

Research for SME Associations

FP7-SME-2008-2

- BRIGHT-CHILD -

Adapting e-Learning for inclusion of students suffering from Attention Deficit
Hyperactivity Disorder (ADHD)



Children with Attention Deficit Hyperactivity Disorder (ADHD) are commonly labelled inattentive, stubborn, troublemakers, lazy and careless. The BRIGHT-CHILD proposal focuses on acknowledging the learning potential inherent in children with ADHD chronological impairment and provides them with an e-learning system, incorporating the innovative eye-tracking technology to enhance their learning experience. The e-learning tool based on eye tracking technology will recognize when a child is reading and when he/she has fixated on a word longer than normal, in order to create a highly individualized reading aid. This technology will be embedded in an e-learning system which will make education more accessible to students suffering from ADHD and help them to overcome the barriers they encounter as a result of their learning difficulties.

Parents of ADHD children approached the European ADHD association on several occasions attempting to identify a solution for the education problems faced by their children. Experts in the ADHD association suggested that the solution could be to develop a learning platform, or any computerised software that would support their children in exploiting their learning potential in a context which would control their ADHD problem. The European association for ADHD studied various options amongst which specialised hardware and software equipment such as tablet PCs, e-learning software and virtual environments and conducted studies with parents and children on the usability features and financial aspects of these tools. Results indicated that e-learning was the most viable solution both in terms of usability and financial issues and should this be adapted with features to assist reading, writing, comprehension and communication, it would provide an optimum solution for ADHD children to obtain a better education.

Research findings indicated that when technology is integrated with an existing curriculum it can improve the performance for students with Attention Deficit¹.

The proposed technology is to develop a novel e-learning system enhanced with eye tracking technologies to support ADHD students and encourage them in learning both at school and other environments. The technical expertise and financial capacities required to achieve the desired results are beyond the means of the associations and since the problem reflects a European need of a large number of SMEs, they have opted for European Funding - Capacities, EC financing instrument, Research for the benefit of Associations.

The research and technical developers (RTD) members of the consortium have the available technological and human resources for the successful development of the ideas brought forward by the consortium's associations. Thus, the combination of the financial resources provided by the EC and the technical expertise brought on board by the RTDs shall provide for the successful development of the ideas generated by the associations in this proposal

In Europe there are more than 20,000 Assistive Technology products. Assistive Technology products help people with disabilities to function better in their environment. Such technologies comprise wheelchairs, hearing aids, aids for the visually impaired and specialised software, to name a few examples. However, despite a large market size of 30 Billion Euro, the **EU sector is characterised by fragmentation and is dominated by SMEs. These SMEs form part of Associations that are highly competent but which tend to have limited R&D resources and low market share.** Furthermore, the increasing worldwide trend in advocacy and inclusive legislation for the disabled is fuelling innovation in large Assistive Technology companies that have ample resources, marketing and distribution power. The continual advances in technology increase the likelihood that more and more children with disabilities could benefit from assistive devices. Studies, however, indicate that there is a shortage of professionals who are adequately or appropriately trained to provide AT products or services to children or to serve children within an AT system of care² Therefore, the need is for SME-AG members to offer up-to-date, e-learning focused solutions to ADHD suffers which will enhance their product portfolio and hence place them on a stronger footing when competing in the real world.

¹ Kang, H. W., Zentall, S. S., & Burton, T. (2007). Use of Images in Instructional Technology for children with attentional difficulties. *IDC 2007 Proceedings: Input Technologies*, 129-132-
<https://smoontaylor.wikispaces.com/Technology+for+ADHD+students>

² Quality indicators for assistive technology services: Implications for physical therapists -
http://findarticles.com/p/articles/mi_qa3959/is_200206/ai_n9137639/print?tag=artBody;col1

There are approximately 30 million primary school pupils, 1 million primary school teachers and 200,000 primary schools within the EU³. **It is currently estimated that up to 5% of school age children, i.e. 1.5 million are affected by Attention Deficit Hyperactivity Disorder (ADHD)**⁴, making it the most common **chronic mental health problem among young children**⁵. The screening and the clinical diagnosis of ADHD by qualified health care professionals is based on a careful and complete review of an individual's history, overall patterns of behaviour and the symptoms of the disorder using the diagnostic criteria of the 4th Diagnostic Statistical Manual of Mental Disorders DSM-IV TR⁶. According to the fourth edition of the (DSM-IV) of the American Psychiatric Association (APA) (1994), **ADHD is a neurological impairment characterized by a clinically significant and persistent pattern of inattention and/or hyperactivity/impulsivity**. Although **ADHD is not a learning disability and children may be intelligent, their inability to acquire information, as a result of inattentive or hyperactive symptoms or behaviour, results in poor grades and difficulties at school**⁷. ADHD children act impulsively, taking action first and thinking later. They are constantly moving, running, climbing, squirming, and fidgeting, and often have trouble with gross and fine motor skills. As a result, they may be physically clumsy and awkward. ADHD is also associated with a wide range of long-term adverse outcomes including criminality, lower occupational status, substance abuse, lesser academic outcomes, social exclusion, low self-esteem and increased driving accidents .

The **Bright-Child** project will allow members of SME AGs to expand the knowledge base of larger communities of member SMEs in the industrial sector of assistive technologies for the learning disabled. SME AGs in the Assistive technologies and Social dimensions together with their members from different countries across the EU will join forces around the development of a novel technology for the benefit of ADHD sufferers. SME AGs have opted to outsource work to RTDs, since these have the resources to help SME AGs and their members to enhance their knowledge and capabilities of new product development. In the long run, it is foreseen that the partners SME AGs and their members will provide increased level of quality in developed products and increases in market share, thus leading to better economic benefits.

The proposed project will bring together experts in the field of ADHD and Assistive Technologies who have experience and knowledge in the vast complex issues and interactions introduced by disabled learners' requirements for accessible e-learning, compatible assistive technologies and effective learning support. Together with the assistance from RTD members, the consortium associations and their partners will develop the ground knowledge and the AT association will disseminate information to its members with the aim of improving current technologies and exploiting the benefits of targeting a new market sector. On the other hand, the ADHD Europe association will benefit considerably from the technology developed, which will be targeted to primary schools and enhanced with features such as eye tracking technology to enhance reading, writing and listening skills and promote the inclusion of students with learning disabilities into the digital divide. Young sufferers of ADHD will be provided with a tool that will assist them in overcoming barriers and obstacles in learning whereas teachers and parents will be given support to act as facilitators in the child's development.

The e-learning tool is not foreseen to replace traditional classroom teaching methods but will serve as an augmented instrument to enhance learning. The child will be supplied with teaching aids

³ The E-Learning Industry and Market in Europe -

http://ec.europa.eu/education/archive/elearning/doc/studies/market_annex1_en.pdf

⁴ Mapping ADHD across Europe - <http://www.adhs-deutschland.de/pdf/pdf0007.pdf>

⁵ The Effect of ADHD on educational outcomes - <http://www.nber.org/aginghealth/summer04/w10435.html>

⁶ ADHD – Europe - http://ec.europa.eu/health/ph_determinants/life_style/mental/green_paper/mental_gp_co073_en.pdf

⁷ Tools for learning disabilities and ADHD - http://oln.org/ILT/ada/Fame/web/f3_36_373.html

and guidelines to support them at home, as the facilitator does in a classroom environment. Through the proposed idea we aim to create stimuli which will grab the students' attention and keep them focused on their work for a longer period of time.

The platform will be tailor made and adaptable to the needs of the students and can be easily managed by their educators. Prior to initiating the use of the system, a questionnaire and a short study will be conducted to identify the interest and needs of the student. This will help the facilitator to set the e-learning tool so as to generate a number of stimuli and responses that will mostly appeal to the student in question, thus making the application more tailored to meet the needs of the students. Through the system, students, facilitators and parents will be able to interact and monitor the feedback from the child.

The technological objective of this proposal is to develop an e-learning platform with the aim of assisting pupils between the age of 7 and 10 and their educators to facilitate the transfer of knowledge adopting a user friendly approach to learning for student sufferers of ADHD.