# ICT SUPPORTED APPROACHES TO AUTISM

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Abstract: Autism is a disorder that affects human skills and behaviour essentially. The use of ICT can support education and rehabilitation of people with autism and also teachers, parents and social workers benefit from using ICT. ICT and particularly the Internet support the creation of Virtual Communities of Practice (VCoPs) as a promising approach for learning, housing reviews of research evidence and engaging persons working in the ASD field to share practical knowledge and to make practical innovations. In this paper we present aspects of training and cooperation for people with autism particularly by using ICT and VCoPs and give an example of a successful project.

## 1 INTRODUCTION

In Germany as in many other European countries and in Turkey, the number of young people with autism disorder (ASD) and the autism awareness has increased considerably within the last two decades. Autism is a disorder that affects human behaviour and skills essentially (e.g. social interactions, ability to express ideas and feelings, to communicate and to establish relations with others). The way children learn, as social beings, to take care of themselves and to participate in the community generally has life-long effects. Therefore, training approaches which make use of new information and communication technologies (ICT) and methods to cooperate are necessary.

The use of ICT can support the education and rehabilitation of people with autism. It could enable learners to communicate easier and this is helpful particularly for children with autism, which are the main target group of one of our projects to participate in lessons and learn more specifically. Learners with autism are able to accomplish tasks while working at their own pace. Increased ICT confidence among students motivates them to use the internet at home for schoolwork and leisure. It is important to find ways of engaging this group because pupils with autism or Asperger syndrome are 20 or more times more likely to be excluded from school than their classmates (Barnard, Prior and Potter, 2000).

But engaging pupils with autism in learning and using interactive ICT media (i.e. white boards) which have a positive effect on teaching and learning is difficult, taking into consideration the sensory disruption of these pupils, atypical learning styles, environmental needs and lack of social skills (Hersh and Hamburg, 2004; Myles, et al., 2004).

In this context, the teachers and social workers benefit from the use of ICT enabling them to communicate electronically with colleagues, thereby reducing their isolation, improving their skills, as well as accessing and using best practices and online resources for their work.

ICT and particularly the internet also support co-operation e.g. the creation of Virtual Communities of Practice (VCoPs) as a promising approach for learning, housing reviews of research evidence and engaging persons to share practical knowledge and to make practical innovations.

Communities of Practice (CoPs) (Wenger, 1998) are social-oriented cooperations where practitioners (i.e. trainers, social workers, doctors, parents, person with autism) are held together in a CoP by a common interest in a body of knowledge. CoPs are driven by a desire and by the need to learn through practice and social participation, to share problems, experiences, insights, templates, tools. CoPs address not only the acquisition of technical skills for a determined practice but also social and informal aspects of sharing and developing knowledge.

In this paper we present aspects of training for people with autism particularly by using ICT (part 2), VCoPs (part 3) and give as an example our EU-

Learning partnership Bringing New Approaches to Education of Autistic Children in Turkey and European Countries http://www.autism-newapproach.org (part 4). Another on-going project is also shortly presented.

## 2 ICT SUPPORTED SOCIAL SKILLS TRAINING

Social skills training can be illustrated by the phrase "teaching a person how to navigate social reality" (www.iancommunity.org/.../social_skills_interventio ns) which is a very complex and multifaceted field. Generally, there exists limited knowledge in the field of social development and, as a consequence, also referring to autistic children. A starting point in this direction could be a list with issues of social impairments of ASD pupils like a lack of interest in initiating social interactions, a lack of understanding of emotions and how they are expressed, poor eye contact, which could be improved by social training.

Pupils with ASD need social skills training beginning from childhood with basic social skills and continuing in adulthood turning into complex social skills required for living and working in a community. Social skills are necessary also for the individual success of pupils, for their social acceptance and integration in schools, workplaces and society (Myles and Simpson, 2001).

Computers and other ICT media like video, software or virtual-reality programmes teaching complex social skills such as recognition of emotions in facial expressions and tone of voice can support social skills training (Hagiwara and Myles 1999; Hamburg, et al., 2007).

We use videos in our project e.g. having a child watch him- or herself performing a social task or role-playing a social situation and then analyzing what is well done and what not. The videos can help pupils to interpret body language, to learn greeting visitors.

Virtual rehabilitation (Hamburg and Ionescu, 2009) with new graphics technologies and tele-rehabilitation supporting more efficient services facilitate the treatment of more people are important developments particularly for ASD. It is expected that this area which combines multidisciplinary technological fields like virtual reality, bio-electronics, and natural human-computer interfaces will "revolutionize" many special treatment units in the coming years.

In trainings using virtual reality, socially interactive robots can be used to set up practice "social interactions" for individuals with autism.

As another ICT tool we consider interactive white boards as best practice for children with autism. Unfortunately teacher skills and strategies in this context are missing. So in our project we will start first with some research work about advantages and disadvantages of white boards and then develop one-day training for Initial Teaching students.

Referring to the ICT based learning methods, E-Learning combined with traditional instructor-led training offers more efficiency for learning social skills providing flexibility in terms of time, place, adaptation of the learning material, audience and individualized (customized) content (Hamburg, 2010).

There are also disadvantages of ICT based training particularly by using the internet like bandwidth limitations for certain media types and assistive technologies necessary for people also having other disabilities, initial development costs which can be more expensive than development costs for print-based or instructor led training and longer development time. In order to be efficient, the learners must be self-directed learners and comfortable using the Web.

One barrier that hinders the learning of social skills could be the poor range and quality of provision in some areas which means that many disabled adults are still not given the opportunities they need to learn basic social skills. It seems that these opportunities depend on the commitment and initiative of individuals rather than on a clearly defined right of access.

A second problem is that ASD requires good specialist teaching, which is not available to many learners because of the shortage of skilled and qualified teachers. Some learners require specialized equipment, but many teachers are unfamiliar with the range of special available software or with the technology used (e.g. white boards). Other learners require transport to the place of learning, more accessible accommodation, timetabling which avoids fatigue, or a personal assistant who is sometimes missing.

Also the curriculum for social skills is insufficiently flexible to enable all learners to build new skills which are required in connection with many economic and technical changes for example to teach them how to use the Web and how to communicate through media. Many learners need continuous learning opportunities in a community; it could be realised by a combination of formal and informal education methods (including different evenings, activities of social and health services, etc).

The teaching of social skills should be (if possible) integrated with the rest of people's lives. There is little Web-based learning material for adults that is age-appropriate and sufficiently challenging. It is important that each student is involved in deciding which skills to develop and has an individualised learning plan, built on previous learning experiences and experience with the ICT.

## 3 VCoPs

A Community of Practice (CoP) may provide a useful perspective on learning, information, knowledge sharing and creation. In a CoP, a group of people come together who share a concern, a set of problems, expertise and/or a passion for a topic. "Communities of practice are formed by people who engage in a process of collective learning in a shared domain of human endeavour". Some research pointed out that knowledge developed in Communities of Practice is important for understanding different types of knowledge and how knowledge develops in different contexts. These distinctions are important when processes of learning and knowledge development in SMEs are analysed.

The design of CoPs also is important. Some principles of "designing for aliveness" which can guide organizations wishing to start a CoP are explained here. These we have followed in our current projects (see part 4):

▪ Design for evolution e.g. design elements should be combined in a way that they may act as catalysts for a natural evolution to a life-long learning oriented CoP,

▪ Keep an open dialog between inside and outside perspectives of the CoP because the latter can help community members to see new possibilities and act effectively,

▪ Consider different levels of participation for the members of the CoP (leadership roles, core active group, rare participants, etc.)

▪ Develop public and private community spaces

▪ Create a rhythm and rules for the community

Internet technologies extend the interactions within Communities of Practice beyond geographical limitations and enable the building of virtual CoPs (VCoPs). These communities free their members from constraints of time and space.

Sometimes a transition takes place from a face-to-face to a Virtual CoP, in order to reach more continuous levels of information sharing. In this case it is important to choose adequate software to support the VCoP.

The current generation of web-based technology (Web 2.0) which is not mainly a technical revolution but first of all a social one, has a vast potential to create prospering environments for emerging Communities of Practice.

The lack of face-to-face contact within a Community of Practice can often be an advantage because it helps to suppress traditional group norm behaviour. On the other hand, it remains an open question whether a community of practice where face-to-face contact is entirely excluded can be sustained over a long period. In our project we are going to support both virtual and face-to-face contacts in the community of practice under development.

Despite the great potential, there are also limitations of current technologies in relation to Virtual Communities of Practice: because virtual community infrastructure can be set up across cultures via www, cultural and language differences can hinder the desired fluidity of activities in communities of practice.

Some positive aspects referring to people with ASD, which could be influenced by CoPs, are the following (Engert, et al., 2008):

▪ Improving the learning curve of new staff

▪ Supporting new ideas for products and services

▪ Reducing rework and preventing "reinventions of the wheel"

▪ Responding more rapidly to people with autism needs and inquiries

▪ Development of friendly repositories of knowledge and good practices

There exist some initiatives in building VCoPs to fill the gaps in rehabilitation and training in the field of ASD. For example, for many social problems there is a gap in the availability of proven evidence-based strategies (Rosen, et al., 1999). A good solution for social workers who need advice and also for sharing knowledge and inventing new practical solutions are VCoPs (Cook-Craig, 2008).

## 4 EXAMPLE

After having gained experience in the GRUNDTVIG project BASKI aimed at the development of a model of social basic skills for people with learning disabilities, we continued our work in the EU-Learning partnership Bringing New Approaches to Education of Autistic Children in Tur-

key and European Countries. The target groups of the project are teachers and students of vocational education, trainers working in special education centres, social workers, parents of autistic children and last but not least children with autism. The partners come from Austria, Germany, Spain and Turkey.

The main tasks of the project are:

- Surveys about autism and existing education approaches in partner countries

- Discussions with experts in this context

- Research of successful methods and new approaches in training of autistic children, trainers and parents

- Structured interviews with trainers, students, parents

- Development of a common approach for the training of target groups

- Development of a Community of Practice with virtual activities (VCoP) involving autistic citizens, trainers, doctors, parents, social workers supported by a Moodle platform to develop training resources

- Pilot runs in Turkey.

Some of the questions for the structured interviews with trainers are the following:

- Have you ever heard of "Autism" before starting to work in this organization?

- Have you ever interacted with an autistic child before working in this organization? If so, could you explain the level of your interaction?

- Do you have any difficulty in training autistic children?

- Who puts you under stress the most while training autistic children?

- To what extent can you solve the problem you have faced?

- What are your attitudes towards people?

- Your opinions about your job

- Do you know the ICT supported methods and techniques used in the education of autistic children?

- Do you know supportive therapy methods used in the education of autistic children?

- Can you easily obtain the written sources and materials about autism?

- Do you think the autistic children should be led to the vocational training?

- In your opinion, what kind of occupations can autistic children be led to?

We started now the development of a VCoP with trainers, social workers and autistic children recommended by trainers, doctors not only from partner countries but also from other European countries. The access to documents, discussions and training modules for achieving social skills is supported by a Moodle-based platform (Dougiamas, 2006) because of the accessibility and flexibility of this tool. The choice of Moodle was based, firstly, on an analysis of some open source virtual learning environments (VLEs) on the criteria of sustainability and viability (that influence the costs for adoption and maintenance of the system) and the pedagogical rationale of the environment. Secondly, we decided to use Moodle because some of the partners already had good experience and competence with this environment.

Another European VCoP and some cultural learning sequences addressed to people with communication disabilities particularly ASD, will be created within the European Grundtvig Learning partnership CLINTEV, starting in these months.

## 5 CONCLUSIONS

In our research work and projects we advocate the help ICT can give to persons with autism particularly to overcome their communication difficulties and to achieve social skills so this person can be included in lessons, in social and working environments. We are confident that learning in CoPs will make a positive contribution to spreading best practices in ASD and find new innovative solutions, but creating sustainable CoPs is a difficult and complex task. In our future work we will create a frame for disseminating existing VCoPs in Europe and abroad and for creating new ones to fulfil existing gaps in research evidence and training not only in the field of ASD but also other disorders.

## ACKNOWLEDGEMENTS

## REFERENCES

Barnard, J., Harvey, V., Prior, A., Potter, D., 2000. *Inclusion and Autism: Is It Working?* London: National.

Autistic Society. …imp.sagepub.com/cgi/reprint/8/1/93.pdf.

Cook-Craig, P., Yekoutiel, Sabah. *The Role of Virtual Communities of Practice in Supporting Collaborative Learning among Social Workers.*

Dougiamas, M. Interview Oct. 2006. http://www.stevehargadon.com/2006/10/interview-with-martin-dougiamas.html.

Engert, St., Hamburg, I., Marin, M., Petschenka, A., 2008. Improving e-learning 2.0-based training strategies on SMEs through communities of practice. In *The International Association of Science and Technology for Development: The Seventh IASTED International Conference on Web-Based Education*, March 17-19, 2008, Innsbruck, Austria. Innsbruck, pp. 200-205

Hagiwara, T., Myles, B. S., 1999. *A multimedia social story intervention: Teaching skills to children with autism. Focus on Autism and Other Developmental Disabilities*, 14, pp. 82-95.

Hamburg, I., 2010. eLearning 2.0 and social, practice-oriented communities to improve knowledge in companies. Ortiz Bellot, G., Sasaki, H., Ehmann, M., Dini, C. (eds.) ICIW, 2010. In *The Fifth International Conference on Internet and Web Applications and Services*, 9-15 May 2010, Barcelona, Spain. Barcelona: CPS, pp. 411-416.

Hamburg, I., Ionescu, A., 2009. Community-based rehabilitation and education services. In *Conference and workshop on assistive technologies for vision and hearing impairment: past successes and future challenges*, 20th-23rd April, 2009, Wroclaw, Poland. CD-ROM. Wroclaw, p. 9.

Hamburg, I., Ionescu, A., Kürtösi, A., Puklus, Z., 2007. Improving social life and communication of people with disabilities by using internet facilities. Hersh, M.A. (ed.): In *Conference and workshop on Assistive Technologies for People with Vision & Hearing Impairments: Assistive Technology for all Ages*, CVHI 2007, Granada, Spain. CD-ROM. Glasgow: Univ. of Glasgow, p. 6.

Hersh, M. A., Hamburg, I., 2004. Working with disabled end-users: training engineers, designers and other professionals. In *Work With Computing Systems,* 2004: proceedings of the 7th International Conference on WWCS, 29 June-2 July 2004, Kuala Lumpur, Malaysia. CD-ROM. Puchong: Damai Sciences; p. 342-347. http://bjsw.oxfordjournals.org/cgi/content/abstract/39/4/725?ck=nck.

Myles, B. S., Simpson, R. L., 2001. *Understanding the hidden curriculum: An essential social skill for children and youth with Asperger syndrome*. Intervention in School and Clinic, 36, pp. 279-286.

Myles, B. S., Hagiwara, T., Dunn, W., Rinner, L., Reese, M., Huggins, A., Becker, S., 2004. *Sensory issues in children with Asperger Syndrome and autism*. Education and Training in Developmental Disabilities, 3, pp. 283-290.

Wenger, E., 1998. *Communities of Practice: Lerning, Meaning and Identity*. Cambridge MA: Cambridge University Press.