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ACCESSIBILITY AND PERSONALIZATION. THE LITERACY PROJECT¹ AND THE UNIVERSAL DESIGN APPROACH

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Abstract

The Literacy Project was a European wide research project funded by the European Commission in the area of ICT under the FP7 Programme. The aim of the project was to create an advanced online portal to support the inclusion of dyslexic youths and adults in society, and research online accessibility. One of our main research area was to meet the needs of dyslexic people. Surveys and interviews helped us to work out the Portal. Our final conclusion is that the future is for the universal design, or rather the inclusive design.

Keywords: dyslexia, accessibility, universal design, inclusion, online portal

1 ACCESSIBILITY AND INCLUSIVE DESIGN

Sliwka (2010) described the changing of the view of social, ethnic, gender and ability differences:

1. Homogeneity - difference not seen.
2. Heterogeneity - difference seen as challenge to be dealt with.
3. Diversity - difference seen as asset and opportunity.

Accessibility means an accessible environment, on the other hand, universal or inclusive design refers to a broader idea of producing buildings and products that are accessible to people having disadvantages for different reasons (disabilities, old or very young age, etc.), as well as for everyone else (Burgstahler, 2008).

We perceive that the concept and solutions in the design have changed according to the changes in the view of differences:

1. Uniform - environment designed to the average, the so called 'normal'.
2. Accessible - environment designed with solutions for extra needs and less barriers.
3. Universal/inclusive - environment designed to diverse needs.

An online environment can follow the initiative of inclusive design easily, as technology makes it extremely amenable to this idea. E-learning materials produced for people having difficulties in any areas can be at the vanguard of this movement.

We worked with more levels of accessibility: (a) digital, (b) universal/inclusive and (c) special accessibility. These areas cover, respectively, (a) the technological issues, (b) overall usability and (c) services for special difficulties. We can reinforce the social inclusion through the example of the online inclusion, too. Inclusive design is the future's approach to use the advantages of diversity.

¹ Literacy Project, 7th Framework programme, Nr. 288596

2 DYSLEXIA THE SPECIFIC LEARNING DIFFICULTY

Quite a few causal factors have been identified for dyslexia, which makes it clear that such a specific learning difficulty is an umbrella term. It is basically an achievement disorder caused by late or abnormal development in the area of speech, reading, writing and/or counting. The terms dyslexia, dyscalculia, dysgraphia and mixed learning disorder are symptomatic designations based on the area of abilities most strongly affected by the neurological difference (Gyarmathy, 2007).

2.1 Disability and difference

Most characteristics identified for dyslexia can be traced back to the differences inherent in information processing. Right hemisphere dominance shows up unequivocally as a causal factor, even though there are a number of individuals with right hemisphere dominance who have no learning difficulties.

The reason for this is that right hemisphere dominance is only indirectly responsible for the problem. Dyslexics are those individuals with a right hemisphere dominance in whose case the cooperation between the two brain hemispheres is inadequate, that is, they are unable to use information from the left hemisphere properly (Fig.1).

Hynd and his colleague shown as early as in 1989 that the front part of the corpus callosum connecting the two hemispheres is less developed in the case of dyslexics in comparison to non-dyslexics. Since then, multiple studies have demonstrated the significant role of an effective connection between the hemispheres in reading performance (Castro-Caldas *et al*, 1999; Dougherty *et al*, 2007; Petersson *et al*, 2007).

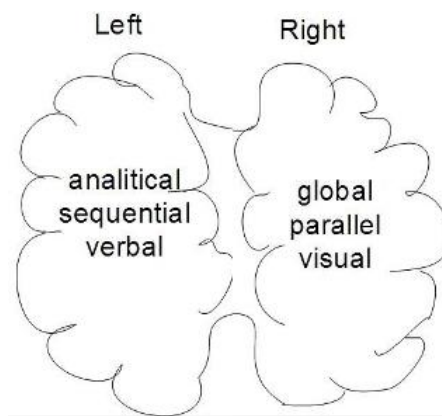


Figure 1 Cooperation between the hemispheres is realized through the corpus callosum.

There are probably people struggling with similar transmission problems, but since their dominant left hemisphere processing is in line with the general requirements, unilateral processing causes less difficulties for them, at least on the outside.

Specific learning difficulty is a neurologically-based syndrome that is independent of intelligence. It affects the mode, rather than the level of thinking. Its manifestation is culture-dependent, that is, environmental effects can influence in many ways its manifestation and the extent to which the different way of information processing will cause difficulties.

2.2 Digital environment and dyslexia

Right hemisphere dominance and other characteristics identified as the source of learning difficulties will only lead to difficulties if the environment fails to take into account the different from regular structure of abilities which characterises these individuals (Gyarmathy, 2007). The characteristics specific to dyslexics has benefits and drawbacks alike, like any other characteristic. Being in minority, however, makes integration and coping with everyday situations more difficult for them.

The visual-kinetic world of the digital culture, having unfolded to a large degree by the 21st century, has increased the ratio of dyslexics owing to the decreased amount of stimuli promoting verbal development that is received by developing brains. At the same time, this very same culture offers

opportunities for efficient coping, as well (Gyarmathy, 2012). With a change in the approach to treating learning difficulties and the increasing variety of assistive technology at hand make it possible to employ the principle of "a hair of the dog that bit him" and create an environment suitable for dyslexic individuals, as well.

Dyslexic individuals as well as most of the people with special abilities have no need for exemptions or waivers, but instead for an environment appropriate for their abilities in order to secure integration and social success.

2.3 Crutches or wings

Dyslexia is rooted in a type of brain functioning that is different from regular, which, coupled with appropriate other characteristics, can also lead to outstanding achievements.

For the moment, the environment strives to channel individuals who process information in a different way than regular into regular frameworks of thinking instead of building on their strengths and thereby generating profit for both the individual and society. The development provided to these individuals is unbalanced, targeting solely their weaknesses. The question arises: if you can hardly walk, would you be better off getting crutches to hobble along with, or wings to fly with?

Spatial-visual abilities are interlinked with mathematical, fine art and musical abilities. Children excelling at mathematics are characterised by a greater activity in their right brain hemisphere than is regular (O'Boyle *et al*, 1991). This different from regular dominance is also signalled by the fact that the ratio of the right-handed is smaller among mathematicians, artists and musicians (Annett, 1985; Geschwind, Galaburda, 1987).

These differences may also lead to disorders. A number of studies show that developmental language disorders, among them, dyslexia, are more prevalent among artists (Winner *et al* 1991; Winner, Casey, 1993;). Studies of musicians and even inventors produced similar results (Hassler, 1990; Colangelo *et al*, 1993;).

Bloom *et al* (1985) revealed in their study that not one of twenty leading mathematicians of the world had learned to read before school, and six of them even had difficulty learning to read. Test studies have established that dyslexics are over-represented at outstanding intelligence levels (Reis *et al*, 1995; Gyarmathy, 1998).

Based on his studies, Lloyd J. Thompson identified learning disorders in earlier age in Lee Harvey Oswald, the assumed murderer of President Kennedy, on the basis of biographical data. When writing his study, his colleagues drew his attention to the danger of potentially presenting an angle on individuals with different language abilities as being more prone to criminal deeds than regular. This drove Thompson to publish his collection of great creators with learning difficulties (Thompson, 1971).

2.4 Dyslexic people with wings

Thompson's compilation features famous artists, politicians and researchers alike, such as Auguste Rodin, General George Patton, American President Woodrow Wilson, bacteriologist Paul Ehrlich, brain surgeon Harvey Cushing. Since then, lengthier and lengthier lists of "Famous Dyslexics" are available even on the Internet. One such list can be found on the website of the British Dyslexia Association, for example: <http://www.bdadyslexia.org.uk/about-dyslexia/famous-dyslexics.html>.

The Hungarian Dyslexia Pages presents famous 'bad students' including Nobel Prizes Laureates diagnosed with learning difficulties: <http://www.diszlexia.hu/DiagnosedNobelPriceWinners.pdf>

Dyslexic brains may perform poorly at school, but may be outstanding at free-time activities. Learning often poses problems for them at elementary school, while they may perform well in higher education. Tannenbaum and Baldwin (1983) called talents with learning difficulties "paradoxical learners".

The best thing that can happen to us is that we find out how we can fly. A personalized website to give you this opportunity is a real step forward to inclusion.

3 AN ONLINE PORTAL FOR DYSLEXIC USERS

The Literacy Online Portal (<http://www.literacyportal.eu>) provides free support for dyslexic youths and adults. Our chief consideration was to develop an interactive, inclusive, personalized online surface giving much freedom for the usage of the site.

3.1 Our principles

The overall approach of the project is built on the following principles:

1. Dyslexia is an umbrella term, thus there are very different needs behind similar achievement difficulties.
2. Dyslexia is a mode of information processing different from what is regular, which, beside its obvious disadvantages, can carry advantages, as well. One such advantage is creative thinking.
3. The most efficient way to cope with problems involves self-advocate groups. Social-interactive situations render the individual effective.
4. In the 21st century, technology makes it possible for an individual with a varied pattern of abilities to perform efficiently. Assistive technologies offer great opportunities to dyslexics, as well.

Based on this, the international research team working on the creation of the online portal has primarily targeted the presentation of assistive technologies and their efficient uses. Situations targeting creativity and self-help serve as a medium.

3.2 Surveys on the content

Surveys have been initiated for the development of the portal content. We examined which services the Hungarian dyslexic users participating in the study chose most decisively at the beginning of the project.

We considered services as outstandingly sought-for that received scores above the average for choice options. The average score for the choice options on a scale of 1 to 5 was 3.9, which means that dyslexic youths and adults definitely welcome opportunities which can provide multiple ways of support.

The average score for the choice options is apparently independent of age and gender, and there is little deviation. One lady gave maximal points to all questions. No average scores were below 3.

Out of the total 24 areas, 13 received higher scores. We can regard as "winning" services those which dyslexic users feel they have the most need for. We classified the items in three groups according the choices (Table 1).

Table 1 Content choices of dyslexic users in three groups

The group of Hungarian dyslexic users prefer to get knowledge on dyslexia and learning methods, especially on learning second language. Less needed support is on the use of the ICT. Our results may suggest either that people with dyslexia are able to cope with the online situations or that they are not aware of their disabilities on this area, yet.

3.3 The current features of the Portal

Now a carefully developed algorithm serves as the background for personalization. The features of the Portal include the following:

- designed for users with dyslexia and other literacy-related disadvantages,
- offers online assessment and personalized brain training,
- offers tips for everyday life issues,
- offers a collection of assistive technologies and tips for effectiveness in everyday life, at work and in study,

- has a human centered, accessible and easily personalizable design,
- offers an opportunity for interactive contact within the group of users,
- available in four languages: English, Hebrew, Czech, Hungarian.

Our aim was to work out the best design and content for dyslexic users while having the portal be universally well-usable. An universally accessible format and ways of communication in the transfer of information lead to true accessibility and inclusion.

3.4 Problem areas

The three years of work on the Portal content and design provided a lot of experience through successes and even more through failures. Some of the problem areas we have encountered include the following:

- ensuring a one-page view without scrolling,
- segmentation of long lists and texts,
- how to accommodate personalization and accessibility,
- text-to-speech solutions in different languages,
- having mobile device compatibility while retaining accessibility.

These areas haven't been solved for our Portal, though they are crucial for our users. Some of these unsolved problems are technical, while some need a different way of literal thinking in the digital age., namely the effective use of the space would make any text more usable.

4 CONCLUSION

Dyslexia is a neurological characteristic, whose benefits and drawbacks endure for the whole life of the individual. The knowledge of the strong and weak points and an appropriate environment is the key to forestall learning and integration difficulties. This, in turn, is the most efficient if it fits in with the relevant sociocultural environment. This way, there is a greater chance of targeting the support we provide well.

Project Literacy is based on the above approach. It builds on creativity, the strength of dyslexic people, and uses a significant component of today's culture, namely, info-communication as its medium. It became clear that the use of info-communication tools presents no problems to dyslexic youth and adults.

Dyslexic people do not need a protective, condescending and weakening environment with waivers and exemptions, rather information to cope with their specialties, and an inclusive online and offline environment to provide an appropriate background for their development and achievements.

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