



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

ICT helps to overcome disabilities

P. Benda, Z. Havlíček, V. Lohr and M. Havránek

Department of Information Technologies, Faculty of Economics and Management, Czech University of Life Science, Prague, Czech Republic

Abstract

As a result of technological progress ICT (Information and Communication Technologies) has created the so-called „digital divide“. Some people are unable to individually respond to this progress, but the proper use of ICT can help them overcome this handicap. One of the possibilities is to create accessible and usable applications depending on the character and level of disability.

In accordance with the European CertiAgri project, e-learning tools are used for integrating people with disabilities into the horticultural area. The paper specifically describes examples of simple teaching aids from the practical „green care“ course, which focus on the skills of people with mental disabilities.

Key words

ICT, mental disability, educational materials, CertiAgri, accessibility, usability.

Anotace

ICT jako výsledek technologického pokroku vytvářejí také tzv. „digitální propast“. Někteří lidé nejsou schopni na tento pokrok samostatně reagovat, avšak správné nasazení ICT jim může pomoci tento handicap překonat. Jednou z možností je vytváření přístupných a použitelných aplikací dle charakteru a úrovně handicapu.

V souladu s evropským projektem CertiAgri jsou vytvářeny učební e-learningové pomůcky pro začleňování hendicapovaných občanů v oblasti zahradnictví. V příspěvku jsou konkrétně uvedeny ukázky jednoduchých učebních pomůcek z praktického kurzu „Péče o zeleň“, který je zaměřen na zvyšování kvalifikace pro občany s mentálním postižením.

Klíčová slova

ICT, mentální postižení, výukové materiály, CertiAgri, přístupnost, použitelnost.

Introduction

The digital age continuously brings new possibilities in ICT. These possibilities lead to the increase in the competitiveness of enterprises, but also create a „digital divide“ for some people. In many cases there is a difference in the Internet usage presented by the low digital literacy. This has an impact not only on job opportunities, but also on education, creativity, commitment, confidence and guidance in the use of digital media. Problems with accessibility and usability are also felt by people with disabilities. If we cross over this „digital divide“ we can help disadvantaged social groups to participate in the digital society in a more equal way and overcome their disadvantage through

better employment opportunities (Digital Agenda, 2020).

Many studies over the last 30 years have shown that technology can play a significant role in any work with specific disadvantaged groups such as the blind and those with movement disabilities. It can do so in the provision of media to facilitate communication and education, but also in other learning (Tas and Tatnall, 2008).

Material and methods

The aim is to analyze the potential of new ICT for overcoming persons' disabilities Educational materials for people with mental disabilities have

been created within the European CertiAgri project. Due to the specificity of these citizens, the main emphasis is placed on maximum usability and simplicity of the created teaching materials.

Results and discussion

Mental handicap

The term handicap, which was formulated in 1827, comes from the environment of horse racing. Handicap means „hand in cap“ and it is used to express particular disadvantages. For example, it could be a disability (physical, mental) which hampers and limits normal life. Instead of the term a „disabled person“ we usually use the term „person with a disability“ In this paper, in accordance with the aim of European CertiAgri project we focus on persons with mental disabilities.

Mental disability (mental retardation) is a developmental disorder of the integration of mental functions, affecting individuals in all aspects of their personalities - mental, physical and social. The most striking feature is a permanently impaired cognitive ability, which manifests itself primarily in the learning process. Possibilities for education are limited depending on the degree of disability (Pipeková, 2006).

Mental disability is not a disease but a state. It is estimated that people with disabilities make up about 3% of the total population and also the largest group among persons with disabilities. Most of them are of school age. They need guidance and lifelong support (Valenta and Krejčíková, 2003).

To enable handicapped individuals to move alone, orientate and flexible operate in working life outside the designated special routes, they need to obtain an individual resources that will control themselves (Bartoňová, 2005).

Status and possible solutions

Education of persons with mental disabilities

Upbringing and education of persons with mental disabilities can be understood as a lifelong process. An integral part of the complex care and support for individuals with mental disabilities are special educational centres. Their work is defined by Decree No. 72/2005Sb.

These centres provide special readiness of pupils for compulsory education, special educational needs, technical documentation for the integration of these pupils, they also provide education for students with learning disabilities, educational and psychological diagnosis, advisory services, methodical support

for staff in schools, etc. (Pipeková, 2006).

A significant number of students with learning disabilities, or special needs, require assistance and support in their learning. The introduction of Information and Communications Technologies (ICT) and use of the Internet have played a major part in shaping the knowledge and skills of these students (Tas and Tatnall, 2010).

Adults with mental disabilities can attend sheltered workshops, special centres and other institutions to further develop their skills and social awareness. Retraining courses are also carried out within these centres, but without much support in the form of online materials and courses.

ICT solutions aimed at compensating for disabilities, such as memory problems and daily activities demonstrate that people with mild to moderate mental disability are capable of handling simple electronic equipment and can benefit from it in terms of more confidence and enhanced positive effect (Lauriks, 2007).

The specification of psychological processes of mentally handicapped persons

Perception - sensory cognition - the process of shaping the experience is slow and takes place with certain variations, the lack of spatial perception, imperfect perception of time, tactile sensations numbness, poor coordination of movement.

Thinking - is loaded with too high a specificity, inaccuracies and errors in the analysis and synthesis. It is unable of higher abstraction, it is inconsistent, terms are clumsy, judgments are inaccurate.

Memory - all new sensations are acquired only slowly and on multiple repetitions, these people quickly forget and recall inaccurately, they are unable to assert knowledge in practice or in time.

Attention - has a low range of reference field, is unstable and easily fatigued.

Will - a specific feature of mental retardation is a will disorder, indecisiveness, lack of will, a reduction of voluntary activities, inability to initiate activity.

Speech - one of the most characteristic symptoms of this disability is a disruption of communication skills, impaired speech development; a considerable delay is affected by the degree of mental retardation.

Emotions - imbalances, emotional instability and aggression, emotions associated with the cognitive activity of person, curiosity, cognitive interests are affected (Valenta and Müller, 2003).

Each mentally disabled person is a distinct entity

with characteristic personality traits, nevertheless, most of them manifest themselves as characteristic features in different periods of life, depending on the depth and extent of mental disability (Vítková, 2004).

Education of disabled people - the application of Mary Montesory pedagogy

Teaching of mentally disabled children and adults is almost impossible without help. It is still needed to encourage and motivate them into action. Interest of mentally disabled people in an activity during their separate search is lower. Also, preparation of tools is demanding. Didactic material must involve much smaller steps, so that a person with this condition could come to the goal unaided. The idea of integration and socialization of people with multiple disabilities provides the basis. Mary Montesory methods are suitable for both children and mentally disabled people. Students learn in a well-prepared and controlled environment. A different time scale for understanding, mastering the curriculum and various activities is respected. An uneven pace of acquiring the knowledge and skills as well as different levels will allow students to learn from each other.

Integration and inclusion

Employment of individuals with mental disabilities

Work performs a number of functions in human life. It structures the life time, brings a sense of self-fulfillment and mediates human social interactions. It can be stated that integration into the working process is seen as acknowledgment of a fully-fledged person. This has a positive effect on his or her confidence. The choice of training pathways and subsequent employment is a significant and very important milestone in the life of every person. It is not always easy to reconcile the interests, inclinations, desires, skills, mental and physical abilities with the assumptions and requirements of a particular occupation. In order for people with mental disabilities to be involved in simple work activities in sheltered workshops or other workplaces as well as adapted household chores in the family, they need to acquire a practically usable range of skills and habits of the working classes. Everything, what the students learn, increases their self-sufficiency as well as independence and helps them and their surroundings live together. The problem with mentally disabled individuals, in contrast to some of their unaffected peers, is too much free time, which they are not able to use effectively. The skills they obtain during their work in the workshop, classroom, course or in the field,

help them alleviate this problem, or completely remove it (Švarcová, 2001).

Adult education is a special phenomenon of the present civilization. Mentally disabled people need the knowledge and support of lifelong learning. Although it does not seem effective its results are very helpful for the life of such individuals. Mentally disabled adults, if left without guidance, lose their hard-won knowledge, skills and habits. Education in adulthood provides important fulfillment for individuals who are not employed for various reasons. It opens new possibilities not only in their socialization. For adults with mental disability education as a goal becomes a value in itself and that is worth pursuing. It positively affects their self-concept, enhances self-confidence and thus it gives space for understanding the new social roles. In many countries, there is part of the training courses for adult mental acquisition and further development of communicative and assertive skills and skills required for independent decision making (Vítková, 2007).

Entry into the free labour market is one of the most important manifestations of social emancipation of people with intellectual disabilities. It provides them with the enhancement of self-esteem and confidence, greater control over their own lives, widening the range of interests and new social contacts, social benefits, improving everyday skills, better meet their own ideas about the application of labour, better use of their own abilities at work, flexible support, adult support roles, the opportunity to gain social respect, natural integration into mainstream society and greater job certainty (Johnová, 1999 in Valenta and Müller).

Creating and implementing of support programmes for persons with mental disabilities is advantageous from an economic point of view. Long-term care is more expensive than supported independence and meaningful work. Even low-paid employment or part-time employment gives a person with mental disability status of an adult and feeling that his real work contributes to society and the work stimulates and maintains the skills and habits (Černá 2009).

Persons with serious level of mental disability are able to work under supervision - in sheltered workplaces, other options include supported employment. The basic objective is to prepare the trainee with severe disabilities for the performance of less demanding professions. These jobs are characterized by their monotony, and therefore are not sought. These include working as a kitchen helper or doing odd jobs in gardening, etc (Pipeková, 2010).

The transition from educational institutions to work can be considered a critical period of the individual with mental disabilities. Graduates often lose their habits of the school period and motivation. They may become convinced that the state must take care of them (Černá, 2009).

The CertiAgri Project

Development and maintenance of access to ICT must be driven by the needs of people with disabilities. Developments which broaden the scope, applicability and usability of the human technology interface will be driven, at least in part by the needs of people who have disabilities (Cook, 2009). Besides accessibility issues, e-learning applications have to face more general problems related to usability (Mesiti, 2011).

New web applications must reflect the current state of technology and respond to end-users, so that they can find additional value in these applications (Havliček, 2011).

The aim of the European CertiAgri Project, which is a part of the TRANSFER OF INNOVATION, LEONARDO DA VINCI, Lifelong Learning Programme, is the creation of pedagogical supports in the form of online materials that are created with regard to the target group - mentally handicapped people. These courses should help persons with mental disabilities through retraining in horticulture. Courses are designed as simple procedures describing the required jobs. Materials are designed for people with intellectual disabilities however students need the help of an assistant in the navigation through the course. In each course there is time reserved for evaluation of the students knowledge in the form of questions, interactive paintings and drawings. Drawing is an important medium of communication. It is a specific way of language, which can replace deficiencies in the commonly used language.

The general, dealing with the situation of disabled people is expressed by the scheme of Courtaut and Hoerter (2010). In this scheme, the term „Travail - Job“ emphasizes future work (employment) for citizens with disabilities and forms the apex of the pyramid. The base of the pyramid is formed by the Education (Training) and Support (Appuis) axis, which is influenced by local social resources.

For the creation of educational materials and organization of practical courses, European experience from the activities of „social enterprise“ as a French „la main verte“ have been used.

There are complex elements, concepts and structures in e-Learning, difficult to transmit to people with disabilities. (Guenaga, 2004)

The principles of education are based on practical experience teaching hours in the field, where students learn or are trained in individual jobs, as well as in the necessary theory. Learning support materials are intended as a summary of the methodological instructions for self-learning and also to repeat reminders and skills acquired through practical experience.

There are some materials of horticulture course described below, namely planting of trees. Although some images and animations may look naive, they are close to the level of understanding by students with intellectual disabilities and very well describe the feelings experienced during the actual job.

Materials are mostly visual and multimedia character with a short description. The reason is a visual reminder of perceptions, which are often enriched with icons describing each of the displayed items of information. These icons show job objects, tools and activities. These icons remain unchanged throughout the course and the students are accustomed to them.

In individual courses there are also photos and



Figure 1: Handicap employment scheme.



Figure 2: Sample animation of tree planting. This is the first frame of animation.



Figure 3: Description of main work object in known environment.



Figure 4: Tree - we put it into the excavated pit.



Figure 5: Spade - we used it to prepare the ground.



Figure 6: Implemented instruction - snapping a pillar of planted tree.



Figure 7: Pictures related to the course - visual, schematic and intellectual experiences.

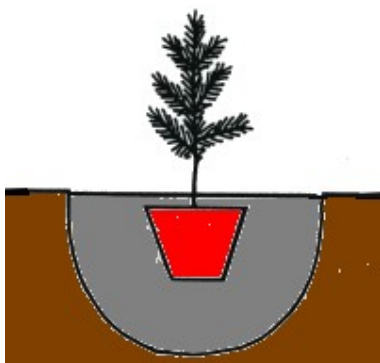


Figure 8: Pictures related to the course - visual, schematic and intellectual experiences.



Figure 9: Pictures related to the course - visual, schematic and intellectual experiences.

videos collected that experienced by the pupils themselves and relate to performed learning.

Again, by the visual information there is presented the outcome of the course to students.

Courses are currently being designed and created on the project website - certiagri.eu. There are also multimedia records, including videos, being developed. They gradually take individual students through the course. The teaching materials can also be used outside the courses. An emphasis is focused on repetition and detailed labeling of individual operations.

Acknowledgements

This paper was elaborated within the framework of the solution VZ MSM 6046070906 „Economics sources of Czech agriculture and their efficient use in the context of multifunctional agri-food systems“.

Conclusion

The digital society must be balanced, ie. it also must offer support to those who must live with disability. It is necessary to use modern ICT,

which allows integration of people with mental disabilities. Results to date indicate that a sensitive approach can create learning materials that can help these people to gain skills and find application in the labour market. Although the creation of courses and materials for people with mental disability is challenging we hope to help in their teaching and learning as well as in their better inclusion in society.

The solution of problems of disabled students by the help of information technology is localized on the acquisition and information processing (Benda, P. 2010). The examples and implemented practical lessons for people with mental disabilities are commended by concerned people as well as by their assistants very much. Currently prepared materials are included in the specific on-line lectures and will be repeatedly tested for appropriateness of their usage.

Existing experience confirms that this form of teaching and presentation of materials can actually lead to the improvement in education of people with mental disability and their better inclusion in the society in general and in the field of horticulture in particular.

Corresponding author:

Petr Benda, Ing.

Department of Information Technologies, Faculty of Economics and Management, Czech University of Life Science, Prague, Czech Republic

Kamýčká 129, Prague 6 - Suchbát, 165 21

Phone: +420 224 382 045

E-mail: bendap@pef.czu.cz

References

- [1] Bartoňová, M., et al. Integrace handicapovaných na trhu práce v mezinárodní dimenzi. Brno: MSD, 2005, 201 s. ISBN 80-866633-31-4.
- [2] Benda, P., et al. Possibilities of web-conferencing systems for disabled students. In AGRIS on-line Papers in Economics and Informatics. Prague : Information and Consulting Center of FEM CULS Prague, 2010. s. 81-86. ISSN 1804-1930.
- [3] Černá, M. et al. Česká psychopedie. Speciální pedagogika osob s mentálním postižením. Praha: Karolinum, 2009. 222 s. ISBN 978-80-246-1565-3.
- [4] Cook, A. M. Using the Web and ICT to Enable Persons with Disabilities : Biomedical Engineering Systems and Technologies. In Communications in Computer and Information Science. Berlin : Springer Berlin Heidelberg, 2009. s. 3-18. ISBN 978-3-540-92219-3.
- [5] Courtay, M., Hoerter, P. L'entreprise apprenante en agriculture au des personnes en situation de handicap. I.D. L Edition 2010. ISBN 978-2-915626-61-2.
- [6] European Commission. Digital Agenda for Europe 2020[online]. 2010 [cit. 2011-10-28]. Available from WWW: <http://ec.europa.eu/information_society/digital-agenda/index_en.htm>.
- [7] Guenaga, M., et al. Accessibility for e-Learning Environments. In Lecture Notes in Computer Science. Heidelberg : Springer Berlin, 2004. s. 626. ISBN 978-3-540-22334-4.
- [8] Havlíček, Z., et al. WWW Applications and Regional Development. In EFITA/WCCA '11. Prague : Czech Centre for Science and Society, Prague, 2011. s. 403-409. ISBN 978-80-904830-0-2.
- [9] Lauriks, S., et al. Review of ICT-based services for identified unmet needs in people with dementia. Ageing Research Reviews. 2007; 223-46. ISSN: 1568-1637.
- [10] Mesiti, M., et al. Collaborative Environments: Accessibility and Usability for Users with Special Needs. In Community-Built Databases. Heidelberg : Springer Berlin, 2011. s. 319-340. ISBN 978-3-642-19047-6.
- [11] Pipeková, J. Kapitoly ze speciální pedagogiky. Brno: Paido, 2006. ISBN80-7315-120-02
- [12] Pipeková, J. Osoby s mentálním postižením ve světle současných edukativních trendů. Brno: MSD, 2006. ISBN 80-86633-40-3.
- [13] Pipeková, J. Pracovní uplatnění osob s mentálním postižením. In Pipeková, J. (ed.) Kapitoly ze speciální pedagogiky. 3. přepr. a rozšíř. vydání. Brno : Paido brno, 2010. od s. 311-316, 6 p. ISBN 978-80-7315-198-0.
- [14] Švarcová, I. Mentální retardace. Praha: Portál 2001, 378 s. ISBN 80-7178-506-7.
- [15] Tas, A., Tatnall, A. Using ICT to Improve the Education of Students with Learning Disabilities. In Learning to Live in the Knowledge Society : IFIP International Federation for Information Processing. 281. Boston : Springer Boston, 2008. s. 63-70. ISBN 978-0-387-09728-2.
- [16] Tas, A., Tatnall, A. Use of ICT to Assist Students with Learning Difficulties: An Actor-Network Analysis. In Key Competencies in the Knowledge Society. In IFIP Advances in Information and Communication Technology. Boston : Springer Boston, 2010. s. 1-11. ISBN 978-3-642-15377-8.
- [17] Valenta, M., Krejčíková, O. Psychopedie. Olomouc: Netopejr 1997, 193 s. ISBN 80-902057-9-8.
- [18] Valenta, M., Müller, O. Psychopedie. Praha: Parta, 2003. ISBN 80-7320-039-2.
- [19] Vítková, M. Integrativní speciální pedagogika. Brno. Paido 2004, 463 s. ISBN 80-7315-071-9.
- [20] Vítková, M. et al. Vzdělávání žáků se speciálními vzdělávacími potřebami I. / Education of Pupils with Special Needs I. VZ MSM0021622443. 1. vyd. Brno: Paido, 2007. 380 s. Edice pedagogické literatury. ISBN 978-80-7315-163-8.
- [21] Česko. Ministerstvo Školství, Mládeže a Tělovýchovy. Decree no. 72/2005 Sb., from 02/17/2005 o poskytování poradenských služeb ve školách a školských poradenských zařízeních. Also available from: <http://spp.ippp.cz/sites/legislativni-predpisy/pdf/vyhlaska-72-2005.pdf>.