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Investigating the use of a computer-based, interactive timetable designed for primary school children with Asperger's Syndrome.

Introduction

An area of difficulty faced by children with autism is coping with change. During the school day many of the activities that take place often involve the children moving to different locations with different teachers. The anxiety this causes can result in loss of learning opportunities and in disruptive behaviour. Teachers report that advanced knowledge of the day's activities can considerably lessen anxiety especially if this information is highly visual in its presentation. Teaching of autistic children often follows the TEACCH approach developed at the University of North Carolina. This model encourages a highly structured approach including the use of visual planning aids (Gillberg & Coleman, 2000; Mesibov et al, 2002). This study is investigating the design and use of a computer-based, interactive timetable, which is currently being developed for a specific group of primary school children with Asperger's Syndrome (or unspecified high-functioning autism).

Background

Children with Asperger's Syndrome have been noted to be skilled at using computers and it has been suggested that computers present an ideal resource for both educational and recreational use (Attwood, 1998; Moore, 1998). Computers can provide a predictable, safe and context free environment, which is well suited to the single channelled interest system of those with autistic spectrum disorders (Bell & Potter, 1999; Moore, 1998; Murray & Lesser, 1999).

The aim of this study is to explore and assess the practical value of an interactive, computer-based timetable, in assisting children with unspecified high-functioning autism with their daily activities. The children taking part in this study attend a language and communication class attached to a mainstream primary school in Edinburgh, Scotland. The class comprises four children, all male; aged between 6 and 8 years of age and taught by a special needs teacher, assisted by a nursery nurse. A speech and language therapist also attends the children as part of their teaching programme.

Methodology

The research is essentially qualitative, of a semi-ethnographic nature and involves a case study approach. The development of the computer-based, interactive timetable follows a user-centred design. Once implemented the timetable will be assessed to determine whether it has any value in reducing anxiety related to changes in daily class routine for each child. Parents and teachers have been interviewed to determine a baseline for assessing anxiety related behaviour for each child and this has involved adapting several recognised tools (e.g. The Stress Survey Schedule, Groden et al, 2001; The Children's Social Behavior Questionnaire, Luteijn et al, 2000; The Children's Manifest Anxiety Scale, Reynolds & Richmond, 1997; The Behavior Problems Inventory, Rojahn et al, 2001) to develop a checklist for triggers and stressors, stereotypical behaviours and physical signs of anxiety.

It is also the intention of this study to establish whether the timetable system is effective as a management and communication tool for the teaching staff and parents. This will be assessed through in-depth interviews. It is hoped that the study will provide enough information to enable recommendations to be made regarding a general system, capable of widespread implementation.

Requirements analysis

The first phase of this project involved an examination of the visual timetable system currently used by the class, to determine the expectations and requirements of the proposed system. For this, non-participative observations were carried out in the classroom setting and semi-structured interviews were conducted with key members of staff. The investigation identified several important issues and concerns regarding the design of the proposed timetable. Staff members considered it important that the timetable should be accessible not just in school, but in the

children's homes as well. To accommodate this need, a web-based interface has been developed, to allow cross-platform use and to increase accessibility for all users. In addition to acknowledging the importance of the fundamental aspects of design such as learnability, flexibility, consistency and predictability of the user interface, it was found that there were other concerns; these were regarding the size and positioning of the computer-based timetable, fears that the staff would lack the skills necessary to maintain the timetable, a concern that a lack of resources (only one computer in the classroom) would lead to problems of availability, and concern that supportive information, adjacent to the timetable would be overlooked. It was recognised from this preliminary investigation that involvement of all users was essential if a functional system was to be developed and from this a collaborative process of interface design began. It was also established that to allow for incorporation of additional information that supports the timetable and to enable flexibility of use, an information management database would need to be integrated with the timetable's web interface. It was also recognised that comprehensive user documentation would be needed to assist staff and that training should be provided once the system is implemented.

Design and evaluation

Ideas for the interface design developed from an initial brainstorming session with members of staff. Sketches of layouts and general structure were developed and evaluated through use of paper and pencil walkthrough sessions. Storyboarding techniques were later used to demonstrate design features, which were evaluated at a group session with all members of staff contributing in constructive interaction (Cox & Walker, 1993; Faulkner, 1998). A prototype of part of the timetable system was implemented in January 2003 and was evaluated by staff through co-operative user observations and general feedback sessions.

Usability testing will take place at the beginning of the new school term in April 2003 and will involve evaluations with the children in the classroom. This will entail sitting beside the children with a teacher present and taking notes of misunderstandings and unexpected actions (Cox & Walker, 1993). Constructive interaction, with two children using the computer-based timetable together may also be used as a form of evaluation, which may present interesting findings. Teachers and parents will be asked to complete a usability questionnaire.

In summary, development of the timetable continues, following a user-centred approach. Formative evaluations of the system have been carried out at regular stages, to increase usability and the final evaluations are planned to take place once the timetable is implemented in August 2003.

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