Abstract

Learning disabilities affect the brain's ability to receive, process, analyze, or store information. Dyslexia is one of the most common learning disabilities. Also called specific reading disability, dyslexia is a common reading and language disorder. It is not linked to any kind of deficit in intelligence overall, educational opportunity, or motivational factors. It affects 5-10% of alphabetic language speakers and 1 in 10 children is dyslexic. Our research was focused on improvement of health of patients with cognitive affections through develop new approach with support of ICT for implementation of conventional methods used in logopedy in an integrated system which also allows remote monitoring and therapy (similar to telemedicine systems).

Keywords: learning disabilities, eLearning, dyslexia;

1. Introduction

Dyslexia is one of the most common learning disabilities and occurs in children with normal vision and intelligence. Sometimes, dyslexia goes undiagnosed for years and isn't recognized until adulthood. This happens because they cannot learn a new lesson using the traditional way, but the teacher has to make use of some complementary techniques of teaching, such as: small steps/unities learning, over-learning and multisensory presentation of the new information (through hearing, seeing and pronouncing).

Also called specific reading disability, dyslexia is a common reading and language disorder. It is not linked to any kind of deficit in intelligence overall, educational opportunity, or motivational factors. It affects 5-10% of alphabetic language speakers and 1 in 10 children is dyslexic.

Many dyslexic individuals experience problems comprehending text because they have to process a sentence word-by-word and, as a consequence, comprehension decreases dramatically. When the task of reading a text is transferred to the computer, the learner can concentrate on the meaning and understanding the text.

As result of multiple studies and statistics, has been found a close connection between children with behavioral disabilities, communication or emotional difficulties, mental health problems and juvenile crime. Language disturbs
is a communication barrier with others, and without specialized help can arrive to impressive personal, educational, economic, social costs.

2. Dyslexia in Europe

Concerns for the definition, characterization and recognition of the students with learning difficulties are relatively recent and dates back to early 1960. The term "learning difficulties" was introduced into Anglo-Saxon literature, in 1963, to meet a group of American parents with children with learning difficulties.

"European Association of Dyslexia" estimates that 10% of population is suffering from this disease. According to the statistic published by "International Dyslexia Association" it can be concluded that, worldwide, the percentage of serious cases is 3-5% of a total rate of 7-10% of children who have learning disorders.

Only 30% of dyslexic children are identified before starting school or during the first academic year. For the others it takes years before their special needs can be supported.

In Romania, concerns about the difficulties of learning research in relation to the immaturity school were started in the '70s. In studies published in that period, were treated, especially the characteristics of students encountered difficulties in various disciplines, the various stages of schooling. In the early '90s the wealth of information and the neurological research made possible the emergence of comprehensive definitions of learning disabilities and generalizing their specific features.

In our country, the necessity to approach this issue comes from the large number of people suffering from a specific neuro-cognitive disorder:
- about 10% of the children have persistent communication disabilities;
- approximately 50% of children start school have language difficulties, but with professional help, can reach the same level as other children;
- in 91% of classes in Romania there is at least one child with special educational needs;
- approximately 10% of children aged 4 to 7 years has, according to statistics, various forms of speech disorders.

As a result of supporting policies for social inclusion at the European level, there are concerns regarding the research, design and implementation of integrated systems of care for people with various neuro-cognitive disorders. Through research carried out in projects as: OLP, NEURODYS, DYS 2.0, iSheds, etc., EU strives to improve the quality of life of people with special needs, promote the rights and ensure their integration and active participation in society. Thus, through the strategy "Europe 2020", elaborate in august 2010 at Brussels, EU proposes 5 ambitious objectives: employment, innovation, education, social inclusion and climate/ energy targets to be achieved by 2020. In the actions referred to in Europe 2020 is found also "sustainable health care and provision of ICT-based support for dignified and independent life". On the other hand, one of the seven action areas of "European Digital Agenda" is "increasing digital literacy, digital skills and inclusion".

Based on social inclusion, the stated objective of the European strategy is to increase the number of disadvantaged people using services like eLearning, eHealth, eCommerce, from 41% to 60% by 2015.

3. Language therapy and special education

Statistical studies have shown that presentation of educational material in multimedia format has a positive effect on knowledge acquisition of patients with learning disabilities.

Recovery methods used in speech therapy are focused in five main areas:
1. activities to improve articulation - capture voice and graphical display provides feedback quickly and with maximum impact;
2. practice activities for volume, intensity and amplitude of voice;
3. use of multimedia applications - this type of exercises represents electronic version of the classic methods of therapy;
4. interactive educational games - the researchers believe that the games and images stimulates memory and are highly motivating for the younger generation;
5. evaluation of progress.
There are several programs and applications in the market for language therapy. Even some of exercises can be used independent of a language (like games) most of them are especially for English language. None of these systems have been developed for Romanian language. Teachers’ competence in supporting the dyslexic learner is weak, only 6% of them feel fully competent.

4. e-Learning platform

Our research focused on finding better methods of speech therapy for certain neurological disorders using a computerized integrated system that would allow long distance therapy and remote monitoring of the patients. The innovative contribution is taking the traditional recovery method (“face-to-face”) to a new level, by integrating advanced technologies based on human-computer interface with more specific methods. This new system is designed to stimulate and motivate a significant target group (7-12 age) of patients with speech and cognitive disorders.

We have developed an e-learning platform made up of the following components:
1. an application for patient’s management and their rights;
2. a recovery module (RM) which is interactive and multimedia software for rehabilitation process of dyslexic person.

The e-learning platform is a multimedia and interactive environment, where dyslexic patients may progress by means of computer-based virtual environment which respond with a specific reaction to a given action of the subject. This eLearning system provide patients access to a suite of software programs to teach them basic/essential skills needed for everyday life.

Innovative research contribution is to reconceptualization the traditional recovery method ("face-to-face"), by being more responsive to the target group, integrating advanced technologies based on human-computer interface with more specific logopedics methods and speech therapy. In this way is achieved a high level of motivation to a significant target group of patients with speech and cognition disorders. Such a system does not replace speech therapist, but it can streamline its work by directing therapeutic intervention by automating repetitive tasks, not least by enabling computerized management of all data, results and report. The aim is to improve speech therapy for certain neurological disorders via an integrated information system.

4.1. Management system

The computer recovery and monitoring system for patients with dyslexia is structured in 3 sections:
1. For patients (patients can interact with speech therapist, with colleagues, with multimedia documents and with administration);
2. For speech therapists (they interact with patients, with appropriate multimedia content necessary for speech recovery, and can also interact among themselves to interdisciplinary collaboration or joint research projects);
3. For staff and administration.

In this three sections, interaction is done by eLearning Platform through communication:
- synchronous (virtual classroom, chat, webinar);
- asynchronous (through speech therapy sessions set by therapist, email, forum, blog, online library).

eLearning Platform for personalized recovery is built around a central system that meets the following requirements:
1. Ensure: (A) connection with the patient, (B) two-way communication patient-system;
2. Manage: (C) Application for recovery programs, (D) Databases, (E) User Interfaces.
The elearning platform is running on Windows Server 2003 with Internet Information Service 6.0 and SQL Server 2003. It uses a ASP.NET technology on .NET Framework version 3.5 platform and is based on Content Manage System (CMS) technology. Through http protocol it ensures patient connection to central system.

4.2. Recovery module

Recovery Module (RM) - represents the transposure of conventional speech therapy methods used in rehabilitation medicine, into the electronic environment. The methods and procedures implemented in ML are based on existing objectives from "face-to-face" therapy.

RM has four distinct components:

1. "Saving and correcting words" - is a module designed to develop the memory and to correct the language. In this module, the patient sees on the screen a word and/or an image and the associated sounds. The patient repeated the word itself and then hear his own pronunciation. This way, he can then compare his pronunciation with the correct one, and can try again. Also, the patient must associate the image on the screen (which can represent an object or action) with the properly noun or verb.

2. "The articulation of words" - this module enables the patient to understand how sounds are formed and to use a constant speed of speech. This module provides short video clips for independent practice pronunciation of letters and is useful especially to those who need to hear and see how sound is formed. The software records the patient and offer a comparison with the speech therapist pronunciation.

3. "Understanding Reading" - this module improves the understanding of the paragraph read. This module teach the patient words and concepts that belong to a category, is practiced reading and comprehension of questions. Tests include: matching a word in a particular category, matching a category to a word, the choose of the word that doesn't belong to a particular category, selecting a category based on a rule, choose a category based on a rule, but the patient must remember the rule; to deduct the belonging category of similar words.

4. "Cognitive Exercises" - is a module that enhances the ability to understand, store and execute instructions, both verbally and written. This module improves the ability to understand, store and execute instructions. Patients hear and / or read a direction that they have to follow by moving shapes on the screen (with mouse or keyboard). If the patient answers incorrectly, the program provides a useful suggestion, such as: "This is not the right form. You must move the red triangle". Can be verbal or written instructions.

All exercises of recovery module have more degrees of difficulty and personalized feedback, depending on the patient's response to the subject. Interactivity of the application is given by the multitude of possible response types: the patient may say, write, describe, choose from a list (consisting of text or images) or can move objects on the screen using the mouse.

5. Conclusions

Without appropriate support, children with disabilities develop behavioral difficulties more than their peers. As they grow, these children exhibit emotional and mental health sensitive. Considering all these aspects, an information system for education and rehabilitation, offering access to patients and therapists to the teaching material, the consultations, to modern and self-evaluation and administrative services (information, planning, management progress, events, etc.), is meant to be a "pioneer" in developing and implementing in Romania systems as e-health/p-health for patients with learning disorders in order to increase quality of care and quality of life of these patients.
References


COM(2008) 689 Communication from the Commission to the European Parliament, the Council, the European economic and social committee and the committee of the regions on Telemedicine for the benefit of patients, healthcare systems and society, Bruxelles, 2008.


