving
- Reading Non-Verbal Cues
- Mind Reading
- Self-Control
- Self-Awareness
- Behaviour Management

Carer Selects Skill Area

- There are ten Skills required for successful social interaction
- Having reviewed a Child’s Profile the Carer selects the skill that this particular child needs to learn
- System indicates strategies that would be appropriate to use when teaching the selected skill at particular learning stages
- Carer is invited to answer questions to assess how confident he/she is using these teaching strategies
- System provides support based on pre-test results – maximum, medium, minimum, none
Create Child’s Profile

- Carer opens Child Profile screen
- Carer creates ‘New Profile’
- Carer enters child’s personal details
  - Firstname, Surname, Address, contact telephone, etc
- Carer enters IEP or Assessment details
- Carer selects Learning Style
- Carer indicates child’s skill knowledge level
  - Edit
  - Submit
  - Create another profile

Prior Knowledge

Initiating Interactions

Please indicate below the level of prior knowledge that this child has of initiating interactions

How would you rate this child’s knowledge of this skill?

Remember that your answer will determine the type of learning content that will be displayed by STAKMATE. The lower the number you select the more basic the educational resources that STAKMATE will provide.
Most children with ASDs are keen to do what is right and to behave in socially appropriate ways, if only they knew what they were. Due to their social-cognitive learning disabilities they are unable to develop social skills or interpret the social nuances around them. If we want them to be successful socially we must teach them the skills that they need to interact with the people they meet. The first of these skills is to initiate interactions.

(Smith, 2003; Smith Myles et al, 2004; Bellini, 2008)
Carer’s Competence using Teaching Strategies

STAKMATE – SOCIAL SKILLS TRAINING FOR AUTISTIC KIDS

Teaching Strategies

Recommended – Initiating Interactions

- Direct Instruction
- Modelling / Role Play
- Feedback
- Positive Reinforcement
- Motivational Game
- Practice
### Direct Instruction

<table>
<thead>
<tr>
<th>Question 1</th>
<th>Have you used Direct Instruction to help children initiate interactions?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 2</td>
<td>Did you break down the skill into a sequence of steps?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Question 3</td>
<td>Did you have to use any prompts?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Question 4</td>
<td>Were the children able to repeat the steps?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Question 5</td>
<td>Did the children remember your instructions later during Role Play?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Question 6</td>
<td>Did you find it easy to integrate Direct Instruction into your lesson plans?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

### Levels of Support for Carers

**STAKMATE – SOCIAL SKILLS TRAINING FOR AUTISTIC KIDS**

- **Recommended Strategy**
- **Explanation**
- **Example**
- **Review**
This is an instructional approach to academic subjects that emphasizes the use of carefully sequenced steps that include demonstration, modelling, guided practice, and independent application (http://www.ldonline.org/glossary).

The teacher explains the steps of a particular skill, often using a poster or a blackboard as a visual aid. This type of structured learning consists of didactic instruction, modelling of skill steps, role-playing skills with feedback and practice (Baker, 2003).

Discrete Trial Instruction (DTI) – a teacher presents an instruction to a child (for example ‘touch your nose’), gives the child a chance to comply, and then rewards a correct response (Weiss & Harris, 2001). A discrete trial consists of four components: a cue, a prompt, behaviour and reinforcement. Discrete trials can be used to teach basic words so that children can later respond to verbal instructions and questions. This method can help to facilitate social interaction (Baker, 2003).

Example – Direct Instruction

- Break communication and social skills down into small steps, and teach these steps with frequent repetition, ‘scaffolding’ more difficult tasks onto previously learnt, simpler tasks (McAfee, 2002).
- The first time you see someone during the day, what do you say?
  - Hi, How are you?
  - When you pass someone in the hallway, what do you say?
  - Hi
  - When someone is leaving for the day, what do you say?
  - Goodbye
  - Follow a sequence of steps in guiding a child towards achieving a particular required skill

Steps to Success – to Greet Someone
1. Smile
2. Use a friendly voice
3. Look at the person
4. Say ‘Hi’ and the person’s name
Review – Direct Instruction

Observe, Measure and Record
Imagine you are a video camera and for about ten minutes observe and write down everything you see that is happening with the student. Pay careful attention to what you can see, hear, smell, touch and taste and write down a description of the scene. Include the following:
- Prompts and/or instructions
- Actions of other children affecting the child you are observing
- What the child is doing
- What happens as a result straight away and afterwards
- Any other relevant events
- Use the form supplied to assist you

STAKMATE
SOCIAL SKILLS TRAINING FOR AUTISTIC KIDS

Display of Educational Resources to Teach Initiating Interaction appropriate for Particular Child
Initiating Interactions – Direct Instruction

- Full Support for Carer - Explanation, Example and Review

Learning Content – Initiating Interactions

- Practice
- Support for Visual Learner with a little Prior Knowledge of Initiating Interactions
**Questionnaire – Preliminary Discussion**

Thank you for agreeing to discuss the design plans for STAKMATE – a personalised adaptive learning system to support carers teaching social skills to children with ASDs. I should be most grateful if you would take a few moments to give me your comments. Please check the appropriate box for each question.

You may omit a response to any question you wish to skip. Many thanks.

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<tr>
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<tbody>
<tr>
<td>Name of Teacher/Parent:</td>
</tr>
</tbody>
</table>

1. Please describe briefly the required skills that you think should be included in this application

2. What support would you like STAKMATE to provide you with?

3. How would you expect STAKMATE to gauge the support you would need?

4. Self-Efficacy is a good guide to the support Carers would require

<table>
<thead>
<tr>
<th>Strongly Agree □</th>
<th>Agree □</th>
<th>Agree Moderately □</th>
<th>Neutral □</th>
<th>Disagree Modestly □</th>
<th>Disagree □</th>
<th>Strongly Disagree □</th>
</tr>
</thead>
</table>

5. Is there a better (more suitable) way to adapt the system to carers’ needs?

6. Educational Resources can be adapted to suit children’s learning styles

<table>
<thead>
<tr>
<th>Strongly Agree □</th>
<th>Agree □</th>
<th>Agree Moderately □</th>
<th>Neutral □</th>
<th>Disagree Modestly □</th>
<th>Disagree □</th>
<th>Strongly Disagree □</th>
</tr>
</thead>
</table>

Please comment
7 What should STAKMATE provide to enable teachers to personalise the learning experience for the child/children

8 STAKMATE would assist me to reach targeted learning outcomes with the child/children

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Agree Moderately</th>
<th>Neutral</th>
<th>Disagree Modestly</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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9 STAKMATE would improve learner satisfaction in online learning

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Agree Moderately</th>
<th>Neutral</th>
<th>Disagree Modestly</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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</table>

10 STAKMATE would give me the tools to motivate children and keep them on task

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Agree Moderately</th>
<th>Neutral</th>
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</tbody>
</table>

Please comment

11 Working with STAKMATE would be beneficial for the child/children I am working with.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Agree Moderately</th>
<th>Neutral</th>
<th>Disagree Modestly</th>
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</tr>
</tbody>
</table>

Please comment

12 Please list and comment on any difficulties you envisage when using STAKMATE

13 Please suggest any modifications that you believe would improve STAKMATE’s effectiveness and efficiency as a teaching tool

14 Any other information you wish to add
FEEDBACK — VALIDATION STUDY

INTERVIEW SUMMARY (1)
(extract rather direct transcription)

Date: Friday 12th August 2011
Venue: Room 0.10 – Westland Square
Present: Secondary Teacher (ST1) & Interviewer (I) (statements in italics)
Demo: STAKMATE Adaptive Learning System

Interviewer (introducing the PowerPoint presentation) These are just my initial thoughts on it [the new learning system]. Again it does not have to be this colour (indicating red template used in slides).

ST1 What is STAKMATE? Is that just the name of the project?
Interviewer That is the name of the project so it is Social Skills Training for Autistic Kids.
ST1 S T A K ...
Interviewer The idea would be that the Carer would register for the system. It will be web-based but to have security. Either the system will give the Carer...
ST1 You are calling it a Carer as opposed to a Teacher so are you talking about non-teachers using this system as well?
Interviewer I would hope that it could be adapted for their use. I would think that teachers would probably be able to use it...I am assuming that the teacher would have a certain level of knowledge and training that the parents may not have so I would have to put in more help, more support.

ST1 But you are talking about parents using this [system]. Is that not too big again? But you are only focussing on teachers anyway at the moment?
Interviewer Yes. They would select the required skill, one of ten. [indicating initiating interaction, conversation, play, reciprocation, problem-solving, reading non-verbal cues, mind reading, self-control, self-awareness and behaviour management on the screen]
They would then put in the learning style of the child. So you'd have this information presumably either through your own assessment or through a psychological report...Going back to the required skill...How does the system adapt to the Carer's needs? ...the system recommends certain strategies...the system then asks you some questions to find out what your level of knowledge of that strategy would be...or you say how confident you would be using this particular strategy...and based on the value [on a scale] you'd get full support, medium support or little support.

ST1 You are talking about the required skill for the student, that the student needs to learn how to say 'hello' and 'goodbye'.
Interviewer Now the teacher needs to be taught how to teach that skill.
ST1 Okay.
Interviewer There are six strategies [Direct Instruction, Modelling/Role Play, Feedback, Positive Reinforcement, Motivational Game and Practice]
ST1 So do you know how to teach them or not...do you know what to do.
Interviewer: They may have used other strategies. These particular six - are you acquainted with them? I will go on a little bit.

ST1: It will probably become clearer as you go on.

Interviewer: This is just an overview. It [the system] is to help support Carers. The system will recommend appropriate teaching strategies.

ST1: Okay. That sounds good.

Interviewer: The registration is very straightforward. Whether one feels that it is better for the system to actually give somebody an ID...

ST1: You are designing the system so it is up to you really.

Interviewer: So for security and everything you know we may have to go with what is best... The login screen would be routine... I am trying to make sure that people realise even though it's web-based that other parents... people can't, unless they are a member, they can't access these resources.

ST1: I would have a problem here - children's personal details on the Internet.

Interviewer: They're not essential... You could choose a nickname, a pseudonym...

ST1: It would have to be. Even dealing with the Department of Education a month ago correcting exam papers I wasn't allowed email the candidate number and the result in the same email because of security and privacy and I know from talking to people in UCD that's not possible.

Interviewer: We don't have to keep that detail. The only thing we do need to know is that this profile is for this given individual because you might have more than one child or other teachers might have two or three so you could have different profiles. You could have a number like an exam number like a child ID. You wouldn't have to keep their actual details. It has to be a unique key. For the purposes of this study one only needs to know their learning style and then how much have they done already with this particular work on this particular skill. Are they novice, intermediate or advanced learners. So that kind of information, okay?

ST1: That should be okay. You are still going to need the parent's permission and you are definitely not going to be able to use the child's name because... the legal ramifications are going to have to be checked and double-checked.

Interviewer: Really what it is - you are creating a profile so it could be Child A, B, C.... this system is not going to have thousands but just to identify them because the idea would be that each interaction that the carer has with the system would be monitored. In other words the initial detail of the progress. You want to know how each child is progressing and how you are progressing as well with the teaching strategies or how effective the teaching strategies are really. The system should be able to [do this] rather than you have to key in all this information it will keep a track of how you use the system so the profile will build up.

ST1: Are you talking about working with the kids online then as well as opposed to taking an idea taking it into the classroom and you know working with photocopies and that type of thing or are you talking about the teacher like reporting after each class as to how it went or what..?

Interviewer: Well yes, maybe not after every single class or maybe every event or anything of significance.

ST1: Like a Reflection Diary?

Interviewer: Yes.
You might log on and get a strategy but like that strategy could take four classes so you wouldn't be on again for two weeks.

Exactly. It is hard to gauge that but just to say that the system could keep a track depending on whether that's a useful thing or not. Presumably for me ...

Yes, you have to be careful because you are getting your data as well.

Yes. Anyway this is the way it would be set up. So the Carer would select a skill but the skill would be appropriate for the particular child. It [the system] would indicate the behavioural strategies and so on...I am envisaging having information behind all of these [icons].

Okay.

So that the teacher would go in and run through them, him or herself first.

I would be very interested in what's behind that [indicating Behaviour Management] Behaviour Management - It is huge.

Yes, it's huge but actually there is a lot of research being done on it so that is good... So I need to explain the sequence ... that one moves from A to B to C you know or one can pick up at any level

If they can initiate interaction you can move on to something on the next...

There is a sort of logic in it. Like there would be hardly any point in teaching problem solving to a child who has very little language.

Yes, they would be at conversation...

Some of these you know like self-control and behaviour management are linked. Mind reading - if they are aware of other people they become aware of themselves so they are linked. So it would be up to the individual teacher there to see what is the proper sequence for this particular situation. I am thinking of using a lot of video clips which are available.

Brilliant.

Particularly on PECS...it is a picture system ... it is an official system for teaching... in other words a child with very little communication skills. They are taught the picture and then to ask if they want an apple they bring the picture to the teacher...

Ah, no. You see this is Primary School level stuff. Secondary School would need secondary school...that would never work in secondary school because no secondary school kid would come up to you with a picture.

This would be teaching little ones...

Small little ones...

I would have to cater for ...the learning styles. I just feel that it is very important for autistic children you know because they tend to be visual learners but yet some are not.

Absolutely. A kid actually in first year and she has to write it down. And you can see her writing it down and you say '[Child's name], listen to me.' and she'll say that, 'There is no point in me listening to you because if I don't write it down and read over it I won't remember it.'

At least she recognizes her problem... this is just to say Prior Knowledge... you would be aware from the documentation that you have just been given on a child...

A teenager...
Interviewer  Yes, a teenager. Again I would imagine that a lot of the initial skills for secondary school... would be covered.

ST1  Yes.

Interviewer  So it would be important to offer all six [strategies] and then the teacher then picks the ones that they need.

ST1  Yes, and you are going to have something behind Positive Reinforcement and something behind Direct Instruction?

Interviewer  Oh gosh, yes and actually examples of how to use it and where to use it...This has all to be built up ...I do not have it ready today now. This would be the type of assessment... Have you used direct instruction? Full Support just means that you are given...an explanation first, a really full explanation of the whole thing - where it's used, how it's used, why it's used...the middle one [icon] would be examples... you'll have already picked visual so the examples will be relating to how to use direct instruction...

ST1  Wow, that is another layer again... for you that's more complicated... for us it's fantastic.

Interviewer  I think there's no point in doing it too general for a teacher... I think it has to be... that would be the whole joy of this.

ST1  But a lot of kids now wouldn't just be visual. They could be 'visual' and 'read and write'. Do you know what I mean? A majority of the kids are not just one. They might be like forty per cent one, sixty per cent the other and they possibly could need the combination of the two to fully learn...

Interviewer  That would be a good idea... to have it that you don't just have them labelled 'visual'. You could have maybe the opportunity to tick a couple of the boxes.

ST1  Yes, it is just more realistic... Most of them would be a mixture.

Interviewer  The literature suggests video clips because you have the visual and then you'd have the story spoken and you'd have the actions going on and then you'd have the people interacting ...I don't know if you'd be happy or if you think teachers would be happier doing a kind of assessment like this or whether just a scale ... just a chance of once off saying, 'Right I am at level 4' or I need full support?

ST1  Well you see, it is up to you in a way as well in that like maybe you could put in 'yes', 'no' or 'unsure' or something like that. 'Yes' and 'No' are probably too black and white but for you designing the system as well like there is only so much you can do because it is a computer system at the end of the day. There is only so much... you are putting more work on yourself as well.

Interviewer  ...I'd like teachers to use it so if I have it too strict... if it's not flexible enough... if it's not going to adapt...

ST1  Well, the more flexible the easier it is for teachers to operate with it. The scale is fine as well. Another thing I'd say is that I wouldn't add just 'yes' or 'no'. You definitely need something in the middle between 'yes' or 'no'... even 'unsure' or 'maybe' or something or, as you said, the numbers one to five or something like that.

Interviewer  Maybe a combination so okay some questions are asked and then the confidence question could be a scale.... and some of these could be on a scale... and then the system could decide that overall I think this person needs full support...

ST1  Okay.
Interviewer  

Behind this [symbol] ...it is a question mark now there will be full support...Do you think that I am going the right way?

ST1  

It is a hundred per cent better than what you had before. It definitely is. I am actually really impressed with the direction. You are in the right direction now. I wasn't sure I'd ever use it. It was too broad...

Interviewer  

I am hoping that I will have a wide enough choice of examples. The examples will be there either video, documents...

ST1  

I love the fact that there are only ten things because it is small enough that you can work with it do you know what I mean. The other thing was just [referring to an earlier project] ... it was overwhelming. This is much much better.

Interviewer  

This is the type of thing. There are several social skills training programmes. There is none online at the moment that I have been able to track. These are tried and tested. This has been on the go since 2005 and it comes well recommended. Direct instruction. She (Coucouvanis) would have this little thing that they would learn off nearly. Then they role play it later on so everything is down to just 'Steps for Success' ...so setting up the scene.

ST1  

They could role play with the teacher?

Interviewer  

Yes, or they could bring this home ...even find different ways of saying 'hi' to the bus driver or somebody they meet in a shop...again breaking everything down to small steps. Behind here [Review] I would have Observe, Measure and Record... Just see how things are going. This is from a national programme to train special needs assistants ...and behind here is an actual form to just fill out so I am going to provide worksheets and forms right the way through..

ST1  

Weather conditions, what has that actually got to do with anything?

Interviewer  

Well, this particular group of people thought that the weather could... and even what they eat and so on could affect their mood and could affect the quality of the learning experience funnily enough.

ST1  

What they eat certainly affects their learning without a doubt. And the weather if they are coming in wet into school...

Interviewer  

I just thought it was a neat form ... has been tried and tested. It works and can be effective in a lot of situations. And then this here is the Autism Treatment Evaluation Check List.

ST1  

Wow.

Interviewer  

And it says here that free scoring is available. It is an official form.

ST1  

I know... It is only me as an end user. All these symbols would just confuse me in that I am really bad at remembering people's names or anything like that so I could see that symbol ten times and I still won't remember what is behind it.

Interviewer  

Ah yes, okay.

ST1  

So from a purely practical point of view if you could have a word or a clue because I'll never remember what that book is for (indicating symbol). I know myself I won't but that's just me.

Interviewer  

No, it is a good point. I was trying to brighten things up.

ST1  

I love the little symbols. They are lovely but I'd need a word or a letter or some type of a clue to tell me what's behind it because as I said I could use it ten times and I'll come back and I still won't remember...And they are only minor design things and it is not anything to do with your project at all.
Interviewer: What I am trying to say to you is that I will find some symbols so that nobody gets lost and that they can always go back to the beginning and they won't have to start entering things again and all that... It will have learning content ... it will actually have it on each particular area. For each one they [the children] will be assessed. So basically it's teaching the strategies or you know confirming the strategies whatever...

ST1: Into in-service support. Absolutely brilliant... I can actually visualise using this and I can see how it could support me and how I could use it very very easily.

Interviewer: What would motivate you to do it?

ST1: And encourage you to stay with it. Because you can find that say with the boards or the online discussion boards [forums] that you might use them once and then you just don't bother... Will you want to come and observe a class or two at some stage? Would that help you?

Interviewer: Well that would be great if I could but then... that depends if you can get permission to do that.

ST1: I have discussed it with my principal .. We would have to get permission from the parent of the student when I have actually picked a student.

Interviewer: I have one or two kids in mind but it's more like what they warned us in UCD was you need a kid that's going to be in attendance. It is all very well picking a kid that is really in need of it but if that kid's only in one day a week you are never going to get anywhere with them.

Interviewer: There are examples online of actual teaching situations. It could be difficult for us... for me to actually devise my own video clips unless I had actors and actresses who were willing to take part in something like that.

ST1: Well yes, that would be a little bit above and beyond...

Interviewer: I suppose what it is really down to is as I asked before do you think that I have put in the things you would need as a teacher in that situation and then the way the system can fully support somebody in that situation.

ST1: Yes, it is an excellent start. Obviously there is nothing behind.. say if you click Conversation now there is nothing behind it at the moment but in that... The idea is absolutely fantastic but I suppose on a practical level one cannot fully comment on it until you actually start using it and as you go along as you said it is much easier to give feedback because while you are in the situation working with the kid you kind of go 'Oh I'd love a worksheet here on this or that and you don't realise you need it until you... get to that point.

Interviewer: What I really need to do is have a plan so that I can pass it on to a developer to do the shell... And then I create all the learning content. And a lot of the learning content that I had in the Content Management System as reinforcers I think they could work. It means that the teacher doesn't have to start working and learning JClic or any other software...

ST1: Or go out on the Internet looking for stuff that can take hours and hours and you still get nowhere any you go around in circles or you end up having to subscribe to different websites or pay and they are only free in the evening time and you cannot get it during the day and this type of stuff... No I think it is an excellent starting point. You know I would actually see myself using that. I would be really interested to try it. You are definitely on the right path. Well done. It is a lot of work I tell you.
Questionnaire – Preliminary Discussion

Thank you for agreeing to discuss the design plans for STAKMATE – a personalised adaptive learning system to support carers teaching social skills to children with ASDs. I should be most grateful if you would take a few moments to give me your comments. Please check the appropriate box for each question.

You may omit a response to any question you wish to skip. Many thanks.

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1. Please describe briefly the required skills that you think should be included in this application

I don’t really understand this question but the skills I would like my students to acquire are those of organization, communication and focus.

2. What support would you like STAKMATE to provide you with?

I would like a system that would support me in what I need for my students. For example if I have a student with ADHD I would like a few strategies on how to support this student and activities to help this student to succeed and reach her potential.

3. How would you expect STAKMATE to gauge the support you would need?

I would like it to offer different levels of support depending on the needs of the student and the teacher’s knowledge of the topic. Maybe by asking a few basic questions to establish the student and teachers needs.

4. Self-Efficacy is a good guide to the support Carers would require

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<th>Strongly Agree □</th>
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5. Is there a better (more suitable) way to adapt the system to carers’ needs?

Maybe clearly laid out strategies to support the students. Most teachers will want to use the system if it will help the students.

6. Educational Resources can be adapted to suit children’s learning styles

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<th>Strongly Agree □</th>
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Please comment

Once the basic resources are in place they can be made harder or easier. They can also be amended to suit students different learning style by adding an image, an audio clip, making text bigger etc.

7. What should STAKMATE provide to enable teachers to personalise the learning experience for the child/children

Clearly defined strategies with more than one working example. Printable/saveable work sheets which the teacher can amend depending on the students ability.
8 STAKMATE would assist me to reach targeted learning outcomes with the child/children

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<th>Strongly Agree</th>
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Please comment
I think it would be great to have a system to hand that could help with specific learning difficulties instead of having to trawl through several books and internet sites looking for materials and strategies.

9 STAKMATE would improve learner satisfaction in online learning

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<th>Strongly Disagree</th>
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Please comment
I am unsure if by the learner you mean the teacher or the student? If it’s the teacher it may just be offering a refresher or clarification on what she already knows. But having it all online in one area and accessible from various locations (home and school) would definitely improve satisfaction in online learning. Students tend to enjoy using the computer for a lot of tasks but it is important to have their learning structured and not just on the PC for the sake of it.

10 STAKMATE would give me the tools to motivate children and keep them on task

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<th>Strongly Agree</th>
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Please comment
I feel it will definitely give me some ideas and resources. If they work then this will increase my belief in the system and give me more confidence in my teaching. However it is hard to comment on this until I have tried it. I would tend to say yes it should give me the tools to motivate students but keeping them on task would come more from the teacher and her ability to adapt the material and present it to the students in a suitable way. However I would expect STAKMATE to give me more confidence and guidance to do this and be successful at it.

11 Working with STAKMATE would be beneficial for the child/children I am working with.

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<th>Strongly Agree</th>
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<th>Strongly Disagree</th>
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Please comment
I have no qualification in special needs and feel I am operating blind with very little clear structured support or guidance from any higher body. I think having a system that will help me firstly understand my students learning problem and then offer me a way to help them would be amazing and very welcome in my teaching practice.

12 Please list and comment on any difficulties you envisage when using STAKMATE

Be gauging the exact level of help I need.

13 Please suggest any modifications that you believe would improve STAKMATE’s effectiveness and efficiency as a teaching tool.

Hard to comment until I start to use it. Maybe more than one working example of a strategy in real life operation.

14 Any other information you wish to add
Date: Tuesday 16th August 2011
Venue: Room 1.5 – Westland Square
Present: Primary Teacher (PT1) & Interviewer (I) (statements in italics)

PT1 Is it a public...a forum type system then? Would you be talking to other people? I am just thinking of a user ID. Are you going to be identified or talking to other people?

Interviewer *I'm going to add a forum...at the moment I have just a separate ID for that.*

PT1 I don't know but I suspect that a forum probably is not hugely useful unless you have a huge user base because people don't use forums that much or only a small percentage of people I think who are using some class of online system would actually go to a forum about it. I don't know if you are I'm sure into the Support Teachers' Forum are you? There is a forum run by INTO which is for support teachers and it might be useful to link to that. I will get you a URL if you want. I'll write it on this. It's a support teachers' mailing list more than forum. You will have a lot of questions on this but autism is something that would come up a lot obviously because learning support and resource teachers would be dealing with it a lot. It is more a mailing list than a forum but people would exchange emails a lot and exchange information by it so it might be something to put a link to on this [system].

Interviewer *Brilliant. The other thing is that obviously if people have any problems with anything they can email me and there will be an FAQ section as well.*

PT1 Right. Great.

Interviewer *Just it is a point because I don't see...there probably will be only 24 people.*

PT1 It's probably not enough to have anything active as a forum really.

Interviewer *Even just to encourage people if they see a book or something...a Carer could have more than one child ... there would be a chance to set up separate profiles for all the children but I don't need information on those children because I think it may be a problem...I think it is more like Child A...once you know as a teacher who is Child A...so you could keep a note, a separate note yourself but it doesn't have to go onto the system.*

PT1 I think it would be better not to have too many personal details on a system like that. I mean an IEP would have child details and their address and telephone number and all that kind of thing. It tends not to be online and if it was put online then other people might possibly or potentially have access to it then it is probably better not.

Interviewer *The only things that you would need to put in would be their learning style.*

PT1 Fine yes.

Interviewer *If you are aware of it and then they may have a mixed...they could be visual...I think the system is going to have to adapt to that instead of having straight forward visual, aural, etc.*

PT1 Absolutely yes. It is hard to decide that at the age group I teach because they still haven't evolved a learning style. At five years old they are mostly starting to learn and most of their learning is physical anyway at that point. So
you would be inclined to put kinaesthetic for nearly every infant really because that's how they should be learning and that is how they would learn more than anything. So until they're maybe a little bit older you are not going to have that. I would certainly be dealing with two children with autism who'd be five or six years old and I would find it very hard to pin a learning style on them at this stage 'cause they shouldn't have one. They won't have evolved into one really.

Interviewer  The reason I am bringing it up is that the learning content...

PT1  Will be more steered towards it I suppose?

Interviewer  I will develop learning content which would help you to teach whatever style.

PT1  Great. That is brilliant.

Interviewer  That obviously is not going to be here today. The other thing is. Say if they come to you and they might already have done a little bit on conversation. It's [the system is] going in a logical sequence. So initiating interaction and conversation. So they have got to the conversation stage but they are not quite perfect but they have covered the first one and conversation being the second one then they're half way through so you could put down that they are an intermediate learner or an advanced learner or whatever so the content then that's offered to you will change and also their language if it's a five year old it's going to be a different language...

PT1  Great.

Interviewer  And anything like that that you think...There are ten skills... Again the one thing that I didn't mention there is that the Carer is invited to assess how confident he or she is.

PT1  Right.

Interviewer  Now how to gauge their confidence level. So in other words depending on their confidence in using that particular teaching strategy the system will give them either full support...

PT1  Okay. Right.

Interviewer  Or lesser degrees of support and so on...so again this is the type of thing...there are ten skills. They pick one. Behind each one there'll be an explanation...Tutoring variation then so the next question would be whether they are visual, aural or so on.

PT1  Okay.

Interviewer  And behind each of these like say the visual it will have an explanation of the type of things that could be useful ...and again the child's prior knowledge of initiating the skill.

PT1  Okay.

Interviewer  So the type of thing would be: ‘how would you rate the child's knowledge?’ so you decide what rate say 7 or whatever it is. The system will be monitoring your interactions, keeping a record so building up Child A, say his or her learning style, and so on. Later on you can go back and see depending on what skills you have worked on with the child - that will all be recorded.

PT1  Very good.

Interviewer  Okay. So Direct Instruction....so these are the six [teaching strategies]. Initially [Teacher's Name] I thought that it would be a case of maybe saying, ‘Okay, to teach initiating interaction you might decide to use Modelling,
Reinforcement and Practice.’ But reading a little bit more I felt that for each of
the skills you could probably use these in different ways - all six strategies.

PT1
Yes, sure.

Interviewer
So there are six offered. So you'd probably no matter what it is - if you
were talking about conversation you'd start off giving them direct instruction, a
little conversation or little things to remember and then you would go on to the
modelling.

PT1
That is right.

Interviewer
So now I think that the system should offer all six depending on which
skill you decided to teach...The assessment. At the moment the assessment just
asks six questions and it tells you there that you will get support depending on
the amount of correct answers. I don't know how you feel - if that's too strict -
yes/no? Or do you think it should be scales?

PT1
It depends on what you are going to be offering. I think that's quite
reasonable. I think yes/nos are probably easier to deal with.

Interviewer
Maybe I should have a 'maybe' or an 'unsure' or what do you think?

PT1
Perhaps or unsure. Those questions are very direct questions and you
should be able to answer 'yes' or 'no' to them if you are teaching I would have
thought. They are very direct questions and they are very specific questions.
The child either remembered or didn't remember my instructions. It was either
easy for me to do it or it wasn't easy or it was hard for me to do it - one or the
other. There shouldn't be an 'I don't know was it easy or hard.' I know it was
easy or it wasn't easy. I don't think there's any need to go into anything more
subtle than that for those questions...

Interviewer
Then I'll try and find appropriate questions to ask for each [strategy]. That's
direct instruction as you see. For Positive Reinforcement there would be
specific questions that one could ask so that the system is kind of detecting -
they are saying yes here but that is possibly not the right answer to give so that
the system will decide, based on the answers to these questions, what level of
support.

PT1
Alright.

Interviewer
On top of that I could ask on a scale - I am working on something similar
lines to a home tutoring package that was designed...They ask: "On a scale of
one to seven, are you confident X in using this?" I think really the questions
would probably be a bit of a help. It is more to prompt people rather than to say
am I a four or a five?

PT1
It is hard to say that and different people will always say....

Interviewer
Then the level of support - explanation, example and review for each of
the...strategies. At every point somebody could go back. Say they decided
initially that the support they were given was minimal support but then they get
down to a point where they are teaching and they say: God, I am lost here how
do I go back? How do I get full support? All they have to do is click on the
question mark and the system will offer them a dropdown.

PT1
Very good.

Interviewer
So you have full support or whatever you need at any point in the system.

PT1
Cool.
Interviewer: This is an example. The learning content will be based on social skills training programmes that are already in existence. There are none of them online. I am trying to put them online with their permission and acknowledge them and so on. This particular programme is very neat I think because it is Steps to Success because as you know with autistic children they don't like to fail.

PT1: No, exactly.

Interviewer: And if you teach them something that they can remember. Okay when you meet somebody smile so they have usually it's like four little steps like that...

PT1: Great.

Interviewer: Just to teach them ...I thought that would be a start with the direct instruction.

PT1: Absolutely.

Interviewer: Then the Review. I am calling it a review - it can be kind of a reflection. It can be...It can be practice. Breaking each skill down into small steps ...It's more tips 'n tricks...just to say that this is evolving so whatever suggestions you have, what would work there, what you need to see there, what you would like to see there...again...I was thinking of having these guys everywhere [indicating the icons on the screen] behind this - I could use different symbols but people would know that they would get an explanation - click there anywhere - throughout the system and if they went here they would get an example and then the review here. Behind here there would be something like this say a file or it could be a video or could be something to help you understand a little bit about direct instruction. I mean direct instruction is an easy one because...even though people mightn't call it direct instruction...

PT1: That's what they do...they tend to...

Interviewer: Then this one might have something else a little bit more advanced so just to have a sequence like that so that introducing yourself and so on and role play and how it helps and how to use role play for initiating interaction and then you would have role play for teaching conversation, role play for ...right the way through. Then behind here we would have something on how to keep a track. I am using a lot of the ABA strategies and they tend to monitor - to 'observe, monitor and record' is their slogan. And here is a type of programme or form that one could adapt. Again the importance of even the weather conditions. If it's hot and sticky it can affect the child and the learning experience.

PT1: Right.

Interviewer: And the food they've taken in and their fluid intake and to make teachers aware.

PT1: That these are having an affect…

Interviewer: And say if a child is not responding today, they might have been brilliant last week. Well there could be something in the environment and it's not that they are not progressing. I always like myself to have a form to have some idea ...Behind every example - this is just the learning content... there would be an explanation of how to use it.

PT1: Very good. Great.

Interviewer: PECs in particular I have a good few videos on that.

PT1: Great.

Interviewer: Behind here you would get your observe [form]. Behind here you would get some file - again that's a similar one. Then this one here - there is an online
assessment from the Autism Research Institute. I will probably adapt it... I think I will have to adapt it. The nice thing about it is there is free scoring of this. It is an official form.

PT1
Good.

Interviewer
It is something that say over the six months - you wouldn't do it every class but say at the beginning when you have sat down and before you have started working with the system with the child you would just circle a few of these...[on the form]

PT1
That sounds great.

Interviewer
And then you could go to the online [version] and check it out but really I think it is the sociability section here that might be appropriate that seems to me could be useful. But there are other assessment records like that to help you...

PT1
Could you give me...I have a new child coming in and he is older than usual in the school. I don't know what his background is but I would love to be able to do that with him early when I start in September.

Interviewer
I have a few other examples as well..

PT1
I'd love to be able to have from the scratch from my first meetings with him to be able to make a profile from that and then I'll work on the IEP and things like that later anyway. It would be great if I could start with this.

Interviewer
Also it would be useful for me to know if this is working.

PT1
Exactly...is it working? How it worked. Absolutely. That's why I am thinking. I mean the other guy I am working with I've had for the last year. He is a little boy. He is only five and so it is a different dynamic probably. This child - I don't know what age he is...but it would be nice for me just to be able to assess him.

Interviewer
Basically just to say then you move on. You can decide though of the six you can say I'd like to use modelling and role play or...and then you are assessed on that so the process is that you are assessed on your confidence level...or not on your confidence so much as your familiarity with a particular teaching strategy and then how that teaching strategy you may be familiar with it but you may not call it what I am calling it.

PT1
What you are calling it there…

Interviewer
But then when you are asked a few questions you realise Ah yeah, sure I have done that before and...you basically have to tell the system that this particular child I am working with has this style and knows a little bit about this or doesn't know anything at all about this and so I am starting from scratch here.

PT1
Right. Right exactly.

Interviewer
And then the system responds to those inputs.

PT1
Sounds good. Great.

Interviewer
So do you think?

PT1
It sounds great. It is a massive amount of work you've done since the last time we saw. [referring to the framework prototype in January 2011]

Interviewer
Do you think so?

PT1
Yes, huge. Massive and it sounds very much more user-friendly than it did before. Hugely.

Interviewer
Well, that's thanks to yourself and X.
You were probably devastated that day.

No, it just shows how far removed because I was looking at so much literature and everything else.

That you become academised…

And the practical…

And now I am still dealing with the Carer and the Teacher – the prominent person here but yet the Teacher has so much contact with the student...that lessons really are revolving around the needs of the student so the system has to adapt to the two...

And also the situation that the Carer is in is a very different one from a Teacher because the Carer has all day or as long as they are with the child. They might have several hours at a time whereas the teacher may have half an hour to maximum an hour a day with a child and probably not. I have an hour a day for the autistic kids. That is what they are allocated. I would spend maybe half of it on a one-to-one and the other half in the classroom with them or working with a group so in terms of teaching specific skills like this particularly social skills you are more likely to be doing that during half an hour rather than during a longer period. The longer periods you are going to be trying to get them to maybe engage in some work in the class or do things maybe sitting beside them trying to help prompt to use materials, to colour or do whatever it is you know.

So this is the other thing. Instead of asking you or the other teachers to learn JClic or learn how to adapt I am trying this time to give you something that actually get straight away...

Can use straight away...that would make a big difference.

...there will be certain things that you can open up on the screen...everything will be downloadable anyway...I am just wondering...there will be certain things that you will like to take with you - it could be a photocopy or something...do you need activities that are actually all online or do you need things that you can take to the classroom?

In my space with the kids I tend to use the computer a lot because I find that autistic children relate every easily to the computer because it's straightforward for them because there isn't an emotional attachment so it is easy for them to work with and to work with certain games on the computer and there are certain things they love to do on a computer. So I work with the computer online a lot with the children when I am in my room but when I go to the classroom I don't really need...when I am in the classroom I tend....I work on the fly a lot of the time with what the teacher is doing so I don't come to the classroom armed with anything really other than myself and a pencil usually. I will come into the classroom and I will sit with or near the child and observe or intervene or whatever depending on what activity is going on....

...So it is situational teaching...

And it is much more fluid...I mean the little guy I teach flies into rages a lot and kicks and spits and bites and runs away and I have bought a tent for the classroom. One of those things that you shake out and suddenly it is rigged up you know.
Interviewer: *Really?*

PT1: And it's a space that he likes to go into for 'quiet time' and it just gives him a cocoon that's his you know.

Interviewer: *That's an excellent idea.*

PT1: Well I felt that he was getting too much stimulation at times. You know an infant classroom is festooned with things. There are far too many things in it as far as I am concerned.

Interviewer: *And the noise and the whole thing wouldn't help...*

PT1: The tent isn't free from noise but it's quiet. There is nothing inside it. There is a green interior. There is nothing inside ...there are cushions on the floor and that's it. So the rule is that you go in there and you take a book....so he'll go in there with a book and he may or may not be reading the book but it's quiet, it's his time and it's nobody's else's; and the other kids think it is really cool so they get a chance but you are not allowed to have more than three people in the tent at a time so there is not too much jostling so it's big enough for that.

Interviewer: *It's great to defuse the situation.*

PT1: It's fantastic.

Interviewer: *The stress ...his stress levels...*

PT1: Yes, absolutely. It calms him a lot and it's just as I say it's a nice calm quiet space that he can be into and so a lot of the time I will be sitting outside the tent talking to him or I will be sitting on the other side...there is a small part of the tent made of net you know and I'll be sitting at that and just talking through the wall of the tent to him and say okay so maybe calming maybe talking about what is going on in the classroom and just ignoring the fact that we are actually separated by a tent. You know just pretending as if we are in the thing and just carrying on.

Interviewer: *It's an excellent idea.*

PT1: It works nicely. It is actually great. It's been brilliant. I got it for a tenner up in Asda. It's in the shape of a dinosaur mouth that you go through so it is specifically for kids but I thought that this would be so cool for him...So the tent is just fantastic as an instant defuser of ...and instant removal of all the stimuli...

Interviewer: *And yet it's not a punishment really...you know this 'time out' putting them in a corner...*

PT1: No it's an amazing treat and the only trouble is keeping them out of it at times or keeping the other kids out of it as well. If they see him going in it's like 'We went to get in there too!' It's not a punishment at all.

Interviewer: *Oh, excellent. It's a special place.*

PT1: Absolutely. Oh, it's a special place and it's a very cool special place you know. I don't know how long it will last for though.

Interviewer: *It is an amazing idea that. Do you mind if I borrow that?*

PT1: Oh take it, take it...I had been looking at things about stimulation...I have a really big thing about not putting things on walls. Primary school teachers are obsessed with backing paper they call it which is bright-coloured paper around which goes a border of maybe a pattern of ABC's or little hands or ...there is a pattern on it anyway and it is right around this backing paper and so you stick
things on it so the kid's paintings, ABCs, I23s or posters and for me that is way too much. I was reading into it a little bit last year about stimulation and about how children sometimes are over-stimulated. Of course, I am reading the stuff I want to read. I'm sure I could find something else that says that they need as much visual stimulation as they can get. But my reading was that they don't need this and they actually learn better in a less hyper environment.

Interviewer: *I think you are right because... one of the videos... they actually start in a supermarket with everything coming at them. For anyone else it would have been a calm supermarket but for the child.*

PT1: Yes, they are trying to read it all...

Interviewer: *And the noise... the whole thing was amplified so much... and then they were saying how they used things to help calm people down.*

PT1: The other thing I do is use headphones or headset in the classroom a lot.

Interviewer: *Right?*

PT1: Again to block out the noise. And it isn't that he is necessarily listening to anything on it but I put a headset on a child if he wants it. I would never do it no purpose... I will say "Do you want quiet?" and he'll put them on and we'll work away that way. And it's just a good set of earphones that block out a lot of the noise.

Interviewer: *Because again it is hard for them to concentrate on what you are saying when all these things both visual and aural... everything is coming at them. It is hard for us to understand...*

PT1: It's an overload. Absolutely. No I understand it completely. It's way too much info and I think anything at all that will calm it at all so the tent and the headset would be my two things that I discovered last year anyway. I don't know about anything else.

Interviewer: *And like I say it [the system] is going to evolve. With Action Research it means that you are going to be more part of this whole process...*

PT1: Cool. That's great.

Interviewer: *It's a case for you as well... I know it's very hard work... Don't get me wrong... I*

PT1: It's a journey of discovery as well because for me it's a huge discovery because I never taught learning support before this last year. I was a teacher in a school for seven years only. I was a film maker for twenty years and then I became a teacher and so I taught for seven years in a regular classroom. Now I had worked as a volunteer with children with severe physical and some mental disabilities in the Central Remedial Clinic but teaching them swimming for ten years so I had been used to working with children in a different kind of way and each child there would have needed their own individual ways

Interviewer: *So you would be conscious of...*

PT1: So you would know that X needs to be held this way. I need to swim underneath that child or I need to swim alongside this one and this guy just wants his toes in the water and nothing else or he is going to freak out so you get to know that there are different ways for each kid which makes them happy. This year learning support was the first time to do it and I had no training officially in it at all...

Interviewer: *And yet you had brilliant training because you could adapt what you
learned in those ten years...

PT1

Exactly.

Interviewer  *I mean teaching anyone swimming is a difficult thing to do...*

PT1

It is and doing it with kids who are physically disabled is a challenge.

Interviewer  *...you don't have to go in this sequence but some of these are so related...*

PT1

That you would be switching back and forth more than likely.

Interviewer  *...the Social Stories have been used by Bellini and others as both to help somebody acquire a skill so you could use it for direct instruction or you could use it as a reinforcer or just in different ways so some of the little JClic stories I'll adapt for this.*

PT1

Great.

Interviewer  *It [the system] will be web-based but at the same time I want to ensure that anything that can be opened up ...I want it to be accessible to everyone.*

PT1

It would be great if it was available across the board. What I have been doing in the school lately is I have been trying to get ...old computers from other places and load them up with UBUNTU with a Linux system so I have done that with one so far as it is the only one I have managed to get. UBUNTU does not need the same amount of memory or anything like that as say a Windows or Mac platform...and it runs Open Office basically. Basically you can go on the Internet and you can have Open Office and you can download - I mean there's a lot of programs - UBUNTU has fantastic learning programs, basic kinds of things but for kids it's amazing educational stuff in it. Look out for ...it's Linux really but UBUNTU is the educational...Open Office does everything that most people would want in things like Word, Excel and PowerPoint. It has 98% of the functionality of the Windows software and most of us only use about 10% of it.

Interviewer  *It is probably more straightforward.*

PT1

And there's a kid's version of it that I love.

Interviewer  *Oh right.*

PT1

I download that as well for the kids.

Interviewer  *I think it is more important at this stage to give people things that they can actually immediately use.*

PT1

Absolutely and most people are using a Mac or a PC. Actually to be honest most documents - if there's anything written PowerPoint, Word or any of those the Open Office will open it anyway so it doesn't need to be written for that.

Interviewer  *Now well the other thing is I have been putting in pdfs...*

PT1

Oh, that's great.

Interviewer  *Now that means though that people can't tweak it.*

PT1

Tweak it yes. It's very hard to.

Interviewer  *So it would be a good idea to have the options...say have the doc files...*

PT1

I think that it is much easier...it's funny I had a pdf file the other day and I was sure I had a converter somewhere and I couldn't find it and I was online for ages and I downloaded three different converters none of which would do what I wanted them to do and then I gave up in the end because it was easier not to bother with it. So I think that a lot of people aren't going to try and download a converter for a pdf file if they want to do something different.
Interviewer: And yet I would like to think that this system would give them material that would be flexible.

PT1: So that they could use it themselves.

Interviewer: So then do you think this is a good way of adapting a system based on the skills so much as on the strategies that the teacher knows or doesn’t know and then the learning styles for the child?

PT1: Yes I do yes. Yes it makes sense to me totally. It really does sound great. It sounds like a very useful way of going about that.

Interviewer: And then the logic would be the prior knowledge of the child. Now the other system was based on their emotional state and I just thought that for an autistic child and for a teacher trying to ...it wasn't really...

PT1: And it would be fluctuating as well. You could have one emotional state one minute and then two minutes later it could be totally different.

Interviewer: And also the children that the other teachers were working with - it was a home situation and so the child were asked 'Are you angry today?' 'Are you sad today?' and I just don't think that's appropriate.

PT1: No it's not and it's very hard to do in school. Certainly with my five year old star he would have twenty-five emotions in the space of fifteen minutes. We could go from pure rage and murderous to I love you sit on your knee kind of a thing in the space of a second and can be changed and fluctuate like nobody's business and certainly I would never ask him was he angry because it probably would keep him angry a bit longer. ‘Yes I should be angry. Amn't I?’ ‘Yes I am angry now.’ I would never ask. I might say you are not having a good day today or something like that and he'd talk to me about it but I would never say 'Are you feeling angry?' or 'Are you feeling sad?' unless something big had happened...

Interviewer: The other thing was that the material was based on trying to ensure that the children got to a happy state and every learning experience was meant to be happy and that's okay for your typical child and difficult enough I think.

PT1: Using it is the thing. To me it looks great at the moment and I am looking forward to trying it out. I really am but it's using it will give me a proper feel and I will be able to come back to you with any proper kind of feedback and say well look this will work or this doesn't...

Interviewer: So again I am saying that the learning content will suit the child’s learning style and whether they are novice, intermediate or advanced in the skill...Have you any suggestions?

PT1: Not at the minute. Now I think you are really on the right track compared to the last time I think it is amazingly more on the right track and there is nothing that is jumping out at me at the moment.

Interviewer: I have actually got a developer to build what I call 'the shell' ... the links and so on. And I'll will be supplying the content...it has to have a certain level of sophistication.

PT1: It does really because people are used to that when they are on the Net so it needs to have that probably in order to get people to use it.
INTERVIEW SUMMARY (3)
(extract rather direct transcription)

Date: Tuesday 16th August 2011
Venue: Room 1.5 – Westland Square
Present: Secondary Teacher (ST2) & Interviewer (I) (statements in italics)

Interviewer demonstrates the personalised system for Carers to support them while they are teaching autistic children and the specific area would be social skills.

Interviewer The system will offer suitable educational resources and the educational resources will be varied and ...appropriate for the child's learning style but also their knowledge and also their age. I know age shouldn't come into it but the text really for a five year old is going to vary from that for a twelve or fifteen year old or whatever. The registration is straightforward and again you are not compelled to put in all your personal details.

ST2 Okay.

Interviewer Something that you would recognise yourself whether it's a nickname. Then the same for a username and password or the system could ...create a username and password... This is the type of login screen...

ST2 Your usual login...

Interviewer Yes, your usual login. Then the Carer opens the Child Profile. Now this might be the trickiest part because these type of details may not be appropriate...to put in personal details? For legal reasons would you have a problem with that? Or do you think that the parents would have a problem with that?

ST2 I think that they'd be okay with it once they know that it's only certain people who can see it then and once it's not going to be used for anything other than helping their child I think it should be okay.

Interviewer I don't need to know and all the system needs to know really is that person's learning style and if they have any knowledge already of one of the skills. The Carer is invited to assess how confident he or she is [using teaching strategies]? Is the way I am using appropriate?

ST2 Identifying what level it's at...

Interviewer Yes, it's just a prompt really.

ST2 Because if someone said they were kind of I don't know between a 4 and a 5 or a 6 - it's sometimes hard to say.

The Interviewer plays one of the videos provided which explains how autistic children have to cope with a chaotic world as visual learners and suggests breakings down skills into small manageable chunks.

ST2 You can still see how you could apply it to other areas.
Interviewer  
Motivation - the particular rewards that would be suitable for the children you are working with. People are telling me that it's very hard to say that somebody is definitely visual. They could be a mix so I will have to have it that instead of ticking visual that it could be a combination...Do you think learning styles is a good way to adapt? Is there a better way if you were building a system yourself would that be something that you would think of - to have the content personalised according to learning style.

ST2  
I think so. I think when you are teaching a whole class it is very hard to meet everyone's needs so usually you are trying to put in a little bit of everything...I think when you are aware of some people who are more visual learners well then you can give them a different type of worksheet with more pictures as opposed to words...

Interviewer  
I would be thinking as well that hopefully the autistic children would have an assessment done, a psychologist would have done an assessment or somebody somewhere along in a previous class would be able to give you a head's up - well I think X learned better through images, animation or whatever. I think it's too straightforward to have a label 'visual' so I think as you say having a variety or offering the teacher a variety so that the teacher can work out ...

ST2  
At the end of the day as well you want them to be integrated into the classroom and I don't think you can always separate them and say well you are working on this part and I'll give something different to all the other students. Maybe leaning towards one but using other items as well.

Interviewer  
Prior Knowledge - I am saying here how would you rate the child's knowledge of this skill...The very first time that the child is coming into your class it is going to be a hard one to know without some report coming with them...the system needs to know whether this child has no knowledge of the skill, whether you are working from the bottom or whether they have a little bit or whatever...then there are six strategies that are recommended...Initially when I was thinking about this system I was saying let's say it was initiating interaction, modelling and role play, positive reinforcement and practice would three good strategies to use again based on the literature and everything but as I read more and as I thought about it myself I am coming around to the idea that any one of those skills you could use these six strategies to a greater or lesser degree. Say for example Conversation you would give them a little bit of the basics directly, then you would go on to modelling that then getting them to imitate you and then getting them to actually role play a little situation whether it is just one-to-one or whether it is as homework to go home and start or even say 'hi' to the bus driver trying to get them to generalise the skill and then the feedback...You would find out how it's working ...if they were actually using it and so on. Positive Reinforcement - I was thinking of using Social Stories there depending again on what skill ...Social Stories could be used as well to help them acquire the skill but also as reinforcement. Motivational Games for any of the skills...just to keep them interested and then practice for all of them so I am thinking then of maybe offering the six for the different skills...relate how they should be used say to teach play, reciprocation or whatever and then up to you the Teacher or Carer to decide which they like using or which...
ST2  Works best.
Interviewer  Works best for the particular child. Assessment for Direct Instruction – I would create questions that would be appropriate for the different skills.
ST2  Okay.
Interviewer  What do you think of that as opposed to a scale saying 'Are you confident in using Direct Instruction?'
ST2  No, I think that's a lot better for some direction as well.
Interviewer  Yes or No. What do you think? Is that a bit too strict?
ST2  No, I would prefer...from my point of view I would prefer to have it structured like that and having direct focus.
Interviewer  Should I say 'Yes', 'No', 'Unsure'?
ST2  I suppose, for that one, 'Did your children remember your instructions for later during role play?' A lot of them really do seem to be either 'Yes' or 'No'. There isn't...to be unsure about it because either they did nor they didn't.
Interviewer  Also for building the system it is easier to have 'Yes' or 'No'.
ST2  I know...I think it does force the Carer to make the decision...they might just keep ticking 'Unsure' then because they don't want to put a definite answer on it then you know.
Interviewer  I am saying here that your answers will help to determine your level of support...the system initially will probably be set or default to having full support anyway.
ST2  and work from that ...That they can make headway…
Interviewer  Over the six months or so that they will be very confident in using these strategies anyway for any of these skills.
ST2  Because I don't think they are going to feel that they have that pressure then Oh no I ticked 'No' there and now I am after realising it should be 'Yes' a week later and go 'Oh no, I have totally ruined this child!' using the wrong support or level.
Interviewer  Introducing the idea of having learning content (support files or educational resources) behind icons throughout the system. Explanation, example and review for support in Word or pdf format. I am thinking that some of the material you will download, photocopy or whatever and have in the classroom...it would be hard to actually put it up on the screen or whatever. It would tend to be for your use in whatever way...
ST2  You don't want the whole class seeing...
Interviewer  Behind this icon you would 'Observe, monitor and record' - imagine you are a video camera and then you have a form and this idea taking into account the weather and how many present and all the rest but also what food has been eaten, what fluids. It mightn't have occurred to the teacher that these are important because it may seem as if the child has made very little progress but in actual fact may be it was the day that was in it and what was happening what other things what distractions were in the room.
ST2  Noises going on...
Interviewer  This is a recognised assessment ATEC...it covers speech, language and sociability...I may adapt this form but for the moment I am leaving it like this because there is actually ...there is a free scoring online which could be very useful ...At the start you could maybe use this form and see how the child is and
then maybe after a few lessons when there is a significant change...or you could decide once a month I will go back I'll do this and see if the scoring has changed and if the child has improved ...Is this the kind of thing that would help you, do you think?

ST2 I think it is good. There is so much information out there on the Internet and you could spend ages looking for something and to have it there at your finger-tips and just be able to click on it I think is brilliant because you could spend so much time and teachers don't have that amount of time you know to be working on outside the class for just one child as well ...I think it is really quick and accessible for the teacher and really easy to use so any basic computer skills which all the teachers have to be able to use this. I definitely see it as beneficial and even the videos there may not relate to the teacher's subject but you know I think the teacher will be able to be thinking of ways of how I'll adapt it to my class.

Interviewer I haven't a lot of the content yet but... I can start creating the content or indeed find the relevant content based on the literature. The system will evolve over the different several cycles...it's helping you but you are helping others. It is only when you start using it that you can say there are limitations here. It is not covering exactly what I would have expected or what I would have needed today in the class.

ST2 But at least you know that it is going to be built up over time and it will just keep getting better and better and especially the more I use it.

Interviewer And there is a lot of research done recently on behaviour management in relation to autistic children ...there will be ways of incorporating that in here and making it available to people.

ST2 I don't know of anything out there available to teachers. I think it is an empty market I think there.

Interviewer ...the system would be giving you learning content based on learning styles and on whether the child had prior knowledge or how much knowledge they had of a particular skill and also trying to get something that is relevant...and the social stories coming in so that they can prepare themselves for some event or some occasion that they don't like... or that they find difficult ...starting secondary school...

ST2 It's a big thing for them. For them to adapt to that. You know I wouldn't know how to get them used to changing classrooms and having different books and having different teachers. You know it's a big change for them in secondary school...

Interviewer And it is one of the things even if they are high-functioning ...either they are very organised and...have a routine set up themselves and they don't like to deviate from it and if you decide to run over and they can't get to their maths class in time they are freaking out because Ms X is delaying me. Whereas then you have the other child with the exact same label will be a total mess. They won't be able to bring the book in that they need for the class. They won't be able to write down the homework because they are totally mixed up. It is not that they are being bold. It is just that they need a bit of help...because a lot of teachers wouldn't have patience if somebody appears to be very highly intelligent and be able to understand the most complex of concepts well why...
wouldn't they be able to bring the book or why wouldn't they be able to write down their homework.

ST2

It just doesn't make sense.

Interviewer

It doesn't make sense but that is their world. Then you have the other child with Aspergers - and you cannot say that all of them will be like that - who will be absolutely methodical about everything ...but then obsessed with their methodology...

ST2

And this could cause issues in the classroom.

Interviewer

The system is not going to be perfect first time but with everybody's help and input it will get close...and once it is helpful and the more people use it...I want it to be handy that people will come back to it.

ST2

There're not going to ...I am not looking at that again...I can't work my way around it.

Interviewer

Learning Style and Prior Knowledge?

ST2

I do agree with that. I think it is the best way to go. The learning styles would suit the teacher.

Interviewer

How do you personalise the content because they are happy or sad?

ST2

I know. It would be more difficult to do and I think going that way ...the learning styles would suit the teacher better as well...working in that direction.

Interviewer

If a teacher has a particular learning style him or herself there might be a tendency, a bias ...

ST2

Leaning towards that?

Interviewer

Yes, that is the only problem...we could see if that is coming through the research data despite the fact that the report says that this child is whatever ...either one style or several styles...is the teacher actually consistently using the visual even though knowing that shouldn't be...

ST2

Suiting themselves...you are taught how to teach and ask questions and ...all the different things but at the end of the day you tend to go back to the way you were taught. In school the teachers end up teaching the way they learned in school which takes a while you know to get rid of ...I can see that happening. It's hard to change your teaching methods suddenly as well I think

Interviewer

I know in the class... you have 24 ...you can help in so far as you can but you can't just concentrate on that particular [student]

ST2

To get them through.

Interviewer

It would be nice to think that they'd have a better more smooth... experience in secondary school if one looked out for them.

ST2

With the support that they actually need as opposed to going on the Internet and guessing you know and saying 'Ah, I'll try this today and see does it work' and hoping for the best.

Interviewer

I don't know if a forum would work here but even that some of that information that people have [on resources that teachers have found to be effective]

ST2

That got shared around...what you do in this situation.

Interviewer

Any thoughts or suggestions?

ST2

I think it is really well laid out. I can see loads of teachers using it and
wanting to use it. At the end of the day it would make their life easier in the classroom as well as their students. It is definitely accessible and especially when I don't know of anything else out there to help the teacher in the classroom and the way things are going with the SNAs being reduced and then the classes being increased you know you need all the support you can get.

Interviewer  
And the surfing...if I can cut down on the amount of searching and that...again it is hard to know the quality of some of the stuff out there...some of it will be American, some of it Australian as well as the UK...as well as Irish.

ST2  
Because something that I might find on the Internet I don't know if it's been researched properly or anything. It could be doing more harm than right..or good.

Interviewer  
Well that would be my job to make sure that whatever I include in here is and that copyright is covered as well...that angle from the school's point of view.

ST2  
That you're not just throwing anything together...Ah, this might work...a lucky dip.

Interviewer  
So also it means that it's going to take that bit longer ...if you don't mind me emailing you stuff as we progress...If I start with a couple...getting a couple developed ...the process is going to be more or less the same so if I have material for a couple of them [skills] rather than have all ten at once and see then...

ST2  
Because even if you say have three done and then you probably notice glitches or something like layouts that can be done easier or better and then instead of having all ten then having to change all of them. Because you really don't know until you are in there in the situation and using it what way it's going to go.

Interviewer  
Again the selection I am thinking of ...for full support everything will be on the screen and as that support is not required things will be hidden because they would be superfluous for that particular teacher but even it could be a time delay or something like that ...so I have to see what is the most appropriate software to use as a foundation ....to make sure that everything is accessible to everybody. I would hate people to come back to me saying that looked good but I couldn't open it.

ST2  
I know. There's nothing worse.
Interviewer There are some social skills training programmes in books.

Parent 1 There is a series of books and a series of apps for phones on it like going to dentist, going to the doctor and it's particularly for kids with autism. Do you see those? Avril Webster is the writer. I know her personally. She was telling me about the books – they are very straightforward and simple, no complication on them. Simple pictures, simple words, simple everything because with autistic kids the more... they can't... if you have it too cluttered, they are distracted so they lose the focus. She wrote them and she has them published in the UK and US and she has an app on a phone – a phone app. You will get her books on... if you googled her name... anyway that's not relevant for now... There are a few things on this [iPad] that are social skills. Just show you a social skills one.. I just want to see am I thinking in the same way you're thinking. This one is Going Places - this is like Going to the Hairdressers.

Interviewer That's brilliant isn't it?

Parent 1 It's simple. Going to the Supermarket is another one. They're not hers... they're not Avril's but that is one that I used with my daughter. There's these ones ... I am just thinking about the social skills ones... wait until I see now there is another one that she likes that I am not mad about Where does this go? Simple stuff like 'Where does this go?' 'This goes in the wardrobe' You see you drag it down. (app voice: Terrific).

Interviewer Excellent.

Parent 1 It is just a simple little thing - where does this go? (app voice: Way to go!) They love this. That is the kind of reward that kids want... Have you seen any of these things [apps] before?

Interviewer I went down actually to Enniscorthy a while back and I thought that it was amazing..... (description of primary school kids and Mac equipment)

Parent 1 There's one for language that is a different kind of a thing. All of these are autism ones [apps]. What they are again it's very simple. This is how my daughter learned how to speak. Now she didn't have it on this. She had the cards: Climbing, Looking, Pouring... How she got to expand the language was by learning the word ‘Pouring’ and then the teacher - they hadn't got voice on it because it was cards but you can switch off the voice on this anyway. Image of boy pouring some water and the teacher would start by saying ‘Pouring.’ Then she would just delay saying ‘pouring’ so the next thing my daughter came out with ‘Pouring.’ And that was how... because if you do them over and over all the time they
recognise it. How she [teacher] expanded that was: ‘The boy is pouring the water.’

**Interviewer**

*Little by little building it up.*

**Parent 1**

‘From the blue bucket’ might be the next bit. Then ‘The boy on the beach is pouring the water from the blue bucket.’ It was all adding from one little picture you can get so much you know.

**Interviewer**

*If I could get permission to use something like that it would be brilliant. That might be in breach of copyright. What I might have to do is create my own.*

**Parent 1**

You see you can do it. You can take a photograph. That's all you've to do and put the word in and say what it is... These are all free these things. You know the iTunes. They're the actions like 'Splashing'

**Interviewer**

*They are brilliant. The actual images are very clear, aren't they? ...For different children with different learning abilities. This would be ideal for a certain group.*

**Parent 1**

Absolutely. This is At the Park...my daughter loves this. 'Merry-go-Round', 'Swings'. You could make them real easily you know. This is a brilliant one and again I don't want to get away too much from what you want to do. There's the Fruits, the same way as that. This is hilarious. My daughter adores this. Kids love something that is going to do something. ‘Hi Tom.’ voice repeats 'Hi Tom'. 'Instant' voice repeats 'Instant'. ‘Bonjour.’ voice repeats 'Bonjour'. What I was using this for... it will pick up everything you say. Say when my daughter wasn’t speaking clearly I’d say ‘Tell Tom.’ So she'd go maybe mutter and he will mutter back so she knows then Now I say ‘Now say it clearly.’ And the next thing you get ...My daughter wants to say it clearly and she wants him to say it back to her...And you can record it. You can just press that and it will record what we are saying. You can save your little clip and then you can play it back again. You can pet Tom. You can give him a wallop. You can give him a drink of milk. He smiles. Isn't it very simple but those kind of things work really well. Kids need a response of some sort of thing. There is a lack of things...Oh yes, this is one she likes. Sight words. You have different levels of words. That is only learning words. You can input your own words. It is clear. You can add in your own words as you want. You can add different levels. This is the best thing that I ever saw. This is something called Locabulary. It is for someone whose speech isn’t good or who isn’t verbal at all. So they would have:I – am – surprised; Can – you – please – help; For somebody who isn’t verbal or who isn’t clear [in their speech]. You can put in your own words and everything. Look at this - McDonald’s: I – would – like – a – quarter pounder.

**Interviewer**

*So they could bring it into the shop or is it that they learn it off?*

**Parent 1**

They have it on an iPhone. I have the same apps replicated on my iPhone. So say my daughter was out on her own, out and about. If she wasn’t clear in her speech or if she wasn’t able to say the words properly or if she went into McDonald’s and said em em em em and the assistant says ‘What...’ Instead of having all that ‘What did you say?’ she can call
up the Vocabulary thing. Because she can say it but...A friend of mine’s daughter is quite deaf and her language isn't clear and she uses one of these all the time. So she’d go into McDonald’s and say ....or Starbuck’s or wherever she is and say...And you can type in your own words. Say for instance if she was lost she could go to the thing on this that says ‘I’m lost’, ‘My Mummy’s name is.....’, ‘My phone number is blah-blah-blah.’ So if she couldn’t say it that would be there...Happy Meal, Hamburger, whatever you want...The best thing is that you are not stuck with it – you can add in your own pictures, your own vocabulary, whatever you want. You can do that and that's the advantage of that, you know that it does that...It's absolutely..This is learning to talk. See if it has the same ones on this. One word actions, Two word actions, Cards - so say one word. P – O – I – N – T spells point.

**Interviewer** So why would you create your own when they are all there? Aren't they brilliant.

**Parent 1** P – U – S – H spells push. Oh that's find the missing words or the letters. If they do it with their finger then it's easier to learn once they start the movement and the action. For a child who can't write ...that's one she’d use on this now. It's amazing. This is all only recent since iPhones came out.

**STAKMATE** demo

**Interviewer** The system plan is evolving.

**Parent 1** A lot of kids with autism respond very well to computerised programs and stuff like that...they seem to link into it.

Interviewer I need to get this right. I don’t want to do anything wrong. The idea here would be to personalise the content for carers and children.

Interviewer explains the purpose of STAKMATE.

**Interviewer** Prior Knowledge on a scale - if you are teaching say Initiating Interaction. You’d be asked whether the child was a Novice, Intermediate or Advanced so you could pick a four there (showing a scale from 1 to 7 to Parent 1) if you thought she knows something or he knows something about Initiating Interaction but could do with a little bit more or whatever. Then after creating the profile the teacher has decided Right Conversation is the thing that I want to teach the child. Once they bring up Conversation they will be presented with ...recommended for Conversation ...say if you have Direct Instruction...any one of those [strategies] they will be asked a couple of questions...How can the parent or the teacher know how confident I am at this? Maybe Direct Instruction they've been doing it but they don't know what I mean by Direct Instruction or some of the others so I thought okay if we ask them a few questions. In other words have you used it? it could be yes or no. These [questions] are kind of explaining what Direct Instruction is. Did
you use prompts? Were the children able to follow the steps? That would give me ...give the system an idea ...Yes, they've used this and yes, it's worked or it appears to have worked. I don't know if you think that yes no is too cut and dried. Should there be a maybe there?

Parent 1

So then what do you do with the ‘maybe’? Where do you go with that?

Interviewer

And the questions ...if I have the right questions there it should be a ‘yes’ or ‘no’. It should be clear. I should have very simple questions.

Parent 1

This is just to bring whoever is working with the child to where they need to go to work with the child.

Interviewer

So if they come up and they...not that they fails but they say 'no' to a lot of those questions then they will get Full Support which will consist of an Explanation, Example and Review. Again behind each one of those there’ll be an explanation of Direct Instruction or an example. So this is where one of these social skills [training programmes] eg Steps to Success – what she [Coucouvanis?] has are a couple if little things that the child is taught - If it is Initiating Interaction, if it is to greet somebody - just to remember four little things or three little things. As of last night I have got permission to use..to adapt Steps to Success and a couple of the other programmes that are out there. Again that came highly recommended. There are about five that I could find ...that are in books but are not actually online and if I adapt them...take the best of them.

Parent 1

Of bits from all of them.

Interviewer

That is kind of an idea that I have. Then the Review could be anything. It could be the little apps. It could be more ...this is now for the Carer to just help them to understand Direct Instruction more.

Parent 1

Ah, that's good.

Interviewer

I thought it would be cool to have something like this so that every time you met one of these characters [animated images as icons] like the question mark that you know that you'd get an explanation behind there or you know you'd get an example behind that one.

Parent 1

Oh, excellent. That's good.

Interviewer

I am just thinking...they don't have necessarily to be these particular icons but I just thought 'New Stuff' and then maybe a video behind here or Prompts - how to use prompts. Now this is from the other program but this is the type of material I am thinking of - background how to get them to imitate and ...prompting them to ask questions 'Do you like swings?' 'Are you eating?' 'What are you eating?' and so on just to break the ice to give them a few examples and then Role Play and everything else [referring to other strategies]...

Parent 1

My daughter – if she says just a one syllable answer to something. I say: ‘Give me the full sentence.’ And if she doesn't give me the full sentence I will model it for her and say what you say is: You say: ‘Thank you, Catherine, for the bar of chocolate.’ And now I say: ‘Now give me the full sentence.’ and then she gives it back. Sometimes she might just say just ‘Thanks’ or whatever. If I am trying to get her to expand the language that's one thing now.
And the prompts as you said there before they're used constantly and just in ways though as you did there you take them back then ...as they say fade them so that they're not depending on you always coming in and saying X.

And a lot of things in the learning stages is the reward. The reward could be something on the screen...they're big...

Or little tokens...Say they are building up little tokens That's to buy a video or buy a game or buy an app or something like that...Now here as well - some of the strategies I am using are ABA and one of the things that ABA is good for is keeping track of progress – so again this is just observing as they say to be a video camera in a room... That is just something that can be expanded on. I am trying to offer them things like that...

It's really giving them tools, a load of tools to select and use as they need. Apps....even the way they present the information might help you for your wording there. www.kindergarten.com to learn more about ABA therapy and applications…‘Our flash cards are specifically created to stimulate learning and provide ...’ see the language in there for you.

A lot of things behind here are missing because I wanted to get feedback from yourself and the teachers as to what would be useful. It is hugely useful.

Overview. You have the option to get into whatever skill is the required skill for the child at the particular time. Skills can change and skills can move ... the flexibility of that is very important. Because you will have a child maybe as you say you want to get the behaviour right before...

When somebody was working with my daughter she had to get her to sit quietly and pay attention; give some concentrated time. So there was no point in having anything else unless you got her sitting and she had her process to do that.

Behaviour Management. I think myself that the six strategies could be used ...to teach any of the skills. Positive Reinforcement - I going to use the Social Stories there quite a bit. The Social Stories seemingly can be used to help them acquire a skill as well as ...they seem to be very effective when they are used.

They are ...It's the one thing that works well. it's nearly like if the child hears the social story and then does the thing. Like say if you are taking a child on a plane and if you do a a social story before you do that giving them every detail...Like we are going to the airport .We are going in a taxi to the airport. Or we pack our suitcase, we go in the taxi, we go to the airport, we have to check in...You go through the whole process when it starts happening there is no fear. It 's what is expected because that is what you've told them.

Learning Styles – how do you adapt a system to a child’s needs? One way would be the learning styles. I don't know ...do you think that is a good way?

I think you have to go with the learning. There is no point in trying to teach somebody ...a child with a learning disability with autism or with
intellectual disability or whatever unless you know the best way that they learn. You have some children who want to write, or want to draw and others want to see and others want to do so you've all your four different ways of learning or styles.

**Interviewer**

If I give the parents and the teachers a way of adapting say direct instruction for a visual learner, adapting for whatever different styles.

**Parent 1**

Absolutely It could also be used if a child even if their learning style is visual and then he teacher thinks they have it to show it to them in another way would actually force whether they get it or they don’t.

**Interviewer**

Reinforcing?

**Parent 1**

There is no harm having all the learning styles in there.

**Interviewer**

Registration? – not have them identified.

**Parent 1**

You are not going to have them identified. That's fine. You just want to have it so that it's a secure system so that someone cannot get in and mess with it. That is why you need to have some kind password control. If a teacher or parent is working with a child and when they log on would they get the profile of that child and where they're at in the learning or would they just get into the system?

**Interviewer**

No, they could bring up the different profiles.

**Parent 1**

Of what the child has already done?

**Interviewer**

Your particular child and only you. You know the way you don't want other parents going in and looking at the children that you are teaching or the child that you are teaching.

**Parent 1**

That is linked to the work that you have done?

**Interviewer**

I am thinking that you would bring up the profile and see okay I did that with my child last week and they were at that stage so the system will keep track ...record the interactions.

**Parent 1**

The same thing you are trying to do is in this book thing – example of what you want to do – Read to me – Resume, Start Over or Cancel. Resume where you were with the child, Start over. It's familiar territory again for the child so there is less learning.

Registration example [bulletin board] and proposed Log in Screen

**Interviewer**

My Profile – teacher sees what strategies they have used and what support they needed ie the levels. Teaching Strategy. Teacher would see their profile. Username and a few basics. The teaching strategies could be combined. My Children – the children’s Ids. Click on their Ids and you could see their learning styles and a little bit about them. When they are building up the children’s profiles they will probably have an assessment done or the previous teacher’s report or if a parent something to give them an idea of where the child is (their developmental stage). My lessons – lessons that they have covered. Different summaries would be available in the Database. You select the required skill then the teaching strategies could come up. Then the questions would come up if somebody goes for any one of the six. The questions would be asked on that specific strategy.
Parent 1: You only want that to happen once. You only want that to happen when they're starting to work with the child. 'Cause you wouldn't do that every time. What you'd want to do is just get into the work. So you would have to have a

Interviewer: ...resumé?

Parent 1: Yes. When you are starting to work with the child - the initial part of the profile of the child you would have all of that. The teaching strategies - you wouldn’t ‘t want to be asked that every time or you'd go ballistic. Ah geezers, I want to get this work done and if your time is condensed to work with the child you want to work with the child and all this is knowledge that should be automatic nearly with the profile of the child.

Interviewer: It will be stored by the system so the system will remember when the particular unique ID comes that person is at level whatever.

Parent 1: Full support? Learning style such and such .

Interviewer: It won’t be your learning style though that they will keep. ‘It is training the trainers.’ So in other words I am trying to monitor how much progress the teacher or parent is making on learning how these teaching strategies work.

Parent 1: Oh it's the parent you are judging not the ...

Interviewer: Yes.

Parent 1: Why do you need to know that? Is that not something that they should learn before they would start using it?

Interviewer: No, You see a lot of people out there in schools teachers out there in schools who are doing the best that they can but they have not got the time to go on the Internet and search out material for particular children so I am cutting or trying to cut down and I am trying to see if they need full support – they will have some of the knowledge as you say they will have done their own research or they worked several years with children. The first time they go in they are asked the questions to establish do they need full support or not. Even if they don't ask for full support and they get down a little bit in the system they might need more support fihan they thought they would so I allow them to go back. On every page select more support than initially they did. The other point about it is if they come along a month later or even next week and they want to use the same strategy their support will vary. At that stage they might need to answer those questions again to see are they answering a few yes’s this time as opposed to giving all no’s. They might have memorised all the questions though mightn’t they? so that wouldn’t be a real test.

Parent 1: You see I'd be looking all the time at the outcomes. So the outcomes are the important bits so the outcomes is the learning the child has.

Interviewer: Oh you'd be monitoring the child as well but initially I am thinking of the Carer to teach them the strategies they should be using.

Parent 1: Is that not nearly a separate thing?
Interviewer Well the system will be looking at both – would be looking at the child and the progress that the child is making. Really what I am trying to measure is how effective this system is in improving online learning for carers. My concentration is more on the carers.

Parent 1 How to see how this is all working is the benefit or otherwise for the children.

Interviewer Both are important but not to forget about the carer. The children are very much part of the system but the carers have got to be supported or catered for by helping them giving them as much information as possible on the different strategies, different examples and how to use different things.

Parent 1 I would see that as a separate thing. In a sense that would be before they ever went near the system they would have to be trained on how to use the system. Mainly what I would say is that if every time they went to work on the system they had to go through a process of checking where their learning was that is wasting the time that they have the child sitting there who is not maybe behaving, a load of concentration gone. I don’t know where…. maybe I am getting the wrong idea…

Interviewer The Carer would not necessarily have the child beside them. This is where I would need feedback from yourself. You are right. The carer would sit down before ever the class would happen. They would know that they were going to have a particular child today/tomorrow. They would go in first and they would work out their lesson plan so it’s probably the evening before. They would look at the child’s profile or they would input the information in the system. They see from the assessments and the system that the child is a visual learner or a mix. Then they would say looking at the profile I think we will do conversation tomorrow and maybe intermediate conversation because that is where the child is at. Then they go off themselves then and say to themselves to teach conversation what does the system tell me for a child who is a visual learner and intermediate standard of knowledge. Then they start getting the different things that they could download or they print out and they have that with them when they start teaching conversation.

Parent 1 So it the tool for ...you are designing the whole thing mainly for the teacher or the parent. Not really from the child’s point of view? So that's what you are doing. What you are doing is giving them a place to go to pull out bits of information and stuff that they need.

Interviewer Cutting down on the searching for them and no learning overload. I am not asking them to learn JClic or anything else to try to personalise the content... But I see it very much as a tool for the carer as opposed to the child sitting with the carer.

Parent 1 Okay so I got a different impression.

Interviewer Sorry.

Parent 1 No it’s my fault because I was thinking all the time of the end user. I wasn’t thinking of the person trying to work with them.
SUMMARY OF STATEMENTS MADE DURING INTERVIEW
(not direct transcription)

Date: Tuesday 30th August 2011
Venue: Room 1.5 – Westland Square
Present: Educational Psychologist (EP1) & Interviewer (I) (statements in italics)

EP1

**VB MAPS** – more complex of the two assessment tools for autism but very good section on barriers to learning which can be used for any child with learning difficulties. **ABLLS** - Partington & Sunberg, 1998 (criterion referenced). It would definitely be worth having a conversation with Special Education Expert (Mary Immaculate in Limerick). X is a super presenter. It definitely worth having a conversation with X. She is a super presenter.

Interviewer

*What I did I got on to the Irish Autism Society and they gave me the... names of the people and then the addresses of all the different autism units in the country but the way it was it was during the holidays and all of the units I would say would be closed...*

EP1

They open for July a lot of them but closed for August.

Interviewer

*If all of these people have been trained on these two [assessment tools] if I could... set it up that they really only have to click on a few things. I'll show you the way that I have done this so far.*

EP1

These are assessment tools for Autism and Language Disorders... that is what they are designed as. But the same assessment tools I felt could be used for children with any disability. They are criterion referenced as opposed to standardised so they are not giving you an IQ score or an age. They follow typically developing children but they acknowledge within them because they are broken down within them as you say social skills, language might be a problem for some but not others. There are little boxes that get coloured in for all the skills that they can do. When you open it up... the way it currently exists the teacher has to go then to page 59 and colour in a box and then another box, and then another box. If that was all done interactively it would mean that the teacher could click on the button and could see here is my ten skills areas and here is my graph - the high ones being the skills accomplished and the low ones being the skills...and it also helps you to see progress which is ultimately what they want. That is your motivation for doing more and I think that would enable teachers to see that without having to spend hours every week ticking boxes.

Interviewer

*It sounds to me that if you have two different manuals and if you are trying to keep the whole thing going...*

EP1

Oh, it's a nightmare! I can see...when we saw them we were saying 'Ah, it's great' and some people were saying that teachers should do it because it is really useful. Then I was saying 'Ah yes but if you or I were the
teacher and you had all of these children in front of you how would you feel about having to fill in eight of these for eight children every day.'

**Interviewer**

*Madness.*

**EP1**

I think what X had been encouraging them to do was to do it with one child first - take one section and one child and I think if people experience success and see the curve going up there's your motivation to do child no 2.

**Interviewer**

*What teachers are saying to me is that they could have more than one and anything up to eight and all of them with different problems. They might also be eight children within twenty-four children or more that they have in a class and even though they might like to go off and research about different areas they don't have the time.*

**EP1**

The time yes.

**Interviewer**

*The Internet being so vast they don't know where to find...what is authoritative, what is recognised...*

**EP1**

The evidence base for a lot of the programs isn't great.

**Interviewer**

*It is the same for Social Stories - Social Stories are meant to be very effective but the problem is that a lot of the data is on a study that has taken Social Stories with a couple of other interventions...*

**EP1**

Other programs yes.

**Interviewer**

*So they don't know whether it is the Social Stories that have been effective or...*

**EP1**

The person delivering the Social Stories. And there's always that problem...

**Interviewer**

*Exactly.*

**EP1**

One of the strategies is Motivational Game...keep it simple and it would be one simple thing that they would be learning and then turn student's game into reinforcing or helping to reinforce that particular skill.

**Interviewer**

*It's an Adaptive Learning System. It is only in PowerPoint at this stage just to give you an idea of what I am thinking of. STAKMATE - I am calling it so Social Skills Training for Autistic Kids and mate as in workmate. Registration - they would register so that people outside...non-members couldn't use this system. So they set up a child's profile. They select a required skill. The profile - I don't need them to fill in all the information from an IEP or a psychological assessment. This program wouldn't assess them although we'll talk later about...*

**EP1**

The criterion reference...

**Interviewer**

*Which would help...*

**EP1**

But this isn't software...both of them are just books at the moment

**Interviewer**

*I shall talk you through this ...Child Profile - they have a learning style and their prior knowledge. The teacher decides ...they pick a skill and the system will then recommend appropriate teaching strategies to use and offer suitable educational resources based on the child's learning style and prior knowledge. The Carer registers...*

**EP1**

As a member.

**Interviewer**

*Yes ...we won't be putting in names and addresses. They could put up*
their own username and password...there seems to be a problem in
different schools I believe from the teachers that I have interviewed...I
was thinking of title, firstname and surname but I don't need to know that
but I just need to have a unique ID.

EP1
Identity for each person.
Interviewer They open a child profile screen...again no addresses but I do need to
know their learning styles or at least what the Carer understands...

EP1
To be their learning style.
Interviewer They can change that. They can update the profile. They indicate the
prior knowledge. The level in each skill. I would think would be
important at that stage. Ten skills...the system will recommend
behavioural strategies that would be appropriate to use in each case. So
you would use the six strategies but say it was Conversation you would
use Direct Instruction slightly differently or you would use Positive
Reinforcement would be slightly different ...

EP1
So these ones would bring that back even further. They'll start with
manding, requesting so that's a point so then imitation...so if a child
cannot imitate...it brings it right back to there
Interviewer In order to converse they need a little bit if language...I am not saying
that a child who is non-verbal child...couldn't get something out of this
because I will give them...sound files...Say they pick initiating interaction
so behind each one of those [icons] there would be an explanation...and
Tutoring Variation...learning style...visual...they'd have an explanation.
These are just examples [indicating file content on screen].

EP1
The Read/Write is an interesting one because there are children with
autism who can read and write and not speak.
Interviewer I am basing this [system] on a program for home tutoring that was
developed a couple of years ago. Now again I am open to suggestion
here. Please indicate below the level of prior knowledge ...I think these
questions would come when the profile is being set up ...they shouldn't
have to be answered more than once.

EP1
Yes, exactly. So they are adding, they increase it...
Interviewer So the system will be tracking the interactions.

EP1
That would be great.
Interviewer It's cutting down on their work but it also means that I am collecting
data. That is where they would see the progress. Somebody would start
at novice and then after several months you'd hope that they would get to
mid-way and then to advanced. In some skills...

EP1
They won't.
Interviewer They won't but that's not critical. It's just whatever their best
performance is. So it doesn't stop them..

EP1
It allows room as well for manoeuvre because they might see that they
were at level 1 in Initiating Interaction and the learning style they were
going with was aural and they might be in something else and the
learning style was something different so it allows them to go back and
see was it the learning style we used or was it the strategy we used or is it
a skill that needs to be broken down further.
Interviewer  Yes. As one of the parents suggested last week, say a child is normally visual ...most autistic children would be stimulated more by images...they cannot understand the meaning so the picture can help the teacher to help them see ...the concept behind because they have a difficulty with abstract concepts so the images...

EP1  Can make the text clearer.

Interviewer  Also they can't sometimes write down ... so when somebody speaks it they have lost it whereas the image they can go home and they can take out that image. That is what is good about the Social Stories ...they can take that out again and again and it can be read over to them or they can read it ...or they can play... a recording of it.

EP1  Sometimes the aural can work with them for the children who are very good at the echoics ...if they have learned to imitate then they can develop the echoics and they can use them quite well...if you have a prompt so somebody saying 'hello' prompts a reaction and so on and so on. So it's working as you say identifying the strategies.

Interviewer  This parent was saying that if you thought that somebody had got it...you had showed it to them, all the images so they had learned it visually a good way then of testing if they really understand something would be to run the aural resources and just see...

EP1  What happens.

Interviewer  Teachers say that it [learning style] tends to be a mix.

Assessment of Carer. This is on whether the Carer has ever used direct instruction before...These [questions] were kind of to see 'Were the children able to repeat the steps?' - that would indicate to me if they said no then...

EP1  You haven't broken it down...

Interviewer  Or you really don't know how to use direct instruction. Then I would be giving them full support.

EP1  Right. Okay.

Interviewer  I would have the program behind selecting it [support] on the basis of the number of yes's and no's. The system just stores that [the Carer's answers]...so that person needed full support last time I will give them medium support the next time. If they need more they can go back to help and they can get more support ....

EP1  Having them to go through all the questions again...

Interviewer  I wouldn't have them do that...Or you could just assume that the first time they get full support and they'll scan it anyway. People who need the support will look typically. If they start and they need full support in the beginning well obviously over the months you'd hope that the system would have helped them ...the system should be teaching them how to do it and then at end at least ...they'll see their own progress in using any of these [strategies].

EP1  So you could have them do this at the beginning and end or at the beginning and at a six-month interval and at an end interval.

Interviewer  I am using a lot of ABA strategies. They tend to keep a progress report
...detailed enough because they have to see how the child is progressing and maybe modify... the child might have seemed to be going on grand last week and the next week they come in and nothing seems to be working and if they actually think about it it could have been because the child was too hot....

EP1
Too hot, too cold...

Interviewer
Or whatever they had to eat or drink beforehand. It could be what was happening in the background. It could be a drill outside or it could be a child distracting them in the classroom so it was just to prompt those kind of thoughts..

EP1
It is really valuable. It would be fantastic in any of our settings.

Interviewer
Do you think that would work?

EP1
I think it would work really well and I think if you could link with X and figure out a way because she does the training...it's a longer term thing but including something like it [criterion referencing] in it...Now you might not be able to get permission to use VB-MAPPs or ABLLS or any of them but even to talk to her about what she thinks is the best alternative.

Interviewer
Of even if I had a look at those...if she could let me have a look at them. I found this - Autism Research Institute - you can go online and free scoring and all the rest of it. Now it is much more detailed than what you were talking about...where you have sociability there 'shows no affection', 'no eye contact'... The idea would be that I would take out the sociability part and again they would see the progress.

EP1
It is good to have something like that. The most commonly used ones that we would use would be CARS Autism Rating and we would use ASDS for Aspergers - Asperper Syndrome Diagnostic Scale. They would be our most commonly used ones but there would be about 100 questions on them or maybe 200.

Interviewer
This [STAKMATE] would come in after somebody has been assessed because I am not a psychologist. I need to start at the very basics...at least the Carer might need to start before ever initiating interaction.

EP1
What X did with us could almost go into that program [STAKMATE] in terms of explaining what reinforcement is, what reinforcers are, the background content that anybody needs to know working in this environment. So there in the support level you could include some of those things. What does reinforcement mean? and various different things and then again the skills basis.

Interviewer
Yes, it might change completely...

EP1
As it is I think it is really good...the only reason I'd consider changing the system would be if it can match this system that is being used then you have a commercially very viable product...people would use it...

Interviewer
People would be familiar with it and I am actually cutting down.

EP1
Their paper work.

[Workflow described by Interviewer]
One of these programmes actually goes through the different skill areas and looks at what is the most appropriate one. So the most appropriate way of teaching imitation is direct instruction. The most appropriate way of teaching manding or requests is concrete resources. There are real reasons...it's the environment. So if you want to teach your child to ask for a drink you have to put a drink over there and leave it there so when they start pointing at the drink you give them the sign and they do it and then they get the drink...Rather than allowing the teacher to choose...Not for everyone but for a lot of tasks there is a more and less appropriate way...so for direct instruction yes for various specifics but it will actually tell them in line with each skill area what they are recommending as the most appropriate.

**Interviewer** Excellent...for Positive Reinforcement I was going to use the Social Stories there and... also sometimes you can use the Social Story to teach them little steps. The feedback would be probably handy for any of the skills...to see how modelling and role play [have gone] ...again some it will suit more than others; the motivational game to try to keep them on task...to give them just some little thing to do and then the practice - just going over...

**EP1** I'd say that the Feedback, the Positive Reinforcement and the Motivational Game would probably all fit into reinforcement and different types of reinforcers so you would have the verbal reinforcer being the Feedback...Positive Reinforcement covers all of them and then the Motivational Game or the motivational reinforcement is getting the thing whether that is the game, the drink, the peanuts, the chips, the pencil.

**Interviewer** So they are kind of right you'd say?

**EP1** Yes but there are more than that of them I think. I would have to look at the list again but those three are kind of similar. They are more a response than an instructional style. So you have direct instruction, modelling definitely, practice and imitation but these three come in under reinforcement and the response.

**Interviewer** Right.

**EP1** So you have what you want them to do, how you are going to get them to do it and how you are going to respond because there has to be a response to everything these children do so you want the teachers constantly thinking about how am I going to respond to that. So if the child is learning that this is the drink sign...every time they do it you have to be sure that there is a drink in the environment. Because every time they make the appropriate sign they get a drink. It starts with anywhere near their mouth and they'll it and then you are trying to teach them no it has to be a proper one so over time they are teaching them to mand or sign properly...It is very nicely broken down. It is sort of like the cycle ABC - antecedent, behaviour and consequence – that type of a cycle: what are you trying to do? what have they done? and what is the response? What is going to motivate them to do it again? With autism and any behaviour you are looking at with the behaviours you want
what's going to increase the likelihood of that happening again and if you want it to happen again and it does then you are reinforcing it appropriately. If you want it to happen again and it isn't then...they are saying if you are reinforcing the child with bits of chocolate which is fine at some point they are satiated so chocolate no longer becomes a reinforcer and the same with the sign of the drinking. So what they are saying is that you cannot teach children those skills in the absence of the environment. It is used in ABA but it is contextualising it because with ABA they tend to hammer on with these things sometimes not everybody regardless of context. If a child isn't thirsty or isn't hungry then food isn't a motivator. But if they're bored and want to play a game that is a motivator. It's about figuring our what is motivating for that child and what is motivating is not the same...Star charts are very rewarding for lots of kids but it's not so much the star it's the teacher saying, 'You are so good I am going to give you a star.' So there is a lot of things in there. There is positive praise, there is all the rest of it and there is the star. Then they bring the star home and it's not the star it's the fact that they go home to Mammy with the star and she goes 'Oh, you're wonderful!' So it's verbal interaction that they're actually getting as well as a star. Because there is the visual and the verbal and all that sort of stuff - they might be getting a hug as well - so it's all of the pieces.

Interviewer
*And they don't like to fail. They like to be successful.*

EP1
And that is what X would say with children with autism – people sometimes are of this opinion that they don't care what's going on in the world. She says that they really do. They want to do things right and they want to know how to do things and they often just don't know.

We will definitely chat again. It's very interesting.

Interviewer
*Thanks a million. That is brilliant*
Appendix XV – Adaptive Learning System Parameters

ADAPTIVE LEARNING SYSTEM – STAKMATE SYSTEM PARAMETERS

Carer

- Teaching strategies will change depending on the required skill being taught
- Support level will change depending on the carer’s prior experience of using the strategies recommended by the system
- Child’s needs will change depending on the particular child that the carer is teaching and some of those specific needs may vary over time
- Educational resources will change depending on
  a) the strategy that the carer is using and
  b) the needs of the child he/she is teaching

Child

- Stage in learning process will change as child develops
- Learning style will not change
- Language ability may change but this is not an objective of the system
- Comprehension ability may change but this is not an objective of the system
- Relevant topics unlikely to change over the lifetime of the investigation as children with ASDs are ritualistic

Please note that the strategies that the system will offer carers are dependent on what learning stages that the children are at:

<table>
<thead>
<tr>
<th>Learning Stage (Child)</th>
<th>Teaching Strategies (Carer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>Didactic Instruction &amp; Modelling</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Role Play &amp; Feedback</td>
</tr>
<tr>
<td>Advanced</td>
<td>Positive Reinforcement &amp; Motivational Game</td>
</tr>
<tr>
<td>Acquired</td>
<td>Practice</td>
</tr>
</tbody>
</table>

This prototype will cater for children who need to learn **Initiating Interaction**, **Conversation** and **Play**. The other seven required skills (ie reciprocation, problem solving, reading non-verbal cues, mind reading, self-control, self-awareness and behaviour management) should be displayed on the screen but they do not need to be activated. The educational resources have been reduced to one resource type per strategy eg discrete trial with didactic instruction. However more than one example of each resource type will be provided to cater for children with good/poor language ability and poor/very poor comprehension and a variety of topics will be covered in this learning content.
This prototype will concentrate on visual and aural learners only. However there will be a requirement in future prototypes to include learning content for children with different levels of language and comprehension ability and read/write and kinaesthetic learners. It will also be necessary to modify the activities depending on feedback from carers and include social stories and other resource types for different strategies. For instance, social stories could be used to teach children at all learning stages – novice through to acquired.

Carers will be given full support, medium support, minimum support or no support depending on the results of their pre-tests. This support will be selected and provided by the system. Full support will include:

- **Recommended teaching strategies** to use with the particular child in specific context
- a detailed **explanation** of the teaching strategy selected by the carer and how it can be applied to teach a particular social skill
- **Examples** of how this intervention strategy has been used successfully in different situations
- **Instructions** on how to observe, monitor, record and reflect on the lesson to encourage carers to carry out continuous assessment of their own learning and the impact of this intervention strategy on the children involved

Levels of support will vary as follows:

<table>
<thead>
<tr>
<th>Level of Support</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full Support</strong></td>
<td>Recommended Teaching Strategies, Explanation, Example and Review</td>
</tr>
<tr>
<td><strong>Medium Support</strong></td>
<td>Recommended Teaching Strategies, Example and Review</td>
</tr>
<tr>
<td><strong>Minimum Support</strong></td>
<td>Recommended Teaching Strategies and Review</td>
</tr>
<tr>
<td><strong>No Support</strong></td>
<td>Recommended Teaching Strategies only</td>
</tr>
<tr>
<td>REQUIRED SKILL</td>
<td>CHILD’S NEEDS</td>
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<td>Play</td>
<td>Novice</td>
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<tr>
<td>Aural Learner</td>
<td>Model Skill Steps</td>
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<td>Language – Very Poor to Very Good</td>
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<td>Comprehension – Very Poor to Very Good</td>
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<td>Topics – Special Interests</td>
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<td>Play</td>
<td>Intermediate</td>
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<tr>
<td>Aural Learner</td>
<td>Corrective Feedback</td>
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<td>Language – Very Poor to Very Good</td>
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<td>Comprehension – Very Poor to Very Good</td>
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<td>Topics – Special Interests</td>
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<td>Play</td>
<td>Advanced</td>
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<td>Aural Learner</td>
<td>Motivational Game</td>
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<td>Language – Very Poor to Very Good</td>
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<td>Comprehension – Very Poor to V Good</td>
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<td>Topics – Special Interests</td>
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<td>Play</td>
<td>Acquired</td>
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<td>Aural Learner</td>
<td>Practice Video Modelling</td>
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<td>Language – Very Poor to Very Good</td>
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<td>Comprehension – Very Poor to V Good</td>
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<td>Topics – Special Interests</td>
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</tbody>
</table>
Appendix XVI – Email to Experts

Sample Email

Hi

Hope you are enjoying the break and wishing you and yours every happiness in 2012.

It took longer than I thought it would to plan out the learning system but the first phase is finally being developed. I have just started to search for suitable apps to include in the educational resources. I shall follow up your suggestions.

I was wondering if you would have time to walk through the system that I am building to see if it would actually help carers to teach children the social skills they need. I know you are very busy so I would email you some details and samples of the activities and ring you, after you would have had a chance to check them out, to get your views. Please let me know if you would be free next week to run through things.

All the best
Appendix XVII– System Walk Through

WALK THROUGH PROPOSED SYSTEM

1. Carer opens up Application in web browser

   ![STAKMATE HOME PAGE](image)

2. Carer registers as a User by clicking on link and completing registration form

   ![Registration Form](image)
3. After registration process has been completed the Carer can log into the application using a valid username and password

4. Carer creates Child Profile by clicking on this option on the entry screen. The system assigns a default ID Number to each new Child.

5. Carer inputs details that he/she knows about the child as follows:

   a. **Current Knowledge of Ten Required Skills**

   The ten required skills should be displayed on the screen with three radio buttons beside each one – one each for novice, intermediate and advanced. The carer will be able to access an overview of each required skill from this screen by clicking on the skill name. An explanation of the rating scale used to categorise learning stages will also be available.
<table>
<thead>
<tr>
<th>Stage of Learning</th>
<th>Value</th>
<th>Characteristics of Learner</th>
</tr>
</thead>
</table>
| **Novice**        | 1 and 2 | 1. Needs a great deal of thinking and working out to complete task  
2. Easily distracted  
3. Requires assistance to complete task  
4. Makes frequent errors  
5. Completes tasks slowly  
6. Requires instant feedback on task performance |
| **Intermediate**  | 3 and 4 | 1. Becomes more independent but still requires a great deal of thought when completing tasks  
2. Less easily distracted  
3. May hesitate between steps of the task, as child attempts to recall the procedure  
4. Makes fewer errors than novice learners; fluency is increased  
5. Performs tasks inconsistently  
6. Requires instant feedback on task performance |
| **Advanced**      | 5 and 6 | 1. Completes tasks independently with little thought  
2. Stays focussed on task  
3. Does not hesitate between steps of a task  
4. Typically performs without errors; Fluency is significantly increased  
5. Is able to complete multiple tasks at the same time  
6. Able to complete tasks across various settings and persons |
| **Skill Acquired**| 7     | Skill has been acquired but practice is required to enhance performance |

Modified Stages of Skill Acquisition (Bellini, 2008)
The carer can click on the radio buttons which indicate the level of knowledge the child has of each skill.

<table>
<thead>
<tr>
<th>Required Skill</th>
<th>Novice (1-2)</th>
<th>Intermediate (3-4)</th>
<th>Advanced (5-6)</th>
<th>Acquired (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiating interactions</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Conversation</td>
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<td>☐</td>
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<tr>
<td>Play</td>
<td>☐</td>
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<td>Reciprocation</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>Problem-solving</td>
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<tr>
<td>Reading non-verbal cues</td>
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<td>Mind reading</td>
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<td>Self-control</td>
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<td>Self-awareness</td>
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<tr>
<td>Behaviour management</td>
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b. Learning Style

The four VARK learning styles (i.e., visual, aural, read/write, and kinaesthetic) will be displayed in a list on the screen with links to information on learning styles. The carer selects the style that best suits the way the child learns.

- Visual ☐
- Aural ☐
- Read/write ☐
- Kinaesthetic ☐
c. Language Ability

An explanation of each descriptor used in the rating scale will be available

<table>
<thead>
<tr>
<th>Language</th>
<th>very good</th>
<th>good</th>
<th>average</th>
<th>poor</th>
<th>very poor</th>
</tr>
</thead>
</table>

d. Comprehension Ability

An explanation of each descriptor used in the rating scale will be available

<table>
<thead>
<tr>
<th>Comprehension</th>
<th>very good</th>
<th>good</th>
<th>average</th>
<th>poor</th>
<th>very poor</th>
</tr>
</thead>
</table>

e. Topics of Interest

Carers will be given the facility to enter topics appropriate for children’s developmental age. Carers may select from a list of topics displayed on screen or input their own choice of topics

- School
- Home
- Family
- Pets
- Games
- Play Activities
- Computer Games
- Sports
- Hobbies
- Collections
- Arts & Crafts
- Pastimes
- Television
- Films
- Music
- Reading
- Holidays
- Food
- News
- Other – please specify
System will store this child profile and will update it each time the Carer uses the system to teach the child. These particulars can be retrieved using the Child ID. When the carer keys in a child’s ID to access the child’s profile a summary of the child’s prior skill knowledge, learning style(s) and developmental age (language, comprehension and relevant topics) is displayed on screen. These details will help the carer to decide on which required skills to teach and at what level.

6. Open **Prototype I**

   Carers will be given access to a system which will offer them assistance when teaching children with the following profiles:
   a. children who need to learn ‘Initiating Interaction’ and/or ‘Conversation’
   b. children at either novice, intermediate or advanced stage of knowledge of the required skill
   c. children who are either visual or aural learners
   d. children who have been diagnosed with classic autism and have poor language ability and very poor comprehension ability
   e. children who have been diagnosed with AS and have good language and poor comprehension ability
   f. children interested in topics relevant to their developmental level (ie based around home or school)

7. Key in Child ID
8. Select Skill – Initiating Interactions or Conversation
9. System will display the child’s level of knowledge of this skill ie Novice, Intermediate, Advanced or Acquired
10. System will recommend strategies to teach that particular skill at that particular level eg didactic instruction and modelling.

Please note that the strategies that the system offers carers are dependent on what learning stages that the children are at:

<table>
<thead>
<tr>
<th>Learning Stage (Child)</th>
<th>Rating Scale</th>
<th>Teaching Strategies (Carer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>1 – 2</td>
<td>Didactic Instruction &amp; Modelling</td>
</tr>
<tr>
<td>Intermediate</td>
<td>3 – 4</td>
<td>Role Play &amp; Feedback</td>
</tr>
<tr>
<td>Advanced</td>
<td>5 – 6</td>
<td>Positive Reinforcement &amp; Motivational Game</td>
</tr>
<tr>
<td>Acquired</td>
<td>7</td>
<td>Practice</td>
</tr>
</tbody>
</table>
11. Carers will be offered support depending on the answers they supply in the pre-tests. The system determines level of support required by carers from the results of the pre-tests that they complete for each teaching strategy. Carers will be given full support, medium support, minimum support or no support depending on their results. Full support will include:

- recommended **teaching strategies** to use with the particular child in specific context
- a detailed **explanation** of the teaching strategy selected by the carer and how it can be applied to teach a particular social skill
- **examples** of how this intervention strategy has been used successfully in different situations
- **instructions** on how to observe, monitor, record and reflect on the lesson to encourage carers to carry out continuous assessment of their own learning and the impact of this intervention strategy on the children involved

<table>
<thead>
<tr>
<th>Level of Support (Carer)</th>
<th>Pre-Test Results</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Support</td>
<td>1-2 correct answers</td>
<td>Recommended Teaching Strategies, Explanation, Example and Review</td>
</tr>
<tr>
<td>Medium Support</td>
<td>3-4 correct answers</td>
<td>Recommended Teaching Strategies, Example and Review</td>
</tr>
<tr>
<td>Minimum Support</td>
<td>5-6 correct answers</td>
<td>Recommended Teaching Strategies and Review</td>
</tr>
<tr>
<td>No Support</td>
<td>7 correct answers</td>
<td>Recommended Teaching Strategies only</td>
</tr>
</tbody>
</table>

Even when it is deemed that no support is required the system will recommend that carers use certain strategies to teach certain skills to certain children (depending on their learning style, language and comprehension abilities). Levels of support will be recorded in the carers’ profiles and will be reduced automatically when carers have used a particular strategy three times. Carers will be able to alter the level of support the system has assigned them by clicking on the help sign (?) on each page (see revised system engine for details).
12. System offers educational resources appropriate for each learning stage.

<table>
<thead>
<tr>
<th>Learning Stage (Child)</th>
<th>Teaching Strategies (Carer)</th>
<th>Educational Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>Didactic Instruction &amp; Modelling</td>
<td>Discrete Trial &amp; Steps to Success</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Role Play &amp; Feedback</td>
<td>Social Skill Picture Story &amp; Cognitive Picture Rehearsal</td>
</tr>
<tr>
<td>Advanced</td>
<td>Positive Reinforcement &amp; Motivational Game</td>
<td>Social Story &amp; Games</td>
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<tr>
<td>Acquired</td>
<td>Practice</td>
<td>Video Modelling</td>
</tr>
</tbody>
</table>

13. System includes educational resources are suitable for either visual or aural learners.

<table>
<thead>
<tr>
<th>Teaching Strategies (Carer)</th>
<th>Educational Resources</th>
<th>Visual Learners</th>
<th>Aural Learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Didactic Instruction &amp; Modelling</td>
<td>Discrete Trial &amp; Steps to Success</td>
<td>PECS</td>
<td>Verbal Repetition</td>
</tr>
<tr>
<td>Role Play &amp; Feedback</td>
<td>Social Skill Picture Story &amp; Cognitive Picture Rehearsal</td>
<td>Images</td>
<td>Oral Readings</td>
</tr>
<tr>
<td>Positive Reinforcement &amp; Motivational Game</td>
<td>Social Story &amp; Games</td>
<td>Graphics and Animation</td>
<td>Audio Recordings</td>
</tr>
<tr>
<td>Practice</td>
<td>Video Modelling</td>
<td>Video Recordings</td>
<td>Video Recordings</td>
</tr>
</tbody>
</table>
PALS
Example User Path

- **Child's Profile**
  - **Required skills include:**
    - initiating interaction,
    - conversation,
    - play,
    - reciprocation,
    - problem solving,
    - reading non-verbal cues,
    - mind reading,
    - self control,
    - self-awareness,
    - behaviour management

- **Child's Current Knowledge of Social Skills**
  - Novice
  - Intermediate
  - Advanced

- **Child's Learning Style**
  - Visual
  - Aural
  - Read/Write
  - Kinaesthetic

- **Child's Developmental Level**
  - Language Ability
  - Comprehension Ability
  - Relevant Topics

- **Initiating Interaction**
  - con
  - play
  - rec
  - prob
  - mvc
  - mr
  - sc
  - sa
  - bm

- **Teaching Strategies**
  - Didactic Instruction
  - Modelling
  - Role Play
  - Feedback
  - Positive Reinforcement
  - Motivational Game
  - Practice

- **Test results determine level of support**

- **Educational Resources recommended by STAKMATE**
Appendix XVIII – Feedback on Design Plan January 2012

Questionnaire – Feedback on Prototype II

Thank you for agreeing to supply feedback on the plans for the personalised adaptive learning system (PALS) that I am building. This survey should only take a few moments. Please do not name third parties in any open text field of the questionnaire. Any such replies will be anonymised. In the extremely unlikely event that illicit activity is reported I shall be obliged to report it to the appropriate authorities.

Here is a list of statements about this PALS. Please check the appropriate box for each question.

Many thanks for your assistance.

Each question is optional. Feel free to omit a response to any question; however the researcher would be grateful if all questions are responded to.

### Personal Details

| Participant ID/username: | Primary Teacher (1) |

### 1  Overall design appears to work

| Strongly Agree □ | Agree □ | Agree Moderately □ | Neutral □ | Disagree Modestly □ | Disagree □ | Strongly Disagree □ |

Please comment

Design seems fine on paper. Teaching these two skills (ie initiating interaction and conversation) would limit you to working with teachers in special units. Autistic children in mainstream school would come in with these basic skills. For instance, I am teaching play (eg joining in, turn taking, etc) and self control at the moment.

### 2  Child Profiles will contain sufficient details to help Carers make informed decisions ie knowledge of skill, learning style, language ability, comprehension ability and special interests

| Strongly Agree □ | Agree □ | Agree Moderately □ | Neutral □ | Disagree Modestly □ | Disagree □ | Strongly Disagree □ |

Please comment  

Seems fine
3 What way would you like the educational resources to be made available? For example, PDF

Instructions etc in pdf format. Short films or video clips rather than animated sequences. The more that the examples reflect real life the better. The children would relate to the boys and girls in the films but would not connect themselves doing the skills when they would see comic characters or animated characters on the screen. You could use a flip camera to take the shots. Take some bigger shots and close-ups of face, hands, mouth etc. Also take cutaways (shots of room or details) that can be slotted in when you need to edit out a piece. You can Windows Movie Maker or iMovie to put turn the images and screens into film. Use an application like Audacity which is free to download to create sound files. If you are filming outside you may need a better microphone to record over background sounds eg aeroplanes passing overhead. Might be an idea to record a voiceover as it would not matter then if the children did not get their lines right. Always have a script prepared and find out if *.flv files would be small enough to insert into website. Alternatively create Flash animated films. This would be more time-consuming (ie several months) and would not be as effective according to current research. Filming would take two days! Might be an idea to have a practice session first.

4 Any other information you wish to add

Might be an idea to discuss ideas with more experienced carers who work in special units.

If you require clarification on any of the questions, please do not hesitate to contact the researcher at doyleth@tcd.ie or mobile 086-8069515.
Questionnaire – Feedback on Prototype II

Thank you for agreeing to supply feedback on the plans for the personalised adaptive learning system (PALS) that I am building. This survey should only take a few moments. Please do not name third parties in any open text field of the questionnaire. Any such replies will be anonymised. In the extremely unlikely event that illicit activity is reported I shall be obliged to report it to the appropriate authorities.

Here is a list of statements about this PALS. Please check the appropriate box for each question.

Many thanks for your assistance.

Each question is optional. Feel free to omit a response to any question; however the researcher would be grateful if all questions are responded to.

### Personal Details

**Participant ID/username:**

- [ ] Parent

### 1 Overall design appears to work

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Agree Modestly</th>
<th>Neutral</th>
<th>Disagree Modestly</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

**Please comment**

Judging from the walk through the system seems fine. It would be hard to cater for every problem so this is a good start. It would be great for parents to be able to key in details about their children and get help particularly when their children have just been diagnosed. Using novice, intermediate, etc is a nicer way to categorise the children. Getting explanations and examples of how to use strategies would be great as it is hard to find this information. What type of questions would I be asked?

### 2 Child Profiles will contain sufficient details to help Carers make informed decisions ie knowledge of skill, learning style, language ability, comprehension ability and special interests

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Agree Modestly</th>
<th>Neutral</th>
<th>Disagree Modestly</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

**Please comment**

It’s a good idea to take a child’s learning style etc into account when teaching him. Special interests too - for example my son loves dinky cars and he lines them up all around the house.
### 3. What way would you like the educational resources to be made available? For example, PDF

PDF would be fine. If carers want to change the documents they could download them and make the changes on their copies. It should not be necessary to supply Word documents.

Her son learns better when pictures of ‘real people’ and ‘real events’ are used. Some animations are too abstract. He likes when I read books like ‘Naughty Children’ (classic edition). Video clips would be good.

Children need to learn skills. Some centres are more concerned when children cannot complete certain tasks or steps on a curriculum rather than how comfortable the individuals are. New trend is to allow children to do what they wish eg Guild which is a group for adults uses the Studio 3 programme.

### 4. Any other information you wish to add

Find things that will catch and hold children’s attention

If you require clarification on any of the questions, please do not hesitate to contact the researcher at doyleth@tcd.ie or mobile 086-8069515.
Questionnaire – Feedback on Prototype II

Thank you for agreeing to supply feedback on the plans for the personalised adaptive learning system (PALS) that I am building. This survey should only take a few moments. Please do not name third parties in any open text field of the questionnaire. Any such replies will be anonymised. In the extremely unlikely event that illicit activity is reported I shall be obliged to report it to the appropriate authorities.

Here is a list of statements about this PALS. Please check the appropriate box for each question. Many thanks for your assistance.

Each question is optional. Feel free to omit a response to any question; however the researcher would be grateful if all questions are responded to.

<table>
<thead>
<tr>
<th>Personal Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant ID/username: Secondary Teacher (2)</td>
</tr>
</tbody>
</table>

1. Overall design appears to work

   | Strongly Agree □ | Agree □ x | Agree Moderately □ | Neutral □ | Disagree Modestly □ | Disagree □ | Strongly Disagree □ |

   Please comment

   Design seems fine. Good for teachers to have a structure to work within. Difficult to cater for every possible case but system is starting at a good point.

2. Child Profiles will contain sufficient details to help Carers make informed decisions i.e. knowledge of skill, learning style, language ability, comprehension ability and special interests

   | Strongly Agree □ | Agree □ x | Agree Moderately □ | Neutral □ | Disagree Modestly □ | Disagree □ | Strongly Disagree □ |

   Please comment

   If a couple of teachers happen to be working with the same child would the system allow them to access the child’s profile? In school all of the children’s records are available to reference in the staff room.
3 What way would you like the educational resources to be made available? For example, PDF

PDF format for documents and information. Same documents in Word format so teachers could edit them for use in their classes. Video clips would be a good idea. Stories using Comic Life or other similar applications which could be imported into a website. Suggestions included using Blogmonster.

4 Any other information you wish to add

If you require clarification on any of the questions, please do not hesitate to contact the researcher at doyleth@tcd.ie or mobile 086-8069515.
Questionnaire – Feedback on Prototype II

Thank you for agreeing to supply feedback on the plans for the personalised adaptive learning system (PALS) that I am building. This survey should only take a few moments. Please do not name third parties in any open text field of the questionnaire. Any such replies will be anonymised. In the extremely unlikely event that illicit activity is reported I shall be obliged to report it to the appropriate authorities.

Here is a list of statements about this PALS. Please check the appropriate box for each question.

Many thanks for your assistance.

Each question is optional. Feel free to omit a response to any question; however the researcher would be grateful if all questions are responded to.

<table>
<thead>
<tr>
<th>Personal Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant ID/username:</td>
</tr>
</tbody>
</table>

1. Overall design appears to work

<table>
<thead>
<tr>
<th>Strongly Agree □</th>
<th>Agree □</th>
<th>Agree Moderately □</th>
<th>Neutral □</th>
<th>Disagree Modestly □</th>
<th>Disagree □</th>
<th>Strongly Disagree □</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please comment

It all looks really good. I am the type of learner that will need to step through it and actually use the system before I can give a lot of feedback... you often find things only occur to you when you are actually using the system. The only small thing I would say at the moment is I wouldn't use the word kids to describe the students. I see your point about the kids... I am sure it doesn't matter, and most people will see only STAK and not what it stands for.

2. Child Profiles will contain sufficient details to help Carers make informed decisions ie knowledge of skill, learning style, language ability, comprehension ability and special interests

<table>
<thead>
<tr>
<th>Strongly Agree □</th>
<th>Agree □</th>
<th>Agree Moderately □</th>
<th>Neutral □</th>
<th>Disagree Modestly □</th>
<th>Disagree □</th>
<th>Strongly Disagree □</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please comment

Will the carer/teacher be able to print out the student profile at the end? Most special needs students now have student profiles written by the teacher and it would be very handy for the teacher to be able to print this out without having to write another individual one.. if that makes sense. I can send you on some links from the sess website that will show you some layouts and examples if you want... but as I said it’s only a minor thing and obviously not what your main aim is.
<table>
<thead>
<tr>
<th>What way would you like the educational resources to be made available? For example, PDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would say the more resources and strategies you have the better and lay them out clearly. the link for the sess website is <a href="http://www.sess.ie/resources">http://www.sess.ie/resources</a>. There are a whole list of resources there but the ones under teaching methods and organisation may be of most interest to you. There are a load of good resources on that website.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Any other information you wish to add</th>
</tr>
</thead>
<tbody>
<tr>
<td>You might find these websites useful (speech and language therapist gave them to me)</td>
</tr>
</tbody>
</table>

- [http://www.hello.org.uk/resources/resources/resources-for-practitioners/universally-speaking.aspx](http://www.hello.org.uk/resources/resources/resources-for-practitioners/universally-speaking.aspx)
- [http://www.ican.org.uk/](http://www.ican.org.uk/)
- [http://www.literacytrust.org.uk/assets/0000/1161/ttybresourcelistnew.pdf](http://www.literacytrust.org.uk/assets/0000/1161/ttybresourcelistnew.pdf)
- [https://elklantraining.worldsecuresystems.com/11-16s](https://elklantraining.worldsecuresystems.com/11-16s)
- [http://www.amazon.co.uk/gp/product/B005UEVPJM/ref=oh_o01_s00_i07_details](http://www.amazon.co.uk/gp/product/B005UEVPJM/ref=oh_o01_s00_i07_details)
- [http://www.blacksheeppress.co.uk/products/narrative/ks2](http://www.blacksheeppress.co.uk/products/narrative/ks2)

Apley Speech and Language Therapy Services
Po Box 8
The Murrough
Wicklow
Co Wicklow
PH:- 087/6297563
Web:- [Apley Speech and Language Therapy, Wicklow - Home](https://www.apleyslt.com) - (www.apleyslt.com)

If you require clarification on any of the questions, please do not hesitate to contact the researcher at doyleth@tcd.ie or mobile 086-8069515.
Appendix XIX – Consent Form for Recording of Videos/Images

Letter to RIAM guardians

6th January 2012

Dear Parents

Please find attached a consent form which I would be most grateful for consideration and co-operation.

We hope to do some filming tomorrow during usual class times and because I cannot calculate how much time this will take I will ensure an extra class will be arranged at the end of term or before the assessments begin so that students do not lost out on any teaching time.

If, for any reason, you would prefer you child/children not to partake in this project I understand fully but they are most welcome to come along, observe and have fun with the other children.

Thanking you in anticipation for your co-operation with this project.

Special Education Teacher (1)

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Trinity College Dublin

Informed Consent Form – Parent

Research Background

This research is being conducted by Theresa Doyle in the School of Computer Science and Statistics and forms part of her Ph D. The purpose of this research is to build STAKMATE, a user-friendly web-based Personalised Adaptive Learning System (PALS) which will offer support to carers based on their confidence using recommended teaching strategies. STAKMATE will also provide educational resources based on the children’s learning styles and prior knowledge of required social skills. Carers are being asked to use the teaching strategies and educational resources recommended by the system and comment on the effectiveness, efficiency and learner satisfaction of this type of online learning experience.

Your child’s teacher has agreed to help in the creation of some educational resources for this learning system. We would appreciate if you would permit your child to take part in this project. During this project the researcher will record children in the class role playing some scenes eg initiating interaction, conversation and play. All of this data will be anonymised so it will be impossible to trace any private personal details back to the individuals involved. There are no anticipated risks to your child’s involvement in this project.

The documentation of the findings will be published and disclosed to a body of examiners in Trinity College Dublin as well as external examiners. There may be lectures, PhD theses, conference presentations and peer-reviewed journal articles written as a result of this project. Extracts of data may be used in these lectures etc but under no circumstances will identities of carers or children be made known and information will not be traced back to the carers and children concerned.
**Declaration**

- I have read, or had read to me, this consent form. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction
- I understand the description of the research that is being provided to me
- I agree that my child’s data is used for scientific purposes and I have no objection that this data is published in scientific publications in a way that does not reveal my child’s identity
- The researcher will not reuse my child’s data for any other purpose than those outlined above
- Any observational sessions will be carried out only with my prior consent
- All recordings (ie audio, video and photographs) will not be identifiable
- That I must indicate my permission in writing to my child’s teacher each time he/she wishes to include photographs of my child or other personalized material to individualize educational resources
- if I decide to withdraw my child from this project, all collected information from his/her participation will be removed and will not be included in the research documentation
- I may email the researcher requesting a copy of the findings and/or the dissertation after the project has been completed
- I understand that if my child or anyone in my family has a history of epilepsy then he/she is proceeding at his/her own risk
- I shall declare any conflict of interest with this research
- If any illicit activity is reported during this project that the researcher is obliged to report it to the appropriate authorities
- I understand that everyone concerned in this project will treat the data compiled with confidentiality, including examiners who will be marking this dissertation.
- I have received a copy of this agreement

**PARENT’S NAME:**

**PARENT’S SIGNATURE:**

**Date:**

**Statement of researcher’s responsibility:** I have explained the nature and purpose of this research study, the procedures to be undertaken and any risks that may be involved. I have offered to answer any questions and fully answered such questions. I believe that the participant understands my explanation and has freely given informed consent.

**RESEARCHER’S CONTACT DETAILS:**

**RESEARCHER’S SIGNATURE:**

**Date:**

The researcher may be contacted by email at doyleth@tcd.ie or by mobile 086-8069515 should you require further information on any aspect of this action research inquiry.
Appendix XX– Correspondence to Copyright Holders

Email to Copyright Holders to ask for Permission to Reproduce Material in Supports and Educational Resources

Dear Sir or Madam

I am a Ph D research student at Trinity College Dublin. As part of my studies I am hoping to design and develop a web-based Personalised Adaptive Learning System to support carers when teaching social skills to children with autistic spectrum disorder and/or learning difficulties. The system will recommend appropriate teaching strategies to employ for each required skill, and offer suitable educational resources (based on the child’s learning style and prior knowledge).

I should be most grateful for permission to use material from Navigating the Social World - a Curriculum for Individuals with Asperger's Syndrome, High Functioning Autism and Related Disorders by Jeanette L McAfee as part of the learning content which this system would offer carers to assist them in their work. It is envisaged that here will be approximately twenty-four carers participating in this action research inquiry.

Kind regards

Theresa
Dear Theresa,

Could you provide me with some more information about your system and specifically which parts of the Building Social Relationships that you would want to use?

Take care and I am certain this will work out.

Brenda Smith Myles

Begin forwarded message:

From: Keith Myles <aapc@aapcpublishing.net>
Date: August 12, 2011 12:24:40 PM EDT
To: 'Brenda Myles' <brenda_myles@mac.com>
Subject: FW: AAPC Website Contact

-----Original Message-----
From: amy@aapcpublishing.net [mailto:amy@aapcpublishing.net]
Sent: Friday, August 12, 2011 11:07 AM
To: kmcbr41457@aol.com; 'Keith Myles'
Subject: FW: AAPC Website Contact

See below!

-----Original Message-----
From: AAPC Website [mailto:info@aapcpublishing.net]
Sent: Friday, August 12, 2011 10:24 AM
To: aapcinfo@aapcpublishing.net
Subject: AAPC Website Contact

Contact Request from the website:

Who: Theresa Doyle
When: 2011-08-12 @ 08:24
Email: doyleth@tcd.ie
Note: Dear Sir or Madam

I am a Ph D research student at Trinity College Dublin. As part of my studies I am hoping to design and develop a web-based Personalised Adaptive Learning System to support carers when teaching social skills to children with autistic spectrum disorder and/or learning difficulties. The system will recommend appropriate teaching strategies to employ for each required skill, and offer suitable educational resources (based on the child’s learning style and prior knowledge).
I should be most grateful for permission to use material from Building Social Relationships - A Systematic Approach to Teaching Social Interaction Skills to Children and Adolescents With Autism Spectrum Disorders and Other Social Difficulties by Scott Bellini as part of the learning content which this system would offer carers to assist them in their work. It is envisaged that here will be approximately twenty-four carers participating in this action research inquiry.

Kind regards
Theresa

SECURITY NOTE: To protect against spam, the email address is not automatically populated into the From address. You will need to copy and paste the email address above in your reply.

IP: 134.226.252.155
Browser: Mozilla/5.0 (Windows NT 6.0; rv:5.0) Gecko/20100101 Firefox/5.0

Theresa Mary Doyle <doyleth@tcd.ie> 22/08/2011

to Brenda

Dear Ms Smith Myles

Many thanks for your email and for considering my application to include some material from Building Social Relationships by Scott Bellini.

As part of the action research inquiry I shall be interviewing carers over the next couple of weeks to find out exactly what material they believe should be included in a personalised adaptive learning system and how they wish to incorporate this information in their lesson plans. I shall forward you specific details as soon as this preliminary stage of the project has been completed. Of course, this will be prior to any development work proceeding.

I have also put in a request to include some content from two other social skills training programs ie Social Skills Training by Jed E Baker and Super Skills by Judith Coucouvanis which are also published by the Autism Asperger Publishing Company and which includes your personal contributions. I hope that you can also grant me this permission.

I would like to take this opportunity to thank you for helping me, through your excellent work in this field, to understand the problems that children with ASDs have to cope with in their everyday lives.

Best regards
Hi Theresa,

Thank you for writing. Could you please provide more info pertaining to what parts of the book will be used, and how they will be used? For example, will you be making copies? If so, will the content be limited to the 24 copies you mentioned?

Thanks!

All the best,

Kelly Gilpin

Creative Director

Future Horizons, Inc.

From: Theresa Mary Doyle [mailto:doyleth@tcd.ie]
Sent: Friday, August 12, 2011 10:10 AM
To: Rae Rohus
Subject: Re: Ph D Research

Dear Sir or Madam

I am a Ph D research student at Trinity College Dublin. As part of my studies I am hoping to design and develop a web-based Personalised Adaptive Learning System to support carers when teaching social skills to children with autistic spectrum disorder and/or learning difficulties. The system will recommend appropriate teaching strategies to employ for each required skill, and offer suitable educational resources (based on the child's learning style and prior knowledge).

I should be most grateful for permission to use material from *Navigating the Social World - a Curriculum for Individuals with Asperger's Syndrome, High Functioning Autism and Related Disorders* by Jeanette L McAfee as part of the learning content which this system would offer carers to assist them in their work. It is envisaged that here will be approximately twenty-four carers participating in this action research inquiry.

Kind regards

Theresa

Theresa Mary Doyle <doyleth@tcd.ie> 21/08/2011

to Kelly
Hi Kelly

Many thanks for your prompt response and for considering my application for permission to use information on social skills training.

I shall be interviewing participants over the coming weeks to find out exactly what material they believe should be included in the application and how they wish to integrate this information in their lesson plans. I shall forward you specific details as soon as this preliminary stage of the project has been completed. This will be prior to any development proceeding.

Kind regards

Kelly Gilpin <kelly@fhautism.com> 23/08/2011

to me

Hi Theresa,

That sounds like a plan. I will watch for your email.

Thanks!

Kelly

Susan Stokes <sstokes@woodbinehouse.com> 22/08/2014

to me

Hi Ms. Doyle,

You have the permission of the authors, Mary Jane Weiss and Val Demiri, to use the information from their book in the manner you describe below.

Susan Stokes Editor

Woodbine House
Dear Sir or Madam

I am a Ph D student working in the School of Computer Science and Statistics at Trinity College Dublin. I have designed and developed a personalised dual-adaptive learning system called STAK (Social Skills Training for Autistic Kids) to help carers teach social skills to children who have been diagnosed with ASD. STAK harnesses the carers’ knowledge by creating profiles for both carer and child. It supports carers during the learning experience by providing them with appropriate educational resources and teaching strategies which match these profiles simultaneously to suit their individual needs. A pilot study was conducted recently with a small representative sample of carers and the feedback received was positive.

I am planning to carry out an action research inquiry over the coming months and I should be most grateful for permission to use material from one of your publications in downloadable resources as follows:

**Jumpstarting Communication**  Mary Jane Weiss & Valbona Demiri
Skills in Children with Autism

Woodbine House Inc

All of the MS Word or pdf files in the system would contain acknowledgements of all textbooks and their authors. It is envisaged that carers would seek out these sources in order to find more examples of material that suits their children’s profiles.

If you require any further information on this learning system and my research study, please do not hesitate to contact me.

Best regards

Theresa
Theresa Mary Doyle <doyleth@tcd.ie> 23/08/2014

to Susan

Dear Ms Stokes

Many thanks for your email and for contacting the authors of Jumpstarting Communication Skills in Children with Autism on my behalf. I am also very grateful to the copyright holders, Mary Jane Weiss and Val Demiri, for granting me permission to use the information from their book in my learning system. I really appreciate this very much. I shall ensure that the carers taking part in my research study are informed of the source of this material and that no copyright regulations are breached.

Please find attached details of my research study for your reference.

Best regards

Theresa Mary Doyle <doyleth@tcd.ie> 21/08/2014

to do2learn

Dear Sir or Madam

I am a Ph D student working in the School of Computer Science and Statistics at Trinity College Dublin. I have designed and developed a personalised dual-adaptive learning system called STAK (Social Skills Training for Autistic Kids) to help carers teach social skills to children who have been diagnosed with ASD. STAK harnesses the carers’ knowledge by creating profiles for both carer and child. It supports carers during the learning experience by providing them with appropriate educational resources and teaching strategies which match these profiles simultaneously to suit their individual needs. A pilot study was conducted recently with a small representative sample of carers and the feedback received was positive.

I am planning to carry out an action research inquiry over the coming months and I should be most grateful for permission to use material from your website in downloadable resources as follows:

- behaviour_story_strips
- first_then_responses
- do2learn_classroom_management
- how_to_start_a_conversation
- nonverbal_cues
- sharing_space
- social_skills_card_game
- story_stripsBehaviour
- story_strips
taking_turns
teacher_observation_sheet
corner+topic
responding_to_questions
sharing_space
taking_turns
Emotions Color Wheel
SocialSkillsToolbox
making_friends
picture_cards
respecting_ideas

All downloadable files in the system will contain acknowledgements of all textbooks and their authors. It is envisaged that carers will seek out these sources in order to find more examples of material that suits their children’s profiles.

If you require any further information on this learning system and my research study, please do not hesitate to contact me.
Best regards

Do2Learn Support <do2learn@do2learn.com> 21/08/2014

to me

Hi Theresa,
I am confused on what you would do with all this content. Is it just for study in your research or are you planning to provide it to others outside your committee?

If you are planning on building your own learning system that will be provided to others based on our copyrighted material, we could not approve that use. If you are looking at something more limited, please describe what you have in mind so I can better understand it.

I do wish you well with your studies.
Best regards,
Dorothy

Theresa Mary Doyle <doyleth@tcd.ie> 22/08/2014

to Do2Learn

Hi Dorothy

Many thanks for your email. Please find attached an outline of my research which will be confined to a small group of participants (teachers, parents and key workers) who will register to use the application. At the moment I have fifty carers interested in taking
The aim of my research is to see if the technology I am using actually matches the profiles created in the system with the appropriate resources. This is not a commercial enterprise but will form part of my PhD programme.

I would be very grateful if you would grant me permission to use your copyrighted material in this context.

Best regards

Attachments area
Preview attachment participant_information_sheet_02022014.doc

Hi Theresa,

If the website you are creating is being used only during the study and our included content will not be made available to anyone through the study website or another website afterwards, it is fine to use anything from our site only in your research study.

As you note in your subject consent information, a website had to provide information on how any content will be used. The content on our website generally has releases for use only on the do2learn website. For example, the color wheel images could not be delivered from any other website.

We do make an exception for outside research requests that are time limited studies such as yours and where the material does not stay around on a website afterwards, or as part of any other offered resource like a book.

If that still is not clear, please let me know. I wish you well with your efforts and would be interested in seeing your results. We do have about 10 million hits a month on the social skills content you are including in your study.

Best,
Dorothy
Theresa Mary Doyle <doyleth@tcd.ie>

to Do2Learn

Hi Dorothy

Many thanks for your prompt response and for granting me permission to use the material from your website for my research study. I shall ensure that the carers taking part in my study are informed of the source of this material and that no copyright regulations are breached. I shall also remove this content from the learning system when I have completed my Ph D next year. I shall be happy to share the results of this research with you.

Congratulations on the phenomenal record of hits on your site!

Best regards

Do2Learn Support <do2learn@do2learn.com> 25/08/2014

to me

Hi Theresa,
Thanks for the use clarification. I wish you the best with your studies and look forward to seeing your results.
Best,
Dorothy

Theresa Mary Doyle <doyleth@tcd.ie> 26/08/2014

to Do2Learn

Hi Dorothy

Many thanks for your email and your assistance in this matter.

Best wishes
Theresa, I am the managing editor of AAPC Publishing. Brenda Myles forwarded me your request to use information from works by Jed Baker and Judy Coucouvanis. I herewith grant you permission for such use. We look forward to learning about the results of your research.

Best wishes,

Kirsten McBride

Kirsten McBride, M.A.
Managing Editor
AAPC Publishing

----

From: Theresa Mary Doyle &lt;doyleth@tcd.ie&gt;
Date: August 22, 2011 12:24:17 PM EDT
To: Brenda Myles &lt;brenda_myles@mac.com&gt;
Subject: Re: AAPC Website Contact

Dear Ms Smith Myles

Many thanks for your email and for considering my application to include some material from Building Social Relationships by Scott Bellini.

As part of the action research inquiry I shall be interviewing carers over the next couple of weeks to find out exactly what material they believe should be included in a personalised adaptive learning system and how they wish to incorporate this information in their lesson plans. I shall forward you specific details as soon as this preliminary stage of the project has been completed. Of course, this will be prior to any development work proceeding.

I have also put in a request to include some content from two other social skills training programs ie Social Skills Training by Jed E Baker and Super Skills by Judith Coucouvanis which are also published by the Autism Asperger Publishing Company and which includes your personal contributions. I hope that you can also grant me this permission.

I would like to take this opportunity to thank you for helping me, through your excellent work in this field, to understand the problems that children with ASDs have to cope with in their everyday lives.

Best regards

Theresa
On 22 August 2011 15:05, Brenda Myles &lt;brenda_myles@mac.com&gt; wrote:
Dear Theresa,

Could you provide me with some more information about your system and specifically which parts of the Building Social Relationships that you would want to use?

Take care and I am certain this will work out.

Brenda Smith Myles

Begin forwarded message:

From: Keith Myles &lt;aapc@aapcpublishing.net&gt;
Date: August 12, 2011 12:24:40 PM EDT
To: 'Brenda Myles' &lt;brenda_myles@mac.com&gt;
Subject: FW: AAPC Website Contact

-----Original Message-----
From: amy@aapcpublishing.net [mailto:amy@aapcpublishing.net]
Sent: Friday, August 12, 2011 11:07 AM
To: kmcbr41457@aol.com; 'Keith Myles'
Subject: FW: AAPC Website Contact

See below!

-----Original Message-----
From: AAPC Website [mailto:info@aapcpublishing.net]
Sent: Friday, August 12, 2011 10:24 AM
To: aapcinfo@aapcpublishing.net
Subject: AAPC Website Contact

Contact Request from the website:
Who: Theresa Doyle
When: 2011-08-12 @ 08:24
I am a Ph D research student at Trinity College Dublin. As part of my studies I am hoping to design and develop a web-based Personalised Adaptive Learning System to support carers when teaching social skills to children with autistic spectrum disorder and/or learning difficulties. The system will recommend appropriate teaching strategies to employ for each required skill, and offer suitable educational resources (based on the childâ€™s learning style and prior knowledge).

I should be most grateful for permission to use material from Building Social Relationships - A Systematic Approach to Teaching Social Interaction Skills to Children and Adolescents With Autism Spectrum Disorders and Other Social Difficulties by Scott Bellini as part of the learning content which this system would offer carers to assist them in their work. It is envisaged that here will be approximately twenty-four carers participating in this action research inquiry.

Kind regards
Theresa

SECURITY NOTE: To protect against spam, the email address is not automatically populated into the From address. You will need to copy and paste the email address above in your reply.

IP: 134.226.252.155
Browser: Mozilla/5.0 (Windows NT 6.0; rv:5.0) Gecko/20100101 Firefox/5.0

Theresa Mary Doyle <doyleth@tcd.ie> 24/08/2011

to Brenda, kmcbr41457

Dear Ms McBride

Many thanks for your email and for granting me permission to use information from works by Jed Baker and Judy Coucouvanis. I appreciate your assistance very much.

I shall contact you again as soon as I have results from the preliminary stage of my action research project to confirm the exact material that the carers would like me to include in

the personalised adaptive learning system.

Best regards
thompsonb41457@aol.com 24/08/2011

to me, brenda_myles

Thank you very much. In fact, we are interested in reviewing your findings with a possible eye toward possible publication. Please stay in touch.

Kirsten McBride

Theresa Mary Doyle <doyleth@tcd.ie> 25/08/2011

to kmcbr41457

Dear Kirsten

Many thanks for your email. That would be fantastic. I shall certainly keep you posted.

Best regards

Theresa Mary Doyle <doyleth@tcd.ie> 21/08/2014

to kmcbr41457, Brenda

Dear Kristen

Further to my email in August 2011, I wish to inform you that I have recently completed the design and development of a personalised dual-adaptive learning system called STAK (Social Skills Training for Autistic Kids) to help carers teach social skills to children who have been diagnosed with ASD. STAK harnesses the carers’ knowledge by creating profiles for both carer and child. It supports carers during the learning experience by providing them with appropriate educational resources and teaching strategies which match these profiles simultaneously to suit their individual needs. A pilot study was conducted recently with a small representative sample of carers and the feedback received was positive.

I am planning to carry out an action research inquiry over the coming months and I should be most grateful for permission to use material from a number of your publications in downloadable resources as follows:


Please see attached details of the extracts that I wish to include in the system. All of the MS Word or pdf files would contain acknowledgements of all textbooks and their authors. It is envisaged that carers would seek out these sources in order to find more examples of material that suits their children’s profiles.

If you require any further information on this learning system and my research study, please do not hesitate to contact me.

Best regards
Theresa

Attachments
Preview attachment AAPC_20082014.xlsx

Kirsten Mcbride <kmcbr41457@aol.com> 22/08/2014
to me, brenda_myles

Theresa,
Again, thank you for your interest in AAPC's publications. I herewith grant you permission to use the materials listed below for the stated purpose. As mentioned earlier, if you decide to publish the results of your study, we hope you will consider submitting a proposal to AAPC Publishing.

Kirsten

Kirsten McBride, M.A.
Managing Editor

AAPC Publishing

-----Original Message-----
From: Theresa Mary Doyle <doyleth@tcd.ie>
To: kmcbr41457 <kmcbr41457@aol.com>
Cc: Brenda Myles <brenda_myles@mac.com>

Theresa Mary Doyle <doyleth@tcd.ie>
to Kirsten, Brenda

Dear Kristen

Many thanks for your email and for granting me permission to use the information from your publications in my learning system. I really appreciate this very much. I shall ensure that the carers taking part in my research study are informed of the source of this material and that no copyright regulations are breached.

I shall be very happy to share the results of my research with you and submit a proposal to AAPC Publishing for your consideration when I have completed my Ph D next year.

Best regards

Theresa

Dear Director

I have designed a learning system to help carers teaching social skills to children who have been diagnosed with an autism spectrum disorder as part of a Ph D research study in the School of Computer Science and Statistics, Trinity College Dublin. This project is non-commercial and will involve approximately fifty carers (i.e., parents, teachers, and key workers) who are working with children with this condition and helping me to evaluate this application.

The idea behind STAK is simple. The system helps teachers and parents to create profiles. It then uses this information to tailor supports and resources which can be accessed through the Activity Centre. These samples will help carers to identify the most appropriate material available online for the children they are teaching.

I would be most grateful if you would grant me permission to include some material available on your website as downloadable files in my learning system. I would ensure that full credit would be given to Behavior Frontiers. I would also indicate your URL to encourage carers to visit your website to find other suitable resources and training courses.

I shall assume if I do not receive a response from you to the contrary that you would have no objection to my use of this material in my study.

Many thanks in advance for your assistance in this matter.

Kind regards

23/08/2014

info@behaviorfrontiers.com
to me
Thank you for your interest in Behavior Frontiers ABA programs. We will contact you in the near future regarding your email inquiry.

Theresa Doyle <doyleth@tcd.ie> 21/04/2006

to information

Dear Dr Smith
I am a student of Trinity College Dublin and as part of the requirements of the first year of an M. Sc. in IT in Education I am about to carry out a case study. I am developing a multimedia tool to introduce parents to Social Stories. I have found a small group of parents here in Dublin who are willing to try out this learning tool with their children.

I have found your 'Writing & Developing Social Stories' an invaluable reference. I should be most grateful if you would grant me your permission to use the text of some of your stories and resource material in this project. I should, of course, acknowledge your work throughout the documentation and website as per your instructions.

Many thanks for your assistance in this matter.

Regards

Simon Wyatt <scwyatt@interactive-connections.co.uk> 24/04/2006

to me

Theresa,

Great to hear of your interest in Social Stories and your work. Please do use my work as you feel fit and acknowledge me. I would like to hear how it goes. I know of a Sheffield MSc student doing something akin to your multimedia area. Would you like her contact details?

Best regards,

Caroline

Dr. Caroline Smith

Tel: +44 (0) 1636 636060
Email: scwyatt@interactive-connections.co.uk
www.interactive-connections.co.uk

**********************************************************************

*
Dear Dr Smith

Many thanks for all your help last year. I completed the pilot study and Trinity College allowed me to expand this research and work with a small group of parents to see if they could create their own social stories, using JClic software and tutorials that I had supplied.

I gave the group access to some sample activities that I had adapted. I added a few more topics to suit individual needs. I have used the text from some of your stories in these examples as follows:

'James's Story: Bins'
'Why children have pencils in my school'
'Things Martin does well'
'What to do when the fire bell rings'
'Pete's story about listening when Maths get hard'
'Playing outside. Why children take off their coats,'
'Will my things still be there when I get back?'

I have acknowledged your material throughout the documentation so I hope that this is okay with you. I am hoping to submit the completed project by 1st May.

Best regards

Theresa Doyle <doyleth@tcd.ie> 09/04/2007

to Simon

Dear Theresa,

Sounds all very exciting. Any chance of an emailed copy of your project when you are happy with it?
Keep up the good work.
Best Regards,

Caroline

Caroline Smith (Dr)
Tel: 01636 636060

11/04/2007

Theresa Doyle <doyleth@tcd.ie>

to Simon

Dear Dr Smith

Many thanks for your email. I shall certainly email a copy of the project to you when it is finished. It would be great to get your comments.


Theresa Mary Doyle <doyleth@tcd.ie> 23/08/2014

to Simon

Dear Dr Smith

Further to my last correspondence with you, I have designed a learning system to help carers teaching social skills to children who have been diagnosed with an autism spectrum disorder as part of a Ph D research study in the School of Computer Science and Statistics, Trinity College Dublin. This project is non-commercial and will involve approximately fifty carers (ie parents, teachers and key workers) who are working with children with this condition and helping me to evaluate this application.

The idea behind STAK is simple. The system helps teachers and parents to create profiles. It then uses this information to tailor supports and resources which can be accessed through the Activity Centre. These samples will help carers to identify the most appropriate material available online for the children they are teaching. I would be most grateful if you would grant me permission to include some of your social stories as downloadable files in my learning system. I would ensure that full credit would be given to you and your publication.

I shall assume if I do not receive a response from you to the contrary that you would have no objection to my use of this material in my study.

Many thanks in advance for your assistance in this matter.

Best regards
to me

Theresa,

I am currently on holiday so cannot give you a detailed response at present. However, as you know the Social Stories book is published by Speechmark so I think you will need their permission to include downloadable files from the book. When I return home I will let you know who in Speechmark should be contacted.

Also if you let me know what you need I can let you have 2 or 3 Social Stories which are not in the book if this helps.

Best regards,

Caroline

Theresa Mary Doyle <doyleth@tcd.ie>

to Simon

Dear Dr Smith

Many thanks for getting back to me so quickly. I really appreciate you breaking your holiday to respond to my email.

My learning system is designed to match children's profiles to appropriate educational resources. The system recommends positive reinforcement as one of two strategies to use when teaching children who have reached the 'advanced' learning stage. Social stories will be selected by the system as a suitable educational resource for children at that skill level.

I was hoping to include your story entitled 'Things Martin does well' (page 42) to show carers how important it is to give children a positive message about their progress. The children's language ability and comprehension ability would be 'average'.

Similarly I was hoping to include your story entitled 'Why Children have Pencils in My School' (page 39) to show carers how to teach simple school rules to children who have poor language and comprehension abilities.
Finally I think that 'Will my things still be there when I get back' (page 55) would be a good example of a story suitable for a child with good language ability and average comprehension ability, which would show carers how social stories could help children understand how to behave in certain situations.

The system is catering for 7,000 different profiles. I need to provide sufficient supports and resources to carers to guide them towards material what best suits the needs of the children they are teaching. I would be very happy to include any of your social stories which you think would suit this purpose. I am extremely grateful for your kind offer. Naturally I would acknowledge your authorship throughout.

I am attaching an outline of my research study for your reference.

Best regards

Attachments area
Preview attachment participant_information_sheet_02022014.doc

W
Theresa Mary Doyle <doyleth@tcd.ie> 24/08/2014
to info

Dear Director

I have designed a learning system to help carers teaching social skills to children who have been diagnosed with an autism spectrum disorder as part of a Ph D research study in the School of Computer Science and Statistics, Trinity College Dublin. This project is non-commercial and will involve approximately fifty carers (ie parents, teachers and key workers) who are working with children with this condition and helping me to evaluate this application.

The idea behind STAK is simple. The system helps teachers and parents to create profiles. It then uses this information to tailor supports and resources which can be accessed through the Activity Centre. These samples will help carers to identify the most appropriate material available online for the children they are teaching.

I would be most grateful if you would grant me permission to include some material available on your website as downloadable files in my learning system. I would ensure that full credit would be given to The Genesis School and Eden Program II. I would also indicate your URL to encourage carers to visit your website to find other suitable resources.

I shall assume if I do not receive a response from you to the contrary that you would have no objection to my use of this material in my study.

Many thanks in advance for your assistance in this matter.
Kind regards
Theresa

27/08/2014

ILENE ROSEN <Irosen@eden2.org>

to me

I am sorry but we do not allow use of our materials.

Ilene S. Rosen
Asst. Director of Development & Public Relations
Eden II/Genesis Programs

150 Granite Avenue
Staten Island, NY 10303

(718) 816-1422 ext. 104
Irosen@eden2.org

From: Theresa Mary Doyle [mailto:doyleth@tcd.ie]
Sent: Sunday, August 24, 2014 4:38 PM
To: info@eden2.org
Subject: Ph D Research

Theresa

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the contents of this information, except its direct delivery to the intended recipient named above, is strictly prohibited.
Theresa Mary Doyle <doyleth@tcd.ie> 27/08/2014

to ILENE

Dear Ms Rosen

Many thanks for your email. I wish to confirm that I shall not include any of your material in my learning system.

Kind regards

Helen Ginty <hginty@sess.ie> 28/08/2014

to me

Theresa,

Thank you for your communication. Can you please advise as to which information you wish to include and how you it will be used on the website,

Best wishes,

Helen Ginty

Advisor
Special Education Support Service (SESS)

SESS Office Tel No: (021) 425 4241
SESS Office Fax No: (021) 425 5647

Disclaimer
The contents and any attachment of this e-mail are private and confidential. They are intended only for the use of the intended addressee. Dissemination, forwarding, publication or other use of the message or attachments by any unauthorised person is strictly prohibited. If you are not the intended addressee, or the person responsible for delivering it to the intended addressee, you are notified that any copying, forwarding, publication, review or delivery of this e-mail or any attachments to anyone else or any other
Many thanks for your email. The file in particular that I would like to include is entitled 'Challenging Behaviour and Students with Special Educational Needs'.

Of course there is much advice on your website on using visual aids and other teaching strategies that would be very helpful for the carers that I am trying to support through my learning system.

The aim of this research is to explore how adaptive techniques can be used effectively to match profiles with appropriate support material (please see attached details).

I would be very grateful if the Special Education Support Service would grant me permission to use these resources in this research study with a small group of participants for a limited time span.

Kind regards

Theresa Mary Doyle <doyleth@tcd.ie>
Helen Ginty <hginty@sess.ie> 29/08/2014
to me

Theresa,

Thank you for that clarification. We have no issue with you creating these links. Please note our Disclaimer form our website.

http://www.sess.ie/disclaimer

We wish you every success,

Best wishes,

Helen Ginty
Advisor

Special Education Support Service (SESS)

SESS Office Tel No: (021) 425 4241
SESS Office Fax No: (021) 425 5647

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WARNING: Computer viruses can be transmitted via email. While this e-mail has been swept for the presence of computer viruses, you are requested to carry out your own virus check before opening any attachment. The SESS accepts no liability for any loss or damage which may be caused by software viruses transmitted by this e-mail.
to Helen

Dear Helen

Many thanks for your email and for granting me permission to use material from your website in my learning system. I shall include the disclaimer and encourage the participants to visit your site and attend training courses that you organise.

I appreciate your assistance in this matter very much.

Best wishes

Theresa Mary Doyle <doyleth@tcd.ie> 29/08/2014

21/08/2014

Theresa Mary Doyle <doyleth@tcd.ie>

to permissions

Dear Sir or Madam

I am a Ph D student working in the School of Computer Science and Statistics at Trinity College Dublin. I wish to inform you that I have recently completed the design and development of a personalised dual-adaptive learning system called STAK (Social Skills Training for Autistic Kids) to help carers teach social skills to children who have been diagnosed with ASD. STAK harnesses the carers’ knowledge by creating profiles for both carer and child. It supports carers during the learning experience by providing them with appropriate educational resources and teaching strategies which match these profiles simultaneously to suit their individual needs. A pilot study was conducted recently with a small representative sample of carers and the feedback received was positive.

I am planning to carry out an action research inquiry over the coming months and I should be most grateful for permission to use material from a number of your publications in downloadable resources as follows:

Motivate to Communicate!  Simone Griffin and Dianne Sandler
Revealing the Hidden Social Code  Marie Howley & Eileen Arnold
My Social Stories Book  Carol Gray and Abbie Leigh White

Please see attached details of the extracts that I wish to include in the system. All of the MS Word or pdf files would contain acknowledgements of all textbooks and their
authors. It is envisaged that carers would seek out these sources in order to find more examples of material that suits their children’s profiles.

If you require any further information on this learning system and my research study, please do not hesitate to contact me.

Kind regards

Attachments area
Preview attachment JPK_20082014.xlsx

X

25/09/2014

JKP Permissions <Permissions@jkp.com>
to me

Dear Theresa Mary Doyle,

Sincere apologies for the delayed reply to your enquiry. Can you please provide us with a little more information about how you intend to use the worksheets/activities? We cannot allow them to be available in the public domain at all so if having them as downloadable resources on the internet would not be possible. However if you were printing the worksheets and using them in your academic work with a small group of children that would probably be fine. How many children are you intending to use the JKP resources with?

Best wishes,

Lucy

Lucy Buckroyd
Editor

(t) +44 (0)20 7833 2307   (f) +44 (0)20 7837 2917   (w) www.jkp.com

Jessica Kingsley Publishers Ltd is a limited company registered in England. Registered number: 2073602
From: Theresa Mary Doyle [mailto:doyleth@tcd.ie]
Sent: 21 August 2014 19:01
To: JKP Permissions
Subject: Re: Request for Permission

Attachments area
Preview attachment JPK_20082014.xlsx

X

27/09/2014

Theresa Mary Doyle <doyleth@tcd.ie>
to JKP

Dear Ms Buckroyd

Many thanks for your email and for considering my proposal. I wish to clarify that I will be working with a small group of carers and children. Only the members of this group will be registered to access resources from the learning system.

I am interested in finding out if the adaptive technologies I am applying match profiles with resources that meet individual needs. By clicking on the icons displayed on screen group members may open files containing appropriate content eg social stories.

If you would prefer I did not include material published by your company in my research study, please let me know.

Kind regards
Theresa
Research Student TCD

JKP Permissions <Permissions@jkp.com> 22/12/2014
to me

Dear Theresa,

I’m very sorry but I cannot find a record of a reply to this query. We would need more clear information about exactly what material you would be using from our books.
If it is large sections of the book then we are unlikely to grant permission. If you could give page references that would be extremely helpful.

My profuse apologies that we hadn’t responded to your latest message.

Best wishes,

Lucy

Lucy Buckroyd
Editor

(t) +44 (0)20 7833 2307   (f) +44 (0)20 7837 2917   (w) www.jkp.com

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From: Theresa Mary Doyle [mailto:doyleth@tcd.ie]
Sent: 27 September 2014 11:47
To: JKP Permissions
Subject: Re: FW: Request for Permission

Theresa Mary Doyle <doyleth@tcd.ie> 27/12/2014
to JKP

Dear Lucy

Many thanks for your email which I received during my Christmas vacation. With reference to your query, I sent an attachment earlier with the references you require. As it appears you may have difficulty opening the MS Excel file I am including the details as follows:

<table>
<thead>
<tr>
<th>Publication</th>
<th>Authors</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivate to Communicate!</td>
<td>Simone Griffin and Dianne Sandler</td>
<td>Jessica Kingsley Publisher</td>
</tr>
<tr>
<td>Motivate to Communicate!</td>
<td>Simone Griffin and Dianne Sandler</td>
<td>Jessica Kingsley Publisher</td>
</tr>
<tr>
<td>Motivate to Communicate!</td>
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<td>Jessica Kingsley Publisher</td>
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<tr>
<td>Motivate to Communicate!</td>
<td>Simone Griffin and Dianne Sandler</td>
<td>Jessica Kingsley Publisher</td>
</tr>
<tr>
<td>Motivate to Communicate!</td>
<td>Simone Griffin and Dianne Sandler</td>
<td>Jessica Kingsley Publisher</td>
</tr>
<tr>
<td>Revealing the Hidden Social Code</td>
<td>Marie Howley &amp; Eileen Arnold</td>
<td>Jessica Kingsley Publisher</td>
</tr>
<tr>
<td>My Social Stories Book</td>
<td>Carol Gray and Abbie Leigh White</td>
<td>Jessica Kingsley Publisher</td>
</tr>
</tbody>
</table>
I hope that you will be in a position to allow me to include these resources as downloads in my learning system. This system will only be available to a small group of thirty carers who have agreed to participate in my research study which aims to find a way to personalise resources for individual children with ASDs.

Many thanks for your assistance in this matter.

Kind regards

J KP Permissions <Permissions@jkp.com> 27 Jan

to me

Dear Theresa,

I'm really sorry it has taken so long for us to sort this one out for you.

We are happy to grant permission for you to use the pages from Motivate to Communicate and Revealing the Hidden Social Code as long as it is solely for research purposes and limited to the 30 carers you have mentioned. Unfortunately we cannot allow the page from My Social Stories as that one has tighter restrictions on its copyright than the majority of our books.

If you would like to write up your research and/or distribute the resources more widely you’ll need to reapply for permission.

Best wishes,

Lucy

Lucy Buckroyd

Editor


(t) +44 (0)20 7833 2307 (f) +44 (0)20 7837 2917 (w) www.jkp.com

Jessica Kingsley Publishers Ltd is a limited company registered in England. Registered number: 2073602
Dear Lucy,

Many thanks for your email and for granting me permission to use the pages from Motivate to Communicate and Revealing the Hidden Social Code. I am happy to comply with the terms and conditions that you have outlined above.

I shall now proceed to take down the page from My Social Stories as per your instructions. If I am planning to write up my research and/or distribute the resources more widely I shall reapply for permission as you suggest.

Kind regards,
Appendix XXI – STAK System Documentation

To run the program on a local Apache server type in the following statement in the browser address bar:
//localhost/stakapp/prgs/skmenuhome.php

To run phpmyadmin from local Apache Server type in the following:
//localhost/phpmyadmin
<table>
<thead>
<tr>
<th>No.</th>
<th>Menu</th>
<th>Program name Called from Menu item</th>
<th>Functionality Summary</th>
<th>Calls another program?</th>
<th>Main Table</th>
<th>Type</th>
<th>Validation - FrontEnd /Javascript</th>
<th>Validation - Server Side / PHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Main</td>
<td>skuregistration.php</td>
<td>Register on the Application</td>
<td></td>
<td></td>
<td>reg_sk_validate.js</td>
<td>gen_php_validate.js</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Main</td>
<td>skulogin.php</td>
<td>Log In</td>
<td></td>
<td></td>
<td>reg_sk_validate.js</td>
<td>gen_php_validate.js</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Main</td>
<td>skulogout.php</td>
<td>Log Out</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Resource Controls</td>
<td>sklearningstyle.php</td>
<td>Add/Edit/Delete/List Learning Styles</td>
<td></td>
<td>sklearningstyle</td>
<td>ref_sk_validate.js</td>
<td>refdata_validate.php</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>list_sklearningstyle</td>
<td>ajax</td>
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<td>SQL scripts to create tables, drop tables populate table, grant db rights etc.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>files_support</td>
<td>Fodler for all support files for carers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>files_resource</td>
<td>Fodler for all learning/educational resource files</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>icons_default</td>
<td>stores default icons for support and resource files</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>icons_resource</td>
<td>Folder for icons for Learner resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>icons_support</td>
<td>Folder for all for teacher support file Icons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>images</td>
<td>images used - none used by php system as I think they are all provided by Joomla</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ja_purity_ii</td>
<td>MR needed a copy to see what styles were like</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>jscripts</td>
<td>javascript files to do front-end validation of data entered + Jquery scripts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>prgs</td>
<td>all php files in the application apart from those called via AJAX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>styles</td>
<td>basestyle.css used in php programs + jquery style sheets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>templates</td>
<td>files to be included in all php programs that are e.g. Footer, top file containing stylesheet references, jquery references etc. used by all php programs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Tables and Views in STAK system - as at 13 February 2013

<table>
<thead>
<tr>
<th>No.</th>
<th>Table Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sklearningstyle</td>
<td>Learning styles</td>
</tr>
<tr>
<td>2</td>
<td>Sklangability</td>
<td>Language abilities</td>
</tr>
<tr>
<td>3</td>
<td>Skcomphability</td>
<td>Comprehension abilities</td>
</tr>
<tr>
<td>4</td>
<td>Sktopic</td>
<td>Topics/ Special Interests</td>
</tr>
<tr>
<td>5</td>
<td>Skskill</td>
<td>Skills</td>
</tr>
<tr>
<td>6</td>
<td>Skskilllevel</td>
<td>Learning stage / skill levels</td>
</tr>
<tr>
<td>7</td>
<td>Skteachstg</td>
<td>Teaching strategies</td>
</tr>
<tr>
<td>8</td>
<td>Skteachcom</td>
<td>Teaching components e.g. Example,</td>
</tr>
<tr>
<td>9</td>
<td>Sksupportlevel</td>
<td>Teaching support levels e.g. Full Support, No support</td>
</tr>
<tr>
<td>10</td>
<td>Skstgquestion</td>
<td>Questions for each of the teaching strategies</td>
</tr>
<tr>
<td>11</td>
<td>Skresourcetctg</td>
<td>Learning resource category e.g. Steps to Success</td>
</tr>
<tr>
<td>12</td>
<td>Skresourcetype</td>
<td>Type of files e.g. PDF, Word, etc and the default logo associated with a file (learningn resource and carer support)</td>
</tr>
<tr>
<td>13</td>
<td>Skauditc</td>
<td>Audit trail of Clicks on Support icons during an activity/lesson</td>
</tr>
<tr>
<td>14</td>
<td>Skauditl</td>
<td>Audit trail of Clicks on Resource / Learning icons during an activity/lesson</td>
</tr>
<tr>
<td>15</td>
<td>Sklresource</td>
<td>Learning Resources - file names of actual pdf, documents, video etc used by the Child</td>
</tr>
<tr>
<td>16</td>
<td>Sktresource</td>
<td>Carer Supports - file names of actual pdf, documents, video etc used by the Carer</td>
</tr>
<tr>
<td>17</td>
<td>Sklearner</td>
<td>Learner/child</td>
</tr>
<tr>
<td>18</td>
<td>Skuser</td>
<td>Carer and all registered users</td>
</tr>
<tr>
<td>19</td>
<td>Sklearnerskill</td>
<td>List of skills and associated learning stage for each child</td>
</tr>
<tr>
<td>20</td>
<td>Sklearnertopic</td>
<td>List of topics/special interests defined for each child.</td>
</tr>
<tr>
<td>21</td>
<td>Skcarerlearner</td>
<td>Carer - learner link. How we know what child is associated with a Carer</td>
</tr>
<tr>
<td>22</td>
<td>Skcarerstg</td>
<td>Contains the answers that the CARER gave for each of the questions about each teaching strategy.</td>
</tr>
<tr>
<td>23</td>
<td>Skcarerstgsupport</td>
<td>Contains one record for each Carer-Teaching Strategy. This stores a count of the YES for each of the teaching strategies and determines the default level of support offered to the Carer.</td>
</tr>
<tr>
<td>24</td>
<td>Sklresourceprofile</td>
<td>Learning Resources Profile. Defines learner profile that can use the file</td>
</tr>
<tr>
<td>25</td>
<td>Sktresourceprofile</td>
<td>Carer Supports Profile. Defines profile of support file - the Teaching Strategy, Teaching Component, Level of Support</td>
</tr>
<tr>
<td></td>
<td>Skabstractln</td>
<td>Abstract Learner - used for linking to Strategy and Resource Categories. NOT USED ANYMORE - mr 13/03/2013</td>
</tr>
<tr>
<td></td>
<td>View Name</td>
<td>Description</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Vwlprofilename</td>
<td>Used in the List learner profile screen</td>
</tr>
<tr>
<td>2</td>
<td>Vwcarerlearner</td>
<td>Used in the List Carer-learner screen</td>
</tr>
<tr>
<td>3</td>
<td>Vwlearnernamecarer</td>
<td>Used in the Childskill, ChildTopic and Start Lesson screens</td>
</tr>
<tr>
<td>4</td>
<td>Vwcarerstg</td>
<td>Used when about to do a lesson?</td>
</tr>
<tr>
<td>5</td>
<td>Vwlearnerskill</td>
<td>Used in the List learner-skills screen</td>
</tr>
<tr>
<td>6</td>
<td>Vwlearnerstopy</td>
<td>Used in the List learner-Special Interests screen</td>
</tr>
<tr>
<td>7</td>
<td>Vwabstractln</td>
<td>Used in the List Abstract learner screen. NOT USED ANYMORE - nr 13/03/2013</td>
</tr>
<tr>
<td>8</td>
<td>Vwabstractlearn</td>
<td>Created and used only to fix the Abstract Learner descriptions</td>
</tr>
<tr>
<td>9</td>
<td>Vwtprofilename</td>
<td>Used in the List Carer Supports Profile screen</td>
</tr>
<tr>
<td>10</td>
<td>Vwstgabstractln</td>
<td>Use to list Teaching Strategies-Abstract Learner Link</td>
</tr>
<tr>
<td>11</td>
<td>Vwctgabstractln</td>
<td>Use to list Resource Categories-Abstract Learner Link</td>
</tr>
<tr>
<td>12</td>
<td>Vwlearnercarer</td>
<td>Use in Allocate Child to another Carer</td>
</tr>
</tbody>
</table>

Total Tables and Views
<table>
<thead>
<tr>
<th>Setting up the STAK Database</th>
<th>Before running the script</th>
<th>Setting up the database</th>
<th>After running the script</th>
</tr>
</thead>
<tbody>
<tr>
<td>To be run in the order listed below</td>
<td>grantrights_stak.sql</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>grantrights_stak.sql</td>
<td>Make sure all tables are gone - do DROP TABLE &lt;tablename&gt; or click Drop on the table row in phpmyadmin</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>droptables_stak.sql</td>
<td>Make sure no Tables exist AND Make sure no Views exist</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>createtables_stak.sql</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>populatetables_stak.sql</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>OMIT THIS LINE mr 13/03/2013 createandpopulate_abstractlearner.sql</td>
<td>Make sure that no views exist. Drop all views</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>populateuser_stak.sql</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>OMIT THIS LINE mr 13/03/2013 fix_abstractlearner.php</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Drop all views</td>
<td>createviews_stak.sql</td>
<td>OMIT THIS LINE mr 13/03/2013 make sure to DROP TABLE skabstractl when this is finished because the correct table is now skabstractln.</td>
</tr>
<tr>
<td>9</td>
<td>Check the database: There SHOULD BE 28 TABLES AND 11 VIEWS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Changes made to add in a Carer Role and Carer-Child Relationship

<table>
<thead>
<tr>
<th>Type</th>
<th>Program name</th>
<th>Folder</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Program</td>
<td>skcarer1.php</td>
<td>prgs</td>
<td>change to allow user to view/edit Role of the carer</td>
</tr>
<tr>
<td>2 Program</td>
<td>get_userdetails.php</td>
<td>ajx</td>
<td>change existing program to also pick up the ROLE</td>
</tr>
<tr>
<td>3 Program</td>
<td>get_carerrolecodeByName.php</td>
<td>ajx</td>
<td>new program to pick up role code if have the role name/desc</td>
</tr>
<tr>
<td>4 SQL Script</td>
<td>create_and_populate_rolesandrels_stak.sql</td>
<td>databasescripts</td>
<td>Script to create and populate 2 new tables: skrole and skreltype</td>
</tr>
<tr>
<td>5 SQL Script</td>
<td>alter_user_and_carerchild.sql</td>
<td>databasescripts</td>
<td>Script to add new field to the Carer/User table and to the CarerLearner table</td>
</tr>
<tr>
<td>6 Table</td>
<td>Skuser</td>
<td>stakdb / database</td>
<td>new field = skrolecode</td>
</tr>
<tr>
<td>7 Table</td>
<td>skcarerleaarner</td>
<td>stakdb / database</td>
<td>new field = skreltype</td>
</tr>
<tr>
<td>8 Table</td>
<td>Skrole</td>
<td>stakdb / database</td>
<td>new table - containing a list of different roles for users/carers</td>
</tr>
<tr>
<td>9 Table</td>
<td>Skreltype</td>
<td>stakdb / database</td>
<td>new table - containing a list of different relationship types between carers and learners</td>
</tr>
<tr>
<td>10 Program</td>
<td>Skchildprofile</td>
<td>prgs</td>
<td>change to allow user to view/edit Relationship type between the Carer and Child</td>
</tr>
<tr>
<td>11 Program</td>
<td>get_reltypecodeByName.php</td>
<td>ajx</td>
<td>new program to pick up relationship type code if have the role name/desc</td>
</tr>
</tbody>
</table>
Appendix XXII – Usability Test Script

Usability Test – STAK (Social Skills Training for Autistic Kids)

USABILITY TEST SCRIPT

Web browser should be open in Google or some other ‘neutral’ page

Welcome

Before we begin, I have some information for you and I am going to read it to make sure that I cover everything.

You probably already have a good idea why I asked you here today, but let me go over it again briefly. I am asking people to try using a web-based personalised dual-adaptive learning system that I have been working on so I can see whether it works as it is intended to. The session should take about an hour.

The first thing I want to make clear right away is that we are testing the application, not you. You cannot do anything wrong so please do not worry about making mistakes.

As you use the application I am going to ask you as much as possible to try to think out loud: to say what you are looking at, what you are trying to do, and what you are thinking. This will be a big help to me later.

Please do not worry about hurting my feelings. We are doing this exercise to improve the site so I need to hear your honest reactions.

If you have any questions as we go along, please ask them. I may not be able to answer them straight away, since I am interested in how people do when they do not have someone sitting next to them to help. If you still have any questions when we have finished the test I shall try to answer them then. If you would like to take a break at any stage, please let me know.

You may have noticed the microphone. With your permission, we are going to record what happens on the screen and our conversation. The recording will only be used to help me figure out how to improve the application and it will not be seen or heard by anyone expect people working on this project. It also helps me because I do not have to take as many notes.
I am going to ask you to sign a simple permission form. As you see, the form just states that I have your permission to record you, and that the recording will only be seen by the people working on this project.

**Give participant a recording permission form and a pen**
**While he/she signs it, START the SCREEN RECORDER**

Informal questions to relax the participant:

How many hours a week altogether do you spend using the Internet, including web browsing and email? What is the split between email and browsing? What kind of sites are you looking at when you browse the web? Do you have any favourite sites?

**Click on the Bookmark for the site’s Home Page**

First I am going to ask you to look at this page and tell me what you make of it: what strikes you about it, what can you do here and what is it for.

Look around and talk about what you see.

You can scroll if you want to but please do not click on anything yet.

Allow this to continue for three or four minutes

**Specific Tasks**

Now I am going to ask you to try doing some specific tasks. I am going to read each one out loud and give you a printed copy.

I am going to ask you to do these tasks without using Search. We will learn more about how well the site works that way.

It will also help us if you can try to think out loud as you go along.

- Hand the participant the first scenario and read it aloud
- Allow the user to proceed until you do not feel that it is producing any value or the user becomes very frustrated
- Repeat for each task or until time runs out

**Say THANK YOU**

**Stop the screen recorder and save the file**

Source: Don’t make me think by Steve Krug available at URL: http://www.sensible.com
FIRST SCENARIO
1. Open the application at URL: http://www.staklearn.com
2. Register to use the application
3. Login with new username and password
4. Logout

SECOND SCENARIO
1. Login
2. Create a profile for Caregiver
3. Logout

THIRD SCENARIO
1. Login
2. Create a profile for Child – visual learner, good language ability, poor comprehension ability
3. Skills – Conversation, novice stage
4. Special Interests – Games
5. Logout

FOURTH SCENARIO
1. Login
2. Start an Activity
3. Choose Child Profile
4. Overwrite Support level
5. Click on Supports
6. Choose Support
7. Click on Resources
8. Select one Resource
9. Logout
Appendix XXIII – STAK Quick Start
<table>
<thead>
<tr>
<th>STAK Guidelines</th>
<th>1 WEBSITE ADDRESS</th>
<th>2 REGISTRATION</th>
<th>3 LOGIN</th>
<th>4 CARER PROFILE</th>
<th>5 CHILD PROFILE</th>
<th>6 SOCIAL SKILLS</th>
<th>7 SPECIAL INTERESTS</th>
<th>8 ACTIVITY CENTRE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Create a username (at least 8 characters long using only letters, numbers, underscores and hyphens)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Create a password (to include a lowercase letter, an uppercase letter and a number between 0-9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Then enter your email address</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Users must login using a registered username and password to access the application</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Select Caregiver option on the left-hand sidebar and click on My Profile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pick a role from the dropdown menu that best describes you</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Click on Teaching Strategies and select one of the strategies from a dropdown list</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Answer questions (tick yes or leave blank as appropriate)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Do this for each of the seven strategies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Select Child option in Caregiver Section or Child Profile in Child Section</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Create an identifier (please do not use the child’s real name)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Indicate the child's gender and date of birth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Enter the child's diagnosis if you know it</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Select the child's learning style [Visual, Aural, Read/Write or Kinaesthetic]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Click on language ability and answer questions (tick yes or leave blank as appropriate)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Click on comprehension ability and answer questions (tick yes or leave blank as appropriate)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Save the profile at this point</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Add Skills and Special Interests to complete the profile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Initiating interaction, Conversation, Play, Reciprocation, Problem solving, reading non-verbal cues, mind reading, self-control, self-awareness and behaviour management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Click on learning stage and answer questions (tick yes or leave blank as appropriate)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Books, cinema, clothes, family, food, games, holidays, school, television etc</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proceed to centre and select option to start an activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix XXIV – Recording Consent Form – Usability Study

Recording Consent Form

Thank you for participating in my usability research.

I will be recording your session to allow me to observe your session and benefit from your comments and suggestions.

Please read the statement below and sign where indicated.

I understand that my usability test session will be recorded. I grant the researcher permission to use this recording for the purposes of this research only and for improving the application being tested.

Signature_______________________________________________________________

Print your name_________________________________________________________

Date___________________________________________________________________

The researcher may be contacted by email at doyleth@tcd.ie or by mobile 086-8069515 should you require further information on any aspect of this action research inquiry.
Appendix XXV – Usability Study Feedback

(recording of usability tests is available on accompanying DVD)

USABILITY TESTS – FEEDBACK

Tests were carried out between Saturday 18th May and Saturday 8th June 2013
Participants (7): Three parents, three teachers and a special needs assistant

- **Logout** option – better on right-hand side under login button
- Alternatively have logout option showing when user is logged in [on the right-hand side]
- **Registration** – message re username and password before the operator registers
- **Role** – who can use the system? Carer could be parent, teacher or key worker
- **Teaching Strategies** – how do people know to select this option?
- Description for each teaching strategy – pull-down or stretching box is a problem as it is not clear what the function of the scroll bar is here (user is inclined to waste time trying to sort out the box)
- **Tick Yes** – one operator mentioned that something appeared to be missing ie No box
- Nice to have a reference to the strategy in the description as the user knows then the last strategy he/is completed
- Fade out description when user saves and goes out of teaching strategy
- Consider changing ‘children’ to ‘child’
- Show user his/her progress through the teaching strategies ie 2 out of 7 completed or progression similar to downloading software components – strategy ticked as it questions have been answered by the user
- Consider changing ‘Do you believe that….?’
- Parents may not be familiar with the word ‘generalise’ – consider an alternative eg ‘adapt’
- **Child Profile** – message needed here to direct users eg please tick on Child Profile tab
- **Date of Birth** – back arrow for year – one parent was very clever and selected today’s date and modified it so she would have the format correct
- **Learning Styles** – children sometimes have a mix of styles so would it be possible to tick more than one option or have ‘hybrid’ styles; could musical style be added? For child with multi-learning styles could user select a number of styles by holding the control key down as different styles are being selected?
- No warning to ‘save’ inputs on Child Profile page before selecting ‘Skills’ or ‘Special Interests’
- Prompt to ‘Save and continue’ or ‘Save and proceed to Skills section’ or ‘Save and come back later’ and ‘Saved on whatever date’
- Auto save child profile before adding skills and interests
- Reminder of what skills the Carer has added
- Descriptors required for each skill eg Reciprocation
- Not clear what ‘List’ means
- **Skills Screen** – Carers expected to be brought to an input screen ie go straight to Skills screen – add/edit option not clear what this was for when they were taken to this page instead
- Too many options on each page – this could lead to confusion
- Hold student/child profile while completing all skills and interests – some operators found it tedious to have to go back and select identifier each time
- Danger of selecting wrong child from the list of identifiers – warning message should pop up ‘Are you sure you want to work on Mary’s Profile?’
- Full range of skills on screen with radio buttons suggested as difficult to remember what skills operator had added to each child
- **Special Interests** – include computers/ipad, social media, Internet, Dr Who, Chat rooms, sports, music, art, dance, friends, nature, history, animals, trains, boats, planes on the list
- **Start an activity** button on the Activity Menu Page
- Click on any of the images on screen to be taken to **Start an Activity** section
- Move ‘hi message’ down a bit on left-hand side
- Building blocks or Road Map – to let the user know where he/she is
- **Support Type** – description of each one
- Message on screen – ‘For more information click here’
- **Resources** – when users finds a resource that they like it would be nice for them to be able to ‘flag’ it to return to later
- Example Eye Contact – nice to be shown a list of other resources on the same theme
- Request for Button to go back to main menu [there is one ie ‘Home’]
- Some resources refer carers to websites for activities – suggestions that it might be better to place these in the ‘suggested other sites’ or ‘links’ pages
- Exit or Close – sometimes operator not sure how to get back to previous screen
- Closing tab in new window was a problem for some – not familiar with how browsers work
- Home / logged out
- **Go to Start** – afraid to click this option in case operator would lose everything
- Position of close button – review
- Questions – long process?
Appendix XXVI – Case Study Information Sheet

TRINITY COLLEGE DUBLIN
INFORMATION SHEET FOR PARTICIPANTS

Project Title:  **STAK – Social Skills Training for Autistic Kids**

Dear Caregiver

I am a research student in the School of Computer Science and Statistics and I am carrying out a study as part of my Ph D. Knowing first hand how difficult it is to find services and support for children with special needs, I am aiming through my research to give parents, teachers and key workers like yourself easy access to material to help you teach social skills to children who have been diagnosed with autistic spectrum disorders (ASDs).

**Background**

I have built a website called STAK which will guide you in the use of appropriate teaching strategies and provide you with a wide range of educational resources which are based on best practice in this area. The system has been designed to tailor all of this support to your own individual requirements.

**STAK**

Here is an outline of how you could help me test STAK and give me feedback to ensure that the learning tool that I have designed will be of benefit to any Caregivers and Children who use it.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Site** | Overview of STAK  
  Registration  
  Caregiver Section  
  Child Section  
  Activity Centre |
| **Activities** | Create Carer Profile by responding to seven questions on each teaching strategy  
  Create Child Profile by selecting the child’s learning style and by responding to questions on the child’s language ability, comprehension ability, learning stage for each of the ten social skills and by indicating child’s special interests  
  Select some social skills to teach a child  
  Try teaching strategies and educational resources recommended by STAK |
| **Reports** | Complete two online questionnaires (one at the beginning and one at the end of your learning experience with STAK  
  Comment on your experience of the learning system  
  Suggest changes to improve the system |
Trinity College Dublin – Ethics Policy

Purpose
The purpose of this qualitative study is to explore how a dual-adaptive learning system matches child profiles with appropriate educational resources and teaching strategies, while at the same time providing caregivers using those recommended strategies with support at levels consistent with their own profiles, to enable them to develop social skills in children with ASDs and meet their individual needs.

Participation
Your participation is completely voluntary and you may withdraw from the study at any time without penalty. If you do decide to withdraw from the research you must inform the researcher by email. All collected information from your participation in the study will be removed immediately and will not be included in the research documentation.

There are no anticipated risks to your involvement in this research. It is envisaged that during the project you will not only experience new technologies which will be helpful to you in your work but also collaborate and share your experience with other caregivers.

Your consent
Each participant must provide their own consent in written form by signing a consent form provided by the researcher.

No personal details will be inputted into the learning system. However, should you wish to include photographs of any of your pupils or any other personalized materials in order to individualize the educational resources, you must obtain written permission in advance from the parents concerned. All of this data will be anonymised and on no account will the identities of caregivers or children be made known. It would be important to make parents aware that any data collected during the course of this project and which may be entered into the dissertation of the researcher, will be held in the libraries of Trinity College Dublin for up to and exceeding seven years.

Permission

If you are employed by a school, and pupils of this school will be involved indirectly in this research, please inform the researcher as she must obtain permission from the Principal of your school before this research can proceed in your school. If you happen to be employed as a School Principal then the researcher must obtain permission from your Board of Management.

Parents’ Consent
During the research data will be stored on individual children and the impact of the learning system on their behaviour. All of this data will be anonymised and under no circumstances will it be possible to trace this information back to the individuals
concerned. However it will be necessary for the researcher to obtain consent from the parents of the children involved by asking them to sign separate consent forms.

**Information Collection**

During the study the researcher will gather evidence via questionnaires, semi-structured interviews, observations, diaries, journals, field notes, photography, audio and video recording, experimental design, rating scales, database logs, text-based communication and documentation. The data will be anonymised and stored in compliance with the Data Protection Act. Extracts of data may be used in presentations etc but under no circumstances will identities of caregivers or children be made known. The information will be analysed based on the pedagogy and learning theories underpinning this research inquiry.

In the extremely unlikely event that illicit activity is reported to the researcher during the interview the researcher will be obliged to report it to the appropriate authorities. Therefore, it is advised that you do not mention third parties during the study or interviews.

The documentation of the findings will be published and disclosed to a body of examiners in Trinity College Dublin as well as external examiners. There may be lectures, PhD theses, conference presentations and peer-reviewed journal articles written as a result of this project but on no account will the caregivers and the children be identified.

**Debriefing**

The researcher will hold a debriefing session after the findings of this project have been published. During this session the collected data and a summary of the analysis will be presented. This session will provide you with the opportunity to examine how your contributions to the study have been used and interpreted, and to ensure that your contributions have not been used inaccurately or out of context.

**Conflict of Interest**

Although the researcher is conducting this study herself, she is unaware of any conflicts of interest regarding this research. The data collected during this project will not be used against you in any way.

If you require further information or have questions during or after the research project, please do not hesitate to contact me, Theresa Doyle, at doyleth@tcd.ie or mobile 086-8069515.
Appendix XXVII – Case Study Consent Form (Participants)

Trinity College Dublin

Informed Consent Form – Participant

Research Background
This research is being conducted by Theresa Doyle in the School of Computer Science and Statistics and forms part of her Ph D. The purpose of this qualitative study is to explore how a dual-adaptive learning system matches child profiles with appropriate educational resources and teaching strategies, while simultaneously providing caregivers, using those recommended strategies, with support at levels consistent with their own profiles, to enable them to develop social skills in children with ASDs and meet their individual needs.

As a caregiver you will be asked to comment on the effectiveness of this learning tool and the suitability of the supports and resources it offers.

During the research the learning system will record your prior knowledge of the seven teaching strategies, and children’s skill levels, learning styles, language and comprehension abilities and special interests but no personal details will be stored. The system will keep a track of all the caregivers’ interactions with the system to monitor the supports and resources downloaded for use. All of this data will be anonymised so it will not be possible to trace any private personal details back to the individuals involved.

There are no anticipated risks to your involvement in this research. It is envisaged that during the project you will not only experience a learning tool which will be helpful to you in your work but also collaborate and share your experience with other caregivers. Individual results will be aggregated anonymously and research reported on aggregate results.

The documentation of the findings will be published and disclosed to a body of examiners in Trinity College Dublin as well as external examiners. There may be lectures, PhD theses, conference presentations and peer-reviewed journal articles written as a result of this project. Extracts of data may be used in these lectures etc but under no circumstances will identities of caregivers or children be made known.

Declaration
- I am 18 years or older and am competent to provide consent
- I have read, or had read to me, this consent form. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction and I understand the description of the research that is being provided to me
- I agree that my data is used for scientific purposes and I have no objection that my data is published in scientific publications in a way that does not reveal my identity
- The researcher will not reuse my data for any other purpose than those outlined in the information sheet
- Any observational sessions will be carried out only with my prior consent
- All recordings (ie audio, video and photographs) will not be identifiable
- Either I must obtain written permission from the parents of the children concerned in advance or, in the case that I am the child’s parent, confirm my permission each time I wish to include any photographs or other personalized material to individualize educational resources
- I freely and voluntarily agree to be part of this research study, though without prejudice to my legal and ethical rights
- I understand that I may refuse to answer any question and that I may withdraw at any time without penalty
- I understand that my participation is fully anonymous and that no personal details about me will be recorded

- if I decide to withdraw from the project, all collected information from my participation will be removed and will not be included in the research documentation
- I may attend a debriefing where I shall be given an opportunity to examine how my contributions to the study have been used and interpreted, and to ensure that my contributions
have not been used inaccurately or out of context

- Alternatively, I may email the researcher requesting a copy of the findings and/or the dissertation after the project has been completed
- I understand that if I or anyone in my family has a history of epilepsy then I am proceeding at my own risk
- I shall declare any conflict of interest with this research
- If any illicit activity is reported during this project that the researcher is obliged to report it to the appropriate authorities
- I understand that everyone concerned in this project will treat the data compiled with confidentiality, including examiners who will be marking this dissertation.
- I have received a copy of this agreement

PARTICIPANT’S NAME: _____________________________________________________________

PARTICIPANT’S SIGNATURE: _______________________________________________________

Date: __________________________________________________________________________

Statement of researcher’s responsibility: I have explained the nature and purpose of this research investigation, the procedures to be undertaken and any risks that may be involved. I have offered to answer any questions and fully answered such questions. I believe that the participant understands my explanation and has freely given informed consent.

RESEARCHER’S CONTACT DETAILS: _______________________________________________

RESEARCHER’S SIGNATURE: _______________________________________________________

Date: __________________________________________________________________________

The researcher may be contacted by email at doyleth@tcd.ie or by mobile 086-8069515 should you require further information on any aspect of this action research inquiry.
Appendix XXVIII – Preliminary Questionnaire (Case Study)

Preliminary Questionnaire for Participants

Dear Participant, as part of my research I am conducting an action research inquiry into using a dual-adaptive learning system to assist carers (ie teachers, parents and key workers) teaching social skills to children with Autistic Spectrum Disorders (ASDs) and/or learning difficulties. The purpose of this questionnaire is to collect information about your experience teaching social skills. Please do not name third parties in any open text field of the questionnaire. Any such replies will be anonymised. In the extremely unlikely event that illicit activity is reported I shall be obliged to report it to the appropriate authorities. Please complete this questionnaire and return it to me. Please check the appropriate box for each question. Many thanks for your assistance.

Each question is optional. Feel free to omit a response to any question; however the researcher would be grateful if all questions are responded to.

### Part 1: Special Education

<table>
<thead>
<tr>
<th>Participant ID:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>1 Have you ever taught social skills to child/children with ASDs?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes □</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2 If yes, what social skills have you taught a child/children with ASDs? (Tick all relevant boxes.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiating Interaction □ Conversation □</td>
</tr>
<tr>
<td>Mind Reading □</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3 Please rate your level of confidence teaching the following social skills?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiating Interaction</td>
</tr>
<tr>
<td>Conversation</td>
</tr>
<tr>
<td>Play</td>
</tr>
<tr>
<td>Reciprocation</td>
</tr>
<tr>
<td>Problem Solving</td>
</tr>
<tr>
<td>Reading non-verbal cues</td>
</tr>
<tr>
<td>Mind Reading</td>
</tr>
<tr>
<td>Self-Control</td>
</tr>
<tr>
<td>Self-Awareness</td>
</tr>
</tbody>
</table>
### Behaviour Management

<table>
<thead>
<tr>
<th>Very good</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
<th>Very poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Specified Skill

<table>
<thead>
<tr>
<th>Very good</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
<th>Very poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. What teaching strategies/methods are you familiar with? (Tick all relevant boxes.)

- Didactic Instruction
- Modelling
- Role Play
- Corrective Feedback
- Positive Reinforcement
- Motivational Games
- Practice

Please specify any other teaching method(s) that you would normally use to teach social skills.

5. What aspect of teaching social skills do you find least difficult?

- Finding information on Social Skills
- Selecting strategies to use
- Identifying appropriate interventions
- Finding suitable resources
- Other

If other, please supply details.

6. What aspect of teaching social skills do you find most difficult?

- Finding information on Social Skills
- Selecting strategies to use
- Identifying appropriate interventions
- Finding suitable resources
- Other

If other, please specify difficulty.

7. What educational resources do you use to help you to teach social skills to children with ASDs?

- Scripts
- Images
- Videos
- Social Stories
- Games
- Other

If other, please supply details.

8. Do you find it difficult to identify which resources suit your children’s individual needs?

- Yes
- No

9. How would you rate your level of satisfaction with the educational resources available?

<table>
<thead>
<tr>
<th>Scripts</th>
<th>Very good</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
<th>Very poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Images</td>
<td>Very good</td>
<td>Good</td>
<td>Average</td>
<td>Poor</td>
<td>Very poor</td>
</tr>
<tr>
<td>Videos</td>
<td>Very good</td>
<td>Good</td>
<td>Average</td>
<td>Poor</td>
<td>Very poor</td>
</tr>
<tr>
<td>Social Stories</td>
<td>Very good</td>
<td>Good</td>
<td>Average</td>
<td>Poor</td>
<td>Very poor</td>
</tr>
<tr>
<td>Games</td>
<td>Very good</td>
<td>Good</td>
<td>Average</td>
<td>Poor</td>
<td>Very poor</td>
</tr>
<tr>
<td>Other</td>
<td>Very good</td>
<td>Good</td>
<td>Average</td>
<td>Poor</td>
<td>Very poor</td>
</tr>
</tbody>
</table>
10. What educational resources have you found **most** helpful when teaching social skills to children with ASDs?

<table>
<thead>
<tr>
<th>Resources</th>
<th>Yes □</th>
<th>No □</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scripts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Images</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Videos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Stories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Games</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. What educational resources have you found **least** helpful when teaching social skills to children with ASDs?

<table>
<thead>
<tr>
<th>Resources</th>
<th>Yes □</th>
<th>No □</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scripts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Images</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Videos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Stories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Games</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you require clarification on any of the questions please do not hesitate to contact the researcher at doyleth@tcd.ie or mobile 086-8069515.
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1 STAK – Learning System for Caregivers

1.1 Introduction
STAK is a personalised learning system which has been designed to support caregivers teaching social skills to children with autism.

The learning system will recommend appropriate strategies to use when teaching children at different learning stages. Caregivers will be guided on how to use these strategies to help children develop social competence. They will also be provided with educational resources to assist them in their work.

1.2 Background Material
A website containing information on autistic spectrum disorders and links to some valuable resources has been created to accompany STAK and is available at URL: http://www.stakmate.com

1.3 Discussion Forum
Caregivers might like to share ideas in a private forum which is available at URL: http://www.staktalk.com

1.4 The Application
In order to personalise the learning resources for a particular child the Caregiver is asked to provide some basic information about their own level of experience and the child’s learning style, language and comprehension abilities and knowledge of social skills.

While the following sections are not mandatory, the Caregiver is recommended to complete the following sections in order to maximise the benefits of the application:

1. My Profile
2. Child Profile
3. Skills
4. Special Interests
1.5 Website

1. Open a browser (eg Internet Explorer, Mozilla Firefox, Google Chrome, etc) and type in URL: http://www.staklearn.com in the address line and click return/entry key

2. The Home Page appears

![Home Page](image)

1. On accessing the application for the first time Caregivers will be asked to register their details. This will allow the Caregiver to navigate through the pages of the website by selecting the different options from either the main menu at the left-hand side of the screen or the menu at the top of the screen.

Note: Some areas of the website are not accessible by unregistered users.
2 Registration

The first time you use the application you will need to register. In order to preserve your anonymity please do not use your real name.

1. **Create Username** - at least 8 characters long using only letters, numbers, underscores and hyphens
2. **Create a password** - to include a lowercase letter, an uppercase letter and a number between 0-9
3. **Email address** - enter your email address (consider creating a new email account for this purpose if your name happens to form part of your personal email address)
3 Login Form

3.1 Login
You must login with your registered username and password

![Login Form](image1.png)

3.2 Reset Password
Select the option under My Profile to reset your password

![Reset Password Form](image2.png)

3.3 Forgotten Username/Password
If you happen to forget either your username or password please contact the Administrator at doyleth@tcd.ie.
1. Please select the role from the dropdown menu that best describes you.
2. Please complete each of the following sections. This will help to gauge your prior knowledge of the teaching strategies that will be recommended during the learning process and ensure that you are offered the appropriate level of support.

a) Select Caregiver option on the left-hand sidebar and click on My Profile
b) Click on Teaching Strategies and select one of the strategies from a dropdown list
3. Answer seven questions (tick yes or leave blank as appropriate)
4. Click ‘Save’
5. Do this for each of the seven strategies ie didactic instruction, modelling, role play, feedback, positive reinforcement, motivational game and practice
6. Click ‘Save’ and ‘Close’
5 Child Profile

1. Select the **Child** option in Caregiver Section or the **Child Profile** option in the Child Section

2. Create an identifier (please do not use the child’s real name)

3. Indicate the child’s gender and date of birth

4. Enter the child’s diagnosis if you know it

5. Select the child’s learning style [Visual, Aural, Read/Write or Kinaesthetic]

6. Click on Save to store details
7. Language Ability – click on the question mark to bring up a series of questions

8. Answer ten questions (tick yes or leave blank as appropriate) and click ‘Save’

The system will determine child’s language ability eg very good, good, average, poor or very poor from your responses

9. Choose comprehension ability - click on the question mark to bring up ten questions

10. Answer ten questions (tick yes or leave blank as appropriate) and click ‘Save’

The system will determine child’s comprehension ability eg very good, good, average, poor or very poor from your responses
11. Continue to add Skills and Special Interests to complete the profile
6 Social Skills

1. Click on Skills option

2. Select Child Identifier

3. Choose one of the ten Skills from the dropdown menu

4. Click ‘Save’ to confirm your selection at this point
5. Learning Stage - click on the question mark to bring up a series of questions
6. Answer twelve questions (tick yes or leave blank as appropriate) and click ‘Save’

The system will determine whether child is at the novice, intermediate, advanced or acquired learning stage in this particular skill
7 Child Special Interests

1. You may indicate if the child has a special interest.
2. Simply select one of the topics from the dropdown list.
1. Select a child [where you have created more than one child profile]
2. Select a skill to teach him/her
3. The system will remember whether the child is a novice or is at intermediate, advanced or acquired learning stage in this skill
4. The system will recommend two strategies to use in each case
5. Choose one of these strategies
6. You may override the support level which is determined by details in your personal profile
7. You may request supports and resources based on a ‘special interest’ by clicking on the child’s special interest in the dropdown box

Now it is time to click on ‘Supports’ or ‘Resources’ to obtain learning content to assist you.
8.2 Caregiver Supports
This is an example of the range of supports provided to a caregiver who is recommended a teaching strategy (ie Role Play) to teach a child at the intermediate learning stage. A series of icons is displayed on the screen. Click on an icon to run/open the associated file. All files open in a new tab. Follow the instructions on screen eg open, save, cancel etc.

8.3 Resources
This is an example of the type of educational resources that the system recommends to use with a child at the intermediate learning stage in Initiating Interaction.
9 Editing Facilities

Caregivers may add or edit any of the details in their personal profiles or in their children’s profiles.

9.1 List

By clicking the List option Caregivers may view the children they have created profiles for and may select to edit any particulars from this screen.

9.2 Audit Tracking

The learning system will record the number of times a Caregiver selects Supports and Resources.

9.3 Allocate Child

If two Caregivers happen to be teaching the same child the Caregiver who has created a profile for this child may allocate that child to the other Caregiver so that the application can keep a more complete record of the child’s progress through the ten social skills.
Allocate Another Carer to Child

Child

To Carer Name

Carer email address

Update Status:

Save  Cancel  Delete

Select the Child, enter the Name and email address of the carer who may also work with the child and right hand.

To deregister/remove association with another care click Delete.
Appendix XXX – Quick Tour Script

Video Script – Recording background for ‘Tour’

Welcome to STAK

Please join me for a quick tour of the Learning System.

Everyone needs to register before using the application. Select the Registration option on the right-hand of your screen. To register you just create a username with 8 characters or more. It might be a good idea to click on help to find out exactly what characters you can use in your username. Please avoid using your own name as your username.

Then create a password – again click on help to find out if you need to use lowercase or uppercase letters etc.

Key in your email address. You may consider creating a new account if your personal email address contains your name. You will be asked to confirm your email address, save and close.

Now you can select the Login option on the top right hand side of your screen and log into the application using your new username and password.

On the left-hand side you will see the navigation bar – for your convenience you will also find the same options on the top menu bar.

When you log into the application for the first time you will need to create a profile for yourself so that the system will be able to provide you with the support you need.

Just select the Carer option from the navigation bar at the left of your screen. Alternatively you may choose the same option from the top menu bar.
Then click on ‘My Profile’ to create your own profile. The system remembers some of the details from your registration form so you only need to choose the role that best reflects the one you play in the child’s life. This may be teacher, assistant, therapist, psychologist or parent. Save your profile at this point.

Now select the **Teaching Strategies** option. Choose the first strategy from the dropdown list and answer the seven indicated for each strategy. Read down the questions carefully and tick ‘yes’ or leave the boxes blank as appropriate. Do this for all seven strategies on the list, saving and closing out each time. The system will remember your answers for later.

Then create a **Child Profile** for each child you are teaching. You will need to come up with an Identifier for each child as you may not use the children’s real names in this research study. For example if the child likes a particular character in a story you could use this or initials and digits.

Fill in as many details as you know about each child ie gender, date of birth, diagnosis, and **Learning Style** and then be sure to save the Child Profile at this point.

You may now progress to the series of questions on **Language Ability**. From your responses to the questions the system will determine whether this child has very good, good, average, poor or very poor language ability.

Similarly you will be asked ten questions on the child’s **Comprehension Ability** (tick yes or leave the boxes blank).

Currently the application includes material to help you teach ten social skills. Click on the ‘**Skills**’ option to add a skill to the profile. When you have selected a skill you will notice that the learning stage has defaulted to ‘Novice’. Click save at this point to bring up a series of twelve questions on the screen. As before please tick yes where appropriate or leave the boxes blank. The system will be able to determine from your responses whether the particular child is at the Novice, Intermediate, Advanced or Acquired stage in this particular skill.
If you are still in the Carer section go to the Child Section at this point. Select the **Special Interests** option and choose the child’s special interest if he/she has one that you know of.

You are now ready to start an activity.

First click on the **Links** option and check that you have all of the ‘essential downloads’ installed on your computer or laptop. Go to your browser and ensure that Javascript is enabled and popups are unblocked.

Now go to the **Activity Centre** and select the option to **Start an Activity**. Choose one of the child ids in the dropdown list. Then select a social skill to teach the child. The system will remember if the child is at the Novice, Intermediate, Advanced or Acquired learning stage in this particular skill.

Choose one of the teaching strategies that the system recommends using when a child is at this particular learning stage. Now you will be offered the level of support which the system considers you require (given the answers that you gave earlier to the questions). You may override this support level if you wish. You may also select a special interest.

Then click on the **Supports** button to get assistance on using this teaching strategy. A series of icons will be displayed on the screen and you work through this material as you wish. When you are ready you can click on the **Resources** button to discover learning content appropriate for the skill you are teaching.

This is the end of the tour. If you have any queries please contact me. I hope you enjoy using this application and that you find it helpful in your work.
Appendix XXXI – Feedback Questionnaire (Case Study)

**Questionnaire 2 – Feedback**

Thank you for helping me to evaluate Social Skills Training for Autistic Kids - STAK. The idea behind STAK is simple. It is aims to create profiles for carers and children and then match these profiles with appropriate resources to teach social skills. Each question is optional. Feel free to omit a response to any question; however the researcher would be grateful if all questions are responded to.

*Please do not name third parties in any open text field of the questionnaire. Any such replies will be anonymized. In the extremely unlikely event that illicit activity is reported I shall be obliged to report it to the appropriate authorities.*

<table>
<thead>
<tr>
<th>1 Personal Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant ID:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2 Please indicate your experience of using STAK under the following headings</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Ease of access to website</td>
</tr>
<tr>
<td>Excellent □    Good □    Average □    Poor □    Very poor □</td>
</tr>
<tr>
<td>b) Registration / Login</td>
</tr>
<tr>
<td>Excellent □    Good □    Average □    Poor □    Very poor □</td>
</tr>
<tr>
<td>c) Navigation through application</td>
</tr>
<tr>
<td>Excellent □    Good □    Average □    Poor □    Very poor □</td>
</tr>
<tr>
<td>d) Ease of use</td>
</tr>
<tr>
<td>Excellent □    Good □    Average □    Poor □    Very poor □</td>
</tr>
<tr>
<td>e) Performance</td>
</tr>
<tr>
<td>Excellent □    Good □    Average □    Poor □    Very poor □</td>
</tr>
<tr>
<td>f) Efficiency</td>
</tr>
<tr>
<td>Excellent □    Good □    Average □    Poor □    Very poor □</td>
</tr>
<tr>
<td>g) Please suggest any changes that would improve your user experience</td>
</tr>
</tbody>
</table>
### Carer Profile

3 Based on your experience using STAK please consider the following statements and indicate your response

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Strongly agree □</th>
<th>Agree □</th>
<th>Neither agree nor disagree □</th>
<th>Disagree □</th>
<th>Strongly Disagree □</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>STAK accurately assesses Carers’ prior knowledge of teaching strategies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>STAK offers support that adequately reflects Carers’ needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>STAK offers simple instructions for using each teaching strategy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>There is no single strategy that will teach a child with autism to be successful socially</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Child Profile

4 Based on your experience using STAK please consider the following statements and indicate your response

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Strongly agree □</th>
<th>Agree □</th>
<th>Neither agree nor disagree □</th>
<th>Disagree □</th>
<th>Strongly Disagree □</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>STAK asks the right questions to correctly assess children’s needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>STAK recommends strategies that are suitable for child/children with ASDs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>STAK offers resources that match individual children’s profiles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>STAK provides resources that help children to develop social skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Teaching Strategies

5 Please rate the following statements from -3 (least helpful) to +3 (most helpful)

<table>
<thead>
<tr>
<th></th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>+1</th>
<th>+2</th>
<th>+3</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) STAK matches appropriate teaching strategies to children’s learning stages (novice, intermediate, advanced or acquired)</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>+1</td>
<td>+2</td>
<td>+3</td>
</tr>
<tr>
<td>b) STAK recommends a combination of strategies to teach children to be successful socially</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>+1</td>
<td>+2</td>
<td>+3</td>
</tr>
<tr>
<td>c) STAK provides adequate support to Carers when they use the strategies recommended</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>+1</td>
<td>+2</td>
<td>+3</td>
</tr>
<tr>
<td>d) Carers requiring Full Support are given access to clear explanations of teaching strategies</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>+1</td>
<td>+2</td>
<td>+3</td>
</tr>
<tr>
<td>e) STAK provides examples illustrating the use of teaching strategies in different contexts</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>+1</td>
<td>+2</td>
<td>+3</td>
</tr>
<tr>
<td>f) Carers are guided satisfactorily through a structured programme to teach social skills</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>+1</td>
<td>+2</td>
<td>+3</td>
</tr>
<tr>
<td>g) Information that STAK provides is sufficient for each of the following strategies:</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>+1</td>
<td>+2</td>
<td>+3</td>
</tr>
<tr>
<td>1. Didactic Instruction</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>2. Modelling</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>3. Role Play</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. Corrective Feedback</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Positive Reinforcement</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>6. Motivating Games</td>
<td></td>
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<tr>
<td>7. Practice</td>
<td></td>
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</tbody>
</table>
### Educational Resources

Please rate the following statements from -3 (least helpful) to +3 (most helpful):

<table>
<thead>
<tr>
<th>Statement</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>+1</th>
<th>+2</th>
<th>+3</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) STAK selects educational resources to suit a child’s learning stage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>b) STAK chooses educational resources which correspond to a child’s learning style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>c) STAK picks educational resources which suit a child’s language ability</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>d) STAK selects educational resources which suit a child’s comprehension ability</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>e) STAK chooses educational resources based on a child’s special interests</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>f) STAK provides educational resources which motivate children to learn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) STAK offers sufficient educational resources</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Structured Approach

Please rate the following statements from -3 (least effective) to +3 (most effective):

<table>
<thead>
<tr>
<th>Statement</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>+1</th>
<th>+2</th>
<th>+3</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Breaking down information into small chunks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Demonstrating the steps in each skill</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Asking children to role play using skill steps</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Giving child encouraging feedback</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Reinforcing skill steps using social stories</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Introducing skills through games</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Providing practice opportunities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8 What did you like best about using STAK?

9 What did you like least about using STAK?
<table>
<thead>
<tr>
<th>10 Do you feel that STAK matched the profiles you created with appropriate resources?</th>
<th>Yes □ No □</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please comment on your answer</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10 Do you think that STAK is helping you to learn how to use strategies to teach different social skills?</th>
<th>Yes □ No □</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please comment on your response</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11 Does your child/children appear to be interested in the resources provided?</th>
<th>Yes □ No □</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please comment on your response</td>
<td></td>
</tr>
</tbody>
</table>

| 12 Any other information you wish to add | |

If you require clarification on any of the questions, please do not hesitate to contact the researcher at doyleth@tcd.ie or mobile 086-8069515.
Appendix XXXII – Graphic Presentation of Data
Case 1: Mada Assistive Technology Center (Qatar)

Figure A32.1  Mada Center Key Workers – STAK User Experience (Question 2)

Figure A32.2  Mada Center Parents – STAK User Experience (Question 2)
Figure A32.3  Mada Center Teachers – STAK User Experience (Question 2)

Figure A32.4  Mada Center Key Workers – STAK Carer Profile (Question 3)
Figure A32.5  Mada Center Teachers – STAK Carer Profile (Question 3)

Figure A32.6  Mada Center Parents – STAK Carer Profile (Question 3)
STAK asks the right questions to correctly assess children's needs

STAK recommends strategies that are suitable for child/children with ASDs

STAK offers resources that match children's profiles

STAK provides resources that help children develop social skills

Strongly agree  Agree  Neither Agree or Disagree  Disagree  Strongly Disagree

Figure A32.7  Mada Center Key Workers – STAK Child Profile (Question 4)

STAK asks the right questions to correctly assess children's needs

STAK recommends strategies that are suitable for child/children with ASDs

STAK offers resources that match children's profiles

STAK provides resources that help children develop social skills

Strongly agree  Agree  Neither Agree or Disagree  Disagree  Strongly Disagree

Figure A32.8  Mada Center Teachers – STAK Child Profile (Question 4)
Mada Center Parents - Stak Child Profile

- STAK asks the right questions to correctly assess children’s needs
- STAK recommends strategies that are suitable for child/children with ASDs
- STAK offers resources that match children’s profiles
- STAK provides resources that help children develop social skills

Mada Center Key Workers - Teaching Strategies

- STAK matches appropriate teaching strategies to children’s learning stages
- STAK recommends a combination of strategies to teach children to be successful socially
- STAK provides adequate support to Carers when they use the strategies recommended
- Carers requiring Full Support are given access to clear explanations of teaching strategies
- STAK provides examples illustrating the use of teaching strategies in different contexts
- Carers are guided satisfactorily through a structured programme to teach social skills

Figure A32.9  Mada Center Parents – STAK Child Profile (Question 4)

Figure A32.10  Mada Center Key Workers – STAK Teaching Strategies (Questions 5 (a) to 5 (f))
Mada Center Teachers - STAK Teaching Strategies

- Carers are guided satisfactorily through a structured programme to teach social skills
- STAK provides examples illustrating the use of teaching strategies in different contexts
- Carers requiring Full Support are given access to clear explanations of teaching strategies
- STAK provides adequate support to Carers when they use the strategies recommended
- STAK recommends a combination of strategies to teach children to be successful socially
- STAK matches appropriate teaching strategies to children’s learning stages

Figure A32.11 Mada Center Teachers – STAK Teaching Strategies (Questions 5 (a) to 5 (f))

Mada Center Parents - STAK Teaching Strategies

- STAK matches appropriate teaching strategies to children’s learning stages
- STAK recommends a combination of strategies to teach children to be successful socially
- STAK provides adequate support to Carers when they use the strategies recommended
- Carers requiring Full Support are given access to clear explanations of teaching strategies
- STAK provides examples illustrating the use of teaching strategies in different contexts
- Carers are guided satisfactorily through a structured programme to teach social skills

Figure A32.12 Mada Center Parents – STAK Teaching Strategies (Questions 5 (a) to 5 (f))
Figure A32.13  Mada Center Key Workers – STAK Teaching Strategies (Question 5 (g) 1 to 7)

Figure A32.14  Mada Center Teachers - STAK Teaching Strategies (Question 5 (g) 1 to 7)
Figure A32.15  Mada Center Parents – STAK Teaching Strategies (Question 5 (g) 1 to 7)

Figure A32.16  Mada Center Key Workers – STAK Educational Resources (Question 6)
Figure A32.17  Mada Center Teachers – STAK Educational Resources (Question 6)

Figure A32.18  Mada Center Parents – STAK Educational Resources (Question 6)
Figure A32.19  Mada Center Key Workers – STAK Structured Approach (Question 7)

Figure A32.20  Mada Center Parents – STAK Structured Approach (Question 7)
Mada Center Parents – STAK Structured Approach

Figure A32.21 Mada Center Parents – STAK Structured Approach (Question 7)

Mada Center – Three Sub-Groups

Figure A32.22 Mada Center – STAK User Experience (Question 2)
STAK accurately assesses carers’ knowledge
STAK offers supports that adequately reflects carers’ needs
STAK offers simple instructions for using each teaching strategy
Theres is no single strategy that will teach a child with autism to be successful socially

STAK asks the right questions to correctly assess children’s needs
STAK recommends strategies that are suitable for children with ASDs
STAK offers resources that match individual children’s profiles
STAK provides resources that help children to develop social skills
STAK matches appropriate teaching strategies to children’s learning stages
STAK recommends a combination of strategies to teach children to be successful socially
STAK provides adequate support to Carers when they use the strategies recommended
Carers requiring Full Support are given access to clear explanations of teaching strategies
STAK provides examples illustrating the use of teaching strategies in different contexts
Carers are guided satisfactorily through a structured programme to teach social skills

Least helpful  |  less helpful  |  unhelpful  |  neutral  |  helpful  |  more helpful  |  most helpful  

Figure A32.25  Mada Center – STAK Teaching Strategies (Question 5)

DIDACTIC INSTRUCTION  |  MODELLING  |  ROLE PLAY  |  CORRECTIVE FEEDBACK  |  POSITIVE REINFORCEMENT  |  MOTIVATING GAMES  |  PRACTICE
1  |  2  |  3  |  4  |  5  |  6  |  7

Least helpful  |  less helpful  |  unhelpful  |  neutral  |  helpful  |  more helpful  |  most helpful  

Figure A32.26  Mada Center – STAK Support on Teaching Strategies (Question 5g)
Figure A32.27 Mada Center – STAK Educational Resources (Question 6)
Figure A32.28  Mada Center – STAK Structured Approach (Question 7)

- Providing practice opportunities
- Introducing skills through games
- Reinforcing skill steps using social stories
- Giving child encouraging feedback
- Asking children to role play using skill steps
- Demonstrating the steps in each skill
- Breaking down information into small chunks

Legend:
- most effective
- more effective
- effective
- neutral
- ineffective
- less effective
- Least effective
Figure A32.29  Mada Center - Children’s Special Interests (Child Profiles)

Figure A32.30  Mada Center Support Material downloaded – STAK Carer Profile
Figure A32.31  Mada Center Educational Resources downloaded – STAK Child Profiles
Case 2: Random Participants (Ireland)

Figure A32.32  Random Participants Parents – STAK User Experience (Question 2)

Figure A32.33  Random Participants Teachers – STAK User Experience (Question 2)
Figure A32.34  Random Participants Parents – STAK Carer Profile (Question 3)

Figure A32.35  Random Participants Teachers – STAK Carer Profile (Question 3)
STAK asks the right questions to correctly assess children's needs.
STAK recommends strategies that are suitable for child/children with ASDs.
STAK offers resources that match children's profiles.
STAK provides resources that help children develop social skills.

**RANDOM PARTICIPANTS PARENTS - STAK CHILD PROFILE**

![Bar chart showing responses to questions about STAK's ability to assess children's needs, recommend strategies, offer resources, and help develop social skills.]

Figure A32.36 Random Participants Parents – STAK Child Profile (Question 4)

**RANDOM PARTICIPANTS TEACHERS - STAK CHILD PROFILE**

![Bar chart showing responses to questions about STAK's ability to assess children's needs, recommend strategies, offer resources, and help develop social skills.]

Figure A32.37 Random Participants Teachers – STAK Child Profile (Question 4)
Figure A32.38  Random Participants Parents – STAK Teaching Strategies (Questions 5 (a) - (f))

Figure A32.39  Random Participants Teachers – STAK Teaching Strategies (Questions 5 (a) - (f))
Information that STAK provides for didactic instruction is sufficient
Information that STAK provides for modelling is sufficient
Information that STAK provides for role play is sufficient
Information that STAK provides for corrective feedback is sufficient
Information that STAK provides for positive reinforcement is sufficient
Information that STAK provides for motivating games is sufficient

Least helpful  less helpful  unhelpful  neutral  helpful  more helpful  most helpful

Random Participants Parents - Sufficient Information on STAK Teaching Strategies

Random Participants Teachers - Sufficient Information on Teaching Strategies

Least helpful  less helpful  unhelpful  neutral  helpful  more helpful  most helpful

Figure A32.40 Random Participants Parents – STAK Teaching Strategies (Question 5 (g) 1 to 7)

Figure A32.41 Random Participants Teachers – STAK Teaching Strategies (Question 5 (g) 1 to 7)
STAK selects educational resources to suit a child’s learning stage

STAK chooses educational resources which correspond to a child’s learning style

STAK picks educational resources which suit a child’s language ability

STAK selects educational resources which suit a child’s comprehension ability

STAK chooses educational resources based on a child’s special interests

STAK provides educational resources which motivate children to learn

STAK offers sufficient educational resources

Figure A32.42  Random Participants Parents – STAK Educational Resources (Question 6)

Figure A32.43  Random Participants Teachers – STAK Educational Resources (Question 6)
Figure A32.44  Random Participants Parents – STAK Structured Approach (Question 7)

Figure A32.45  Random Participants Teachers – STAK Structured Approach (Question 7)
Random Participants – Summary

**Figure A32.46 Random Participants – STAK User Experience (Question 2)**

**Figure A32.47 Random Participants – STAK Carer Profile (Question 3)**
STAK asks the right questions to correctly assess children’s needs
STAK recommends strategies that are suitable for children with ASDs
STAK offers resources that match individual children’s profiles
STAK provides resources that help children to develop social skills

STAK matches appropriate teaching strategies to children’s learning stages
STAK recommends a combination of strategies to teach children to be successful socially
STAK provides adequate support to Carers when they use the strategies recommended
Carers requiring Full Support are given access to clear explanations of teaching strategies
STAK provides examples illustrating the use of teaching strategies in different contexts teach social skills
Carers are guided satisfactorily through a structured programme to teach social skills

Figure A32.48 Random Participants – STAK Child Profile (Question 4)

Figure A32.49 Random Participants – STAK Teaching Strategies (Questions 5 (a) to 5 (f))
Figure A32.50  Random Participants – STAK Teaching Strategies (Question 5 (g) 1 to 7)
STAK selects educational resources to suit a child's learning stage.

STAK chooses educational resources which correspond to a child's learning style.

STAK picks educational resources which suit a child's language ability.

STAK selects educational resources which suit a child's comprehension ability.

STAK chooses educational resources based on a child's special interests.

STAK provides educational resources which motivate children to learn.

STAK offers sufficient educational resources.

Figure A32.51     Random Participants – STAK Educational Resources (Question 6)
Figure A32.52  Random Participants – STAK Structured Approach (Question 7)
Figure A32.53  Random Participants – Children’s Special Interests (Child Profiles)
Random Participants - Educational Resources for Children

- woman_in_shoe.pptx
- visual_learning_style.pdf
- the_shop_game.docx
- teaching_children_with_autism_to_min...
- steps_to_success_paying_compliments.p...
- steps_to_success_joining_in_play.pdf
- steps_to_success_introducing_yourself....
- steps_to_success_ending_conversation....
- social_skills_picture_book_examples.pptx
- sharing_with_my_friends.odp
- sa_factsheet_haircut.pdf
- rules_of_conversation.pdf
- respecting_ideas.pdf
- read_write.pdf
- problem_solving_negotiation.pdf
- non_verbal_cues.pdf
- movement_games.pdf
- making_friends.docx
- introducing_yourself.pdf
- imitation_for_introducing_yourself.pdf
- http://www.do2learn.com/organization...
- hide_and_seek.pdf
- harry_dirty_dog_mini_unit_plan.pdf
- greetings.pdf
- giving_yourself_a_good_talking_to.pdf
- getting_to_know_someone_new.pdf
- game_to_encourage_greetings.pdf
- do2learn_taking_turns.pdf
- do2learn_responding_to_questions.pdf
- detailed_male_faces_large.pdf
- conversation.pdf
- cognitive_picture_rehearsal_example_d...
- cognitive_picture_rehearsal_example_a...
- cognitive_picture_rehearsal.wav
- car.pdf
- blowing_bubbles.pdf
- basic_emotions_pecs.pdf
- all_talk.wmv

Figure A32.54  Random Participants Educational Resources downloaded – STAK Child Profiles

419
Random Participants - Carer Supports

Figure A32.55  Random Participants Parents and Teachers – Carer Supports downloaded
Case 3: St Ultan’s Primary School Autism Unit (Cherry Orchard Dublin)

Figure A32.56  St Ultan’s School Key Workers – STAK User Experience (Question 2)

Figure A32.57  St Ultan’s School Teachers – STAK User Experience (Question 2)
ST ULTAN’S SCHOOL KEY WORKERS - STAK CARER PROFILE

- STAK accurately assesses carers' knowledge
- STAK offers supports that adequately reflects caregivers' needs
- STAK offers simple instructions for using each teaching strategy
- There is no single strategy that will teach a child with autism to be successful socially

Figure A32.58  St Ultan’s School Key Workers – STAK Carer Profile (Question 3)

ST ULTAN’S SCHOOL TEACHERS - STAK CARER PROFILE

- STAK accurately assesses carers' knowledge
- STAK offers supports that adequately reflects caregivers' needs
- STAK offers simple instructions for using each teaching strategy
- There is no single strategy that will teach a child with autism to be successful socially

Figure A32.59  St Ultan’s School Teachers – STAK Carer Profile (Question 3)
ST ULTAN’S SCHOOL KEY WORKERS - CHILD PROFILE

STAK asks the right questions to correctly assess children’s needs
STAK recommends strategies that are suitable for child/children with ASDs
STAK offers resources that match children’s profiles
STAK provides resources that help children develop social skills

- Strongly agree
- Agree
- Neither Agree or Disagree
- Disagree
- Strongly Disagree

Figure A32.60 St Ultan’s School Key Workers – STAK Child Profile (Question 4)

ST ULTAN’S SCHOOL TEACHERS - STAK CHILD PROFILE

STAK asks the right questions to correctly assess children’s needs
STAK recommends strategies that are suitable for child/children with ASDs
STAK offers resources that match children’s profiles
STAK provides resources that help children develop social skills

- Strongly agree
- Agree
- Neither Agree or Disagree
- Disagree
- Strongly Disagree

Figure A32.61 St Ultan’s School Teachers – STAK Child Profile (Question 4)
STAK matches appropriate teaching strategies to children’s learning stages

STAK provides adequate support to Carers when they use the strategies recommended

Carers requiring Full Support are given access to clear explanations of teaching strategies

STAK provides examples illustrating the use of teaching strategies in different contexts

Carers are guided satisfactorily through a structured programme to teach social skills

Least helpful  less helpful  unhelpful  neutral  helpful  more helpful  most helpful

Figure A32.62  St Ultan’s School Key Workers – STAK Teaching Strategies (Question 5(a) to 5(f))
STAK matches appropriate teaching strategies to children’s learning stages
STAK recommends a combination of strategies to teach children to be successful socially
STAK provides adequate support to Carers when they use the strategies recommended
Carers requiring Full Support are given access to clear explanations of teaching strategies
STAK provides examples illustrating the use of teaching strategies in different contexts
Carers are guided satisfactorily through a structured programme to teach social skills

Figure A32.63  St Ultan’s School Teachers – STAK Teaching Strategies (Question 5 (a) to 5 (f))

STAK provides for didactic instruction is sufficient
STAK provides for modelling is sufficient
STAK provides for role play is sufficient
STAK provides for corrective feedback is sufficient
STAK provides for positive reinforcement is sufficient
STAK provides for motivating games is sufficient
STAK provides for practice is sufficient

Figure A32.64  St Ultan’s School Key Workers – STAK Sufficient Information (Question 5(g) 1 to 7)
Information that STAK provides for didactic instruction is sufficient
Information that STAK provides for modelling is sufficient
Information that STAK provides for role play is sufficient
Information that STAK provides for corrective feedback is sufficient
Information that STAK provides for positive reinforcement is sufficient
Information that STAK provides for motivating games is sufficient
Information that STAK provides for practice is sufficient

Figure A32.65  St Ultan’s School Teachers – STAK Teaching Strategies (Question 5(g) 1 to 7)
Figures A32.66 St Ultan’s School Key Workers – STAK Educational Resources (Question 6)
Figure A32.67  St Ultan’s School Teachers – STAK Educational Resources (Question 6)
Figure A32.68  St Ultan’s School Key Workers – STAK Structured Approach (Question 7)

Figure A32.69  St Ultan’s School Teachers – STAK Structured Approach (Question 7)
St Ultan’s School – Summary

Figure A32.70  St Ultan’s School – STAK User Experience (Question 2)

Figure A32.71  St Ultan’s School – STAK Carer Profile (Question 3)
STAK asks the right questions to correctly assess children’s needs

STAK recommends strategies that are suitable for children with ASDs

STAK offers resources that match individual children’s profiles

STAK provides resources that help children to develop social skills

STAK recommends strategies that are suitable for children with ASDs

STAK provides adequate support to Carers when they use the strategies recommended

Carers requiring Full Support are given access to clear explanations of teaching strategies

STAK provides examples illustrating the use of teaching strategies in different contexts

Carers are guided satisfactorily through a structured programme to teach social skills

Figure A32.72  St Ultan’s School – STAK Child Profile (Question 4)

Figure A32.73  St Ultan’s School – STAK Teaching Strategies – Questions 5 (a) to 5 (f)
Figure A32.74  St Ultan’s School – STAK Teaching Strategies – Question 5 (g) 1 to 7

Figure A32.75  St Ultan’s School – STAK Educational Resources (Question 6)
Figure A32.76  St Ultan’s School – STAK Structured Approach (Question 7)

Figure A32.77  St Ultan’s School – Children’s Special Interests (Child Profiles)
Figure A32.78  St Ultan’s Primary School – Educational Resources for Children
Figure A32.79  St Ultan’s School Key Workers and Teachers – Carer Supports downloaded
Three Case Studies Summary

![STAK - Ease of Access to Website](image1)

**Figure A32.80** Three Case Studies – STAK Ease of Access

![STAK - Registration / Login](image2)

**Figure A32.81** Three Case Studies – STAK Registration and Login
Figure A32.82 Three Case Studies – STAK Website Navigation

Figure A32.83 Three Case Studies – STAK Ease of Use
Figure A32.84  Three Case Studies – STAK Performance

Figure A32.85  Three Case Studies – STAK Efficiency
Figure A32.86 Three Case Studies – STAK Assessment of Carers’ Knowledge

STAK accurately assesses Carers’ prior knowledge of teaching strategies

Figure A32.87 Three Case Studies – STAK Support for Carers’ Needs

STAK offers support that adequately reflects Carers’ Needs
**Figure A32.88**  Three Case Studies – STAK provides Simple Instructions

**Figure A32.89**  Three Case Studies – No Single Strategy to Teach Social Skills
**STAK asks the right questions to correctly assess children's needs**

Figure A32.90  Three Case Studies – STAK assessment of Children’s Needs

**STAK recommends strategies that are suitable for child/children with ASDs**

Figure A32.91  Three Case Studies – STAK recommends Suitable Strategies
STAK offers resources that match individual children's profiles

Figure A32.92 Three Case Studies – STAK matches Resources to Child Profile
Figure A32.93  Three Case Studies – STAK provides Educational Resources

Figure A32.94  Three Case Studies – STAK matches Teaching Strategies to Learning Stages
STAK recommends a combination of strategies to teach children to be successful socially

Figure A32.95  Three Case Studies – STAK recommends Teaching Strategies

STAK provides adequate support to Carers when they use the strategies recommended

Figure A32.96  Three Case Studies – STAK provides adequate Support on Strategies
Figure A32.97  Three Case Studies – STAK provides Full Support on Teaching Strategies

Figure A32.98  Three Case Studies – STAK Examples of Teaching Strategies
Carers are guided satisfactorily through a structured programme to teach social skills

STAK provides sufficient information on Didactic Instruction

Figure A32.99 Three Case Studies – STAK Structured Training Programme

Figure A32.100 Three Case Studies – STAK Information on Didactic Instruction
Figure A32.101  Three Case Studies – STAK provides sufficient information on Modelling

Figure A32.102  Three Case Studies – STAK provides sufficient information on Role Play
Figure A32.103  Three Case Studies – STAK Information on Corrective Feedback

Figure A32.104  Three Case Studies – STAK Information on Positive Reinforcement
Figure A32.105  Three Case Studies – STAK Information on Motivating Games

Figure A32.106  Three Case Studies – STAK provides sufficient information on Practice
Figure A32.107  Three Case Studies – STAK Educational Resources suit Learning Stages

Figure A32.108  Three Case Studies – STAK Educational Resources suit Learning Styles
Figure A32.109  Three Case Studies – STAK Educational Resources suit Language Abilities

Figure A32.110  Three Case Studies – STAK Educational Resources suit Comprehension Abilities
STAK chooses educational resources based on a child's special interests

![Bar chart showing participant responses to the statement that STAK chooses educational resources based on a child's special interests.](chart1)

Figure A32.111  Three Case Studies – STAK Educational Resources suit Special Interests

STAK provides educational resources which motivate children to learn

![Bar chart showing participant responses to the statement that STAK provides educational resources which motivate children to learn.](chart2)

Figure A32.112  Three Case Studies – STAK Educational Resources motivate Children
Figure A32.113  Three Case Studies – STAK offers sufficient Educational Resources

Figure A32.114  Three Case Studies – STAK Breaking down information into small chunks
Figure A32.115  Three Case Studies – STAK Demonstrating Skill Steps

Figure A32.116  Three Case Studies – STAK Role-Playing Skill Steps
Figure A32.117  Three Case Studies – STAK Giving Corrective Feedback

Figure A32.118  Three Case Studies – STAK Providing Positive Reinforcement
Figure A32.119  Three Case Studies – STAK Using Motivating Games

Figure A32.120  Three Case Studies – STAK Providing Practice Opportunities
Appendix XXXIII – Related Publications

Using Multimedia to Reveal the Hidden Code of Everyday Behaviour to Children with Autistic Spectrum Disorders (ASDs)

Social Skills Training for Autistic Kids – STAK
(iHCI Conference short paper September 2014)