



01

Pedagogical Framework

Methodological framework for implementation

Published by:

DYS2GO- Learning games for dyslexic young adults

An Erasmus + Project AGREEMENT No - 2018-1-LV01-KA204-046970

Project coordinator:

University of Latvia

Bld.Raina 19, Riga, Latvia, LV1058

Contact person: Prof. Ilze Ivanova

Title:

O1 - Pedagogical Framework

Project website: www.dys2go.eu



Creative Commons 4.0 International.

Index

Chapter 1: National analysis of the situation of young adult dyslexic learners from a learner's and teacher's point of view	5
Introduction.....	5
Austria	5
Bulgaria.....	8
Czech Republic	12
Germany.....	15
Latvia	19
Lithuania	21
Comparative analysis of the Situation in the partner countries (Austria, Germany, Bulgaria, Czech Republic, Lithuania and Latvia)	26
Chapter 2: Description of transferable and adaptable elements (experience, methods, best practice, media, etc.) of former projects to mobile learning games	32
Partner E-Learning concepts/Austria	32
Partner Dyslexia Association Bulgaria.....	35
Partner Euroface / Czech Republic.....	37
Partner Gedonsoft / Germany	38
Partner SPI / Lithuania	39
Partner University Riga / Latvia	40
Summary	42
Chapter 3: Definition of broad (learning) goals for the planned games	45
Introduction.....	45
The role of the game in the learning process.....	45
Pedagogical goals	45
DYS2GO games - how they can help dyslexic learners.....	46
Attention	47
Visual and auditory perception.....	47
Visual and auditory memory	48
Spatial orientation	48
Expected results	49

Chapter 4: Pre-Selection Results	51
Introduction.....	51
Pedagogical types of the Auditory Areas	52
Games of the Auditory Areas	54
Pedagogical types of the Visual Area	58
Games of the Visual Area	60
Pedagogical types of the Spatial Position Area	65
Games of the Spatial Position Area.....	66
Chapter 5: Proposed Hardware and Software Requirements	68
General Considerations	68
Microsoft Windows	68
Google Android	68
Apple IOS	69
Chapter 6: Overall concept for training materials, especially interactive learning designed for mobile devices	70
Introduction.....	70
Guidance material	71
Chapter 7: General concept of user interface	72
General	72
Technical: WCAG 2.0	73
Navigation.....	76
Attachments:	78

Chapter 1: National analysis of the situation of young adult dyslexic learners from a learner's and teacher's point of view

Introduction

This chapter aims to provide a brief common information on partner countries situation regarding dyslexia. It is not a result of a research project or of a deep analysis. It is an internal project working document. It is based on information collected through a questionnaire that project partners completed at the project start. Their knowledge and expertise make a valuable contribution to the reflexions and discussions that took and take place to the development of game methodology.

Austria

1. Is Dyslexia officially recognised in legislation?

The different perspectives of research disciplines led to several focuses on dyslexia in Germany and Austria. The research results are discussed controversially. The focus on a medical perspective (by ICD-10) turns students into patients. However, a medical diagnose is important that excludes possible hearing, vision problems, mental health problems. Although the medicine gives a diagnosis “dyslexia”, it does not offers treatment. The Austrian legislation even does not obligate social insurance companies to reimburse the costs for diagnostics. Pedagogical measures are the main “treatment”.

The Austrian legislation addresses compensations of disadvantage (Nachteilsausgleich): e.g. special design of task sheets, conversion of written tasks into MP3 formats, time penalties in written exams, use of calculator and formula collections, etc. protective measures: e.g. exemption from certain parts of the examination; exemption from reading aloud e.g. at the blackboard, in front of the class; different weighting of oral and written grades when forming the total grades and admission to tests despite inadequate performance, etc.

School

The Article 16 of the Austrian “Regulation on Performance Assessment in School” specifies language issues in case of assessment e.g. pupils written examinations. See also the Ministry Letter 32/2001. For the assessment the aspects like content, expression, correctness of speech and correctness of writing are indicated. Thus, correctness of writing cannot and must not be the sole basis of the performance assessment.

Austria has a federal structure, therefore, additional specific educational regulations are in force (<http://www.schulpsychologie.at/lernen-lernerfolg/lese-rechtschreibschwaeche/regionales>) . These specific regulations are mainly focused on the organisation and implementation of appropriate support (see 3).

VET & University

VET providers and universities main goals are to increase dyslexic persons employment and independence and foster the ability to tackle social inclusion and disadvantages. Strategies for achieving this is to give learners everyday skills.

Dyslexic students have the right to deviate examination methods in accordance with §59 (1) Z 12 UG, if the learning difficulty makes it impossible to perform the examination in the prescribed method and the content and the requirements of the examinations are not impaired by an alternative method. That means: Exam with same content + same performance, but different mode.

2. What terms are used?

The term “Legasthenie” = dyslexia is rarely used in German everyday language. Most people use the term “LRS”. But this use is often inaccurately in everyday language since some see LRS as a partial-achievement-weakness, others a reading-weakness, a spelling-weakness or both. The technically correct term for dyslexia is read-spelling disorder = LRS = Lese- und Rechtschreibstörung.

The partial activities are the basis of mental development. Disturbances in these areas can lead to both motor developmental abnormalities as well as language abnormalities and in a broader sense then to school learning difficulties such as dyslexia or dyscalculia. These are difficulties in which the normal patterns of skill acquisition are disturbed at an early stage of development. However, the difficulties are not to be understood as a result of a lack of intelligence or any acquired brain injury or disease.

Attention: The term LRS is also often used for describing a “Lese- und Rechtschreibschwäche” = literacy difficulty. In this case normal tutoring sessions are sufficient because literacy difficulties have other causes (for example, bad schooling, family crises, or wrong learning techniques) compared to read-spelling disorders.

3. What support is offered for dyslexic youngsters?

At schools

In general, it is regulated, that dyslexic students can use all word processing programs e.g. that include spell checkers.

As said before, the Austrian countries (Lower Austria, Upper Austria, Burgenland, Styria, Carinthia, Tyrol, Vorarlberg, Salzburg, Vienna) have implemented additional specific regulations. There is a network of support measures implemented that helps so far the student underlies the organisation of a school. Example. Regulations at schools in **Lower Austria:**

Teachers have the task to watch closely the written language acquisition or the development of reading and writing competences of their students. Particular attention should be paid to the early detection of children with LRS. If a LRS is suspected, the teachers may require a pedagogical clarification and the development of an appropriate support plan by a learning consultant for LRS.

Learning consultants for LRS must have completed an appropriate training at an educational academy, a pedagogical institute, an educational University or equivalent education. Theirs tasks: assessment of weaknesses in written language acquisition, consulting of teachers, recommendation of support measures, consulting of parents, providing courses for dyslexic students

Courses for dyslexic students start immediately after the clarification of LRS. The duration of a course is flexible to handle and oriented to the needs of the supervised students. Only students with a clearly identified LRS (e.g. documented by a psychologist) can participate in the courses.

AT VET providers & At universities

Special regulations for examinations are in force: The aim is to design examinations and courses in such a way that physically or psychologically impaired students are not disadvantaged e.g. verbal instead of written examination, use of word processing programs, more time for written exams. However, dyslexic students have to apply for this support and are required to present a clarification document e.g. by clinical psychologists.

More and more students with partial performance problems study at universities. Awareness is growing that reading-spelling disorder (dyslexia) weakness is not something that "grows out", but also affects (young) adults. Slower reading speeds, errors in writing and reading, and problems with writing structured texts can make transcripts incomplete or difficult to read. Student organizations offer support e.g. exchange of lecture and seminar docs.

4. What are online training offers that exist for dyslexic youngsters?

The age of digitalization is a great opportunity for students with dyslexia, because the technical tools can help to compensate the lack of skills. However, the basic conditions for students with dyslexia are disastrous in most Austrian schools. There is still a lack of qualified teachers for remedial education and the technical equipment at schools is still in its infancy. Although it is regulated, that dyslexic students can use e.g. all word processing programs often students are still denied the use of technical aids in the classroom. The use of such tools is still often seen as a preference to other students.

Thus, the use of technical support takes mainly place at home. Mobile technology such as smartphones and tablets are examples of technology that can be helpful. Android and IOS stores provide hundreds of applications (apps) that can be used for educational purposes. Reading software, speech recognition software and spelling correction software are the most helpful tools.

The Austrian Dyslexia Association lists several online training offers

<https://www.legasthenie.at/category/software/>. The offers are widely used - but they are for children. Examples:

Searchpictures <https://www.suchbilder.com/suchbild-des-tages/> (visual discrimination)

Wordpuzzle <https://wort-puzzle.at/> (visual memory)

SpeechCare <https://www.speechcare.de/die-apps/kinder/lese-rechtschreibschwaeche-lrs/>

Find the pairs <https://www.gedaechtnisspiel.com/> (visual memory)

Orientation <https://www.intellecta.de/spiele/> (spatial position)

Attention training <https://www.eurolernspiel.de/>

5. What can you say about the role and acceptance of special learning games by trainers, parents and youngsters?

Austrian teachers/tutors emphasize that apps cannot replace a dyslexia training. But, apps are certainly a useful addition to the training. This is a "common understanding" among trainers.

Mr. Mario Engel, the Chairman of the Austrian Dyslexia Association, has formulated this understanding more detailed (2017):

Youngsters like to play on the computer. Thus, a combination of learning and playing, that's ideal. In many discussions with experts, the following important findings have emerged under which conditions dyslexic or dyscalculic people can use computer games as best as possible for learning:

- If you do not notice that you are learning, then you learn the most.
- Less is more, a given background music is usually disturbing.
- Time pressure shall be avoided.
- The best way to compare the success of the game is to compare it with your own results. Good games should not lead to high score lists, because there are always other people who can do something better. Especially when learning this should not be in the foreground.
- A computer game should occupy the entire screen area. No ads, no flickering banners - and thus no distraction from the plot - are allowed.
- Good computer games must promote sensory perceptions. Better to listen, to look more closely, to be more attentive are those achievements that people need so urgently in reading, writing and calculating.
- Short game sequences are recommended. Five-minute games "for distraction" are exactly the motivation that is needed, for example, to remain attentive to the homework.
- The games should be easily accessible without detours, so you can quickly put online a short game sequence, preferably at the push of a button.

Bulgaria

1. Is Dyslexia officially recognised in legislation? (font:12 cursive)

There is **no overall governmental policy** concerning dyslexia, nor obligatory legal acts which are binding. While certain documents have been produced and distributed, the practice is still new and, in the absence of a monitoring procedure, implementation is left to individual initiative of employers, school principals and University administration. The main dyslexia related regulation until very soon was the Ordinance 1 for education of children and students with special educational needs, but even there the term "dyslexia" was not mentioned. Only in September 2015 The Parliament ratified the changes in the Ordinance №1 on the education of children and young people with specific educational needs and chronic diseases. Among the specific educational needs for the very first time were listed dyslexia, dysgraphia and dyscalculia.

In December 2017 the Ordinance №1 was replaced by a new document called An Ordinance for Inclusive Education. In this document dyslexia, dysgraphia and dyscalculia are in the list of special educational needs and children and students who are officially diagnosed can receive support at school.

2. What Terms are used?

In Bulgaria, the first articles where the term "dyslexia" could be found date back to the 1980s.

Prof. Matanova (Matanova, Dyslexia, 2001) states the following:

Dyslexia is a general category of specific learning disorders, which refers to the ability in seven specific areas of functioning:

impressive speech,

expressive language,

basic reading skills,
comprehension of reading,
basic writing skills,
understanding of the writing,
basic math skills and mathematical thinking.

As it can be seen from the definition in Bulgaria the term “dyslexia” is used for a wide range of specific learning difficulties. Along with terms “dysgraphia”, “dyscalculia” are also used to describe difficulties in the specific areas of learning.

From the other side in Bulgaria very often when assessing a child for learning difficulties is used the ICD-10 - the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD), a medical classification list by the World Health Organization (WHO). There are several conditions that cover the understanding of dyslexia. They go under the classification code F81 - Specific disorders in the development of school skills. These are disorders in which the normal ways of acquiring skills are impaired in the early stages of the development, the infringement is not a simple consequence of the lack of opportunity to learn and not due to any form of acquired brain trauma or disease. This term includes specific reading disorder (dyslexia), specific disorder of writing (dysgraphia), specific disorder of numeracy acquisition (dyscalculia) and mixed disorder of school skills.

Listed disorders are regarded as specific to the acquisition of school skills. There are five basic requirements for their diagnosis: 1) a clinically significant degree of infringement of individual school skills; 2) the infringement is specific, i.e. cannot be explained by injury or dysfunction; 3) This is a developmental disorder that arises early in the development of a function, rather than acquired later in the process of schooling; 4) should be excluded external factors as an excuse for school difficulties; 5) specific disorders in the development of study skills should not be due to uncorrected hearing or visual impairment.

3. What support is offered for dyslexic youngsters?

At this point support providers for children and adults with dyslexia in Bulgaria as well as for teachers dealing with dyslexic children are currently limited to NGOs, private specialists and academic groups in some Universities.

In 2015 as a part of a Erasmus+ project MoDyslexia (Mobility of Educational Services for Adolescents with Dyslexia) Dyslexia Association - Bulgaria did a survey among teachers, young people (all students 16 - 19 y/o) with reading/writing difficulties and their parents. The main objective was to show the status of the country in terms of special support for young people with dyslexia; availability and affordability of assistive technology and their level of use to support adolescents with dyslexia in the educational process.

All participants were asked to rate the usage of the accommodations available at their schools. (1 - never; 6 - very often).

1 (never) is the most given answer by the students for most the accommodations. That shows that usages of these accommodations are considerably low at schools in the eyes of the students.

Of all the accommodations listed, usage of audio-books, Text to speech software and the possibility to record the lectures/lessons in class are the ones which were almost never used at schools. The accommodations that got the highest score from students are:

Sitting near the teacher in the classroom;

Not to be made to read aloud in front of the class;

To have oral examination instead of written one.

Students were asked to mark the services which are available for them at their schools, from the given list. Most of the interviewed students share that they get support in their schools in form of extra lessons, assistance by subject teachers or individual counselling. In fact this help is equally available for all students in the school and is not specified for those with dyslexia. 11% reported availability of extra training on ICT in their schools, but this are again regular lessons, included in the school curriculum and obligatory for all students. There is no training on usage of assistive technologies.

Only 40 % of students answer they use assistive technologies to help themselves. Other 60% gave negative answer. The most used technology is Spell checker.

72% of those who use assistive technologies do it only at home, 14% - only at school, and the rest - both at home and at school.

From the answers given by interviewed parents about the availability of accommodations (list of accommodations was provided), could be done the following conclusions:

Of all the accommodations listed, usage of audio-books, Text to speech software and the possibility to record the lectures/lessons in class are the ones which were almost never used at schools.

The accommodations that got the highest score from parents are:

Sitting near the teacher in the classroom;

To be examined orally instead of having to write.

Regarding the services available for students at school, the opinion of the parents matches the students' answers. In most cases students are offered extra lessons, assistance by subject teacher or individual counselling, but all these services are equally available for all students and are not specified for those with dyslexia. Over half of the parents are not enough satisfied with the accommodations and services their children are offered at school.

The results of the survey among teachers show that Audiobooks, text to speech software and even Spell checkers are almost never used at school. The use of computers and tablet for the purpose of note taking in the classrooms is quite low. Most of teachers report students are not allowed to record the lectures/lessons. Teachers' answers show that it is very rare case when students with dyslexia are given extra time on tests and/or exams.

The accommodation that teachers pointed as the most available is the position near the teacher in the classroom, and provision of some alternative learning materials, which matches the parents' and students' answers.

Teachers' answers regarding the availability of services don't differ from those given by two other target groups (parents and students).

In most school extra training, assistance from subject teachers and individual consultations are available but the problem is that this support is not adapted to the specific needs of students with dyslexia.

Teachers' opinion on this question differs from the one of interviewed parents and students, who are not enough satisfied by the services offered by school. Teachers think that in most of the cases (78%) services offered at school address the needs of the students with dyslexia at good, very good and excellent level. The results could be explained by the lack of information and knowledge how to better support and help a dyslexic student in class. Teachers' understanding of the possible help is limited to placing a student close to

the teacher in the classroom, not asking him/her to read aloud in front of the class and replacing the written exams with the oral ones when it is possible.

All three groups are absolutely certain that students with dyslexia need accommodations. At the same time they share that most of the accommodations listed in the Questionnaires are not available in their schools. One of the reasons for this situation is that most of the students with reading difficulties have not been officially diagnosed - from one side, and from the other side, until this school year dyslexia was not mentioned among the Specific Learning Difficulties. So, students with dyslexia and their parents had to rely on teachers' understanding and wish to help, as far as implementation of the accommodation for students with reading difficulties were not regulated until now.

All three groups demonstrate relatively good knowledge on the usefulness of the assistive technologies in supporting students with dyslexia to overcome their difficulties. At the same time all three groups report they don't use these technologies at appropriate level, especially at school. Reasons are different: from one side the usage of assistive technologies at class is not regulated, and some teachers are cautious that if they let some students to use technologies others (or their parents) may feel discriminate; from the other side - not all of the technologies, popular in some Western countries, have Bulgarian versions available. And finally, all three groups, although believe in the positive role of technology in the learning process, are not well-informed about the potential of the assistive technologies.

4. What are online training offers exist for dyslexic youngsters?

There is nothing available

5. What can you say about the role and acceptance of special learning games by trainers, parents and youngsters?

The brief survey, made among several teachers/trainers, students (16+) with reading/writing difficulties and their parents, shows that there is not a practice to use special computer learning games as a tool in the learning process. Youngsters spend a huge amount of time playing computer games but just for entertainment. Both teachers and students use quite often different educational websites during the classes and at home. The best one in Bulgaria is considered <https://ucha.se/>, which presents all lessons from 1st to 12th grade on all subjects in an interactive way. Unfortunately, there are not many learning games available in Bulgarian. This has started to change during the last 1-2 years, thankfully to different EU projects. One example is the project ICS (Intelligent Serious Games for Social and Cognitive Competence) which targeted children and youth with disabilities.

At the same time all interviewed shared the opinion that learning games can be of great help for all students and especially for those with learning difficulties to improve their study skills and to achieve better results, as far as learning through games engages all senses, is more interesting and motivating for children and youngsters.

After the realisation of two projects on using computer games in foreign language teaching/learning for young students (CalDysc and CalDys2) the feedback from both teachers and students was very positive. Teachers then shared that it would be good to have in their tool box some educational computer games that would not only help the foreign language learning, but to support developing other study skills of dyslexic learners.

Czech Republic

1. Is Dyslexia officially recognised in legislation?

In the Czech Republic for pupils and students with specific learning disabilities (including dyslexia) studying in basic and secondary schools there is applied the regime enshrined in the Education Act and its relevant decrees.

Legislation related to specific learning disabilities in the Czech Republic:

- ***Education Act on Pre-school, Basic, Secondary, Professional Higher and Other Education, act no. 564/2004 Sb.***

- in Section 16 there is settled that children, pupils and students with special educational needs has the right to use supportive measures provided by schools and educational counselling centers

The Ministry of Education, Youth and Sports sets out detailed arrangements in relation to the organisation and implementation of basic education and special education:

- ***Decree no. 48/2005 on basic education and some requisites of compulsory school attendance***
- ***Decree no. 73/2005 on the education of children, pupils and students with special educational needs and talented and gifted children, pupils and students***
 - describe in detail supportive measures of special methods, forms, instruments and individual support within the classes and the usage of pedagogical-psychological services
- ***Decree no 72/2005 Sb. on provision of counselling services at schools and educational counselling facilities***
 - determine in detail the role and services provided by schools, educational counselling facilities and special educational centers

At level of tertiary education (universities) there is no legal regulation in the Czech Republic regarding the students with specific learning disabilities.

For adult students with dyslexia no legal regulation exists - support for adult dyslexic students is left to abilities and willingness of teachers.

2. What Terms are used?

Dyslexia, dysorthography, dysgraphia and dyscalculia form together a heterogeneous group of developmental disabilities known as Specific Learning Disabilities (SLD) or Special Education Needs (SEN). The advantage of this designation is that it includes all kinds of difficulties into one category. Very often it happens that a person who has dyslexia has also dysorthography and dysgraphia.

In the Czech Republic Dyslexia is understood as a specific learning disability that causes difficulties in reading, despite good teaching, home practice and adequate (sometimes even above-average!) intellectual capacities. Dyslexia concerns the ability to decode a written text and manifests itself when reading accuracy and fluency are not automated.

However, the disadvantage of the term Learning Disability is that the word “learning” makes us think of the school environment too much, and therefore sometimes it might

make us forget that these difficulties are reflected in extracurricular, daily activities, and persist into adulthood, when we don't go to school anymore. Besides, the word "disability" doesn't sound too good. Much more important is to approach people with dyslexia, dysgraphia or dysorthography as those who learn and work differently. They are not "disabled"; they just need to work in different conditions.

The problems are caused by a minor damage to the central nervous system and are probably hereditary. They are associated with several other types of disabilities and in everyday life they manifest as difficulties in reading. These troubles persist throughout life and are not related only to school. It depends on their intensity, and also on the extent of therapeutic work (the so-called reeducation). Sometimes these difficulties can be completely minimized later in life, sometimes the individual still perceives them as very intense. Moreover, it is also important to understand the conditions under which the person manages to read better. Factors that can contribute to this are a certain time of the day, but also peace and plenty of time for reading, and the use of various modern technologies (e.g. e-readers, voice recordings from the computer, audiobooks, setting the computer to make texts as easy to take in as possible).

In the Czech Republic, in all types of schools, pupils with dyslexia are entitled to have the conditions for studying adjusted for them, but it is important to know exactly what they need, so that any adjustments are actually effective.

Resource: www.tablexia.cz

3. What support is offered for dyslexic youngsters?

A) School counseling center

Primary and secondary schools set up the School counseling center. Its services depend on the size of school and particular educational needs of pupils and students.

Special education teacher at school help to ensure correct reading and writing literacy of pupils and students, i.e. in collaboration with class teachers and parents provide to dyslexic students individual lessons and coaching using special methods and techniques to improve reading fluency and accuracy.

B) Pedagogical - Psychological Centers

These services provided by the Pedagogical - Psychological Centers operated by public organizations are engaged in psychological and special pedagogical diagnostics and interventional activities with regard to age, school level, its development and possible difficulties.

Its services include diagnosis of specific learning difficulties, coaching of children, pupils and students with specific learning difficulties with special pedagogical techniques.

Pedagogical-Psychological Centers are officially registered at Ministry of Education. There is a network of PPC in every region of the Czech Republic, operating in each district, methodically guided by Ministry of Education.

C) Support of non-governmental organizations

There is also support of non-governmental organization, such as:

a) Czech Society DYSLEXIA (Česká společnost DYSLEXIE)

<http://www.czechdyslexia.cz/indexa.html>

Czech Society Dyslexia is portal informing about problems of specific learning difficulties and behavior. Czech Society Dyslexia presents news in the field of SLD,

organize events, seminars and conferences held by Czech Society Dyslexia as well as of other organisations related to specific learning disabilities.

b) Counselling provided by **Mrs. Olga Zelinková**

<http://www.zelinkova.cz/index.php>

Mrs. Olga Zelinková is engaged with diagnosis and counseling in the field of specific learning disabilities throughout the entire age from pre-school to adulthood. She is the president of the Czech Society Dyslexia. Mrs. Zelinkova has published a numerous of professional publications for educators, parents and other professionals. She is the author of workbooks for people with learning disabilities and interactive equipment for developing of hearing perception.

c) **DYS-centrum®**

www.dyscentrum.cz

DYS-centrum® Praha is a non-governmental organization for individuals with dyslexia and other specific learning disabilities, their parents, teachers, other educators, partners, employers etc. The activities are based on a long tradition of specific learning disabilities (SLD) assessment and remediation in the Czech Republic. We also find resources and inspiration in foreign “good practice” models, which are evidence-based.

DYS-centrum cooperates with a number of specialists including psychologists, (special) educators, speech therapists, neurologists, psychiatrists, and paediatricians, who treat individuals with specific learning disabilities. They either participate in different problem solving situations or lead various educational activities organized by DYS-centrum®.

Dyscentrum is a member of European Literacy Network, <https://www.is1401eln.eu/en/>.

4. What are online training offers exist for dyslexic youngsters?

<https://www.tablexia.cz>

Tablexia is a modern educational application aiming to support the development of cognitive abilities. It is designed primarily for children with dyslexia in secondary schools. It should find its use in schools to supplement the standard teaching, as well as in pedagogical-psychological counseling offices and other counseling facilities for pupils with learning difficulties.

<https://www.vcelka.cz/cs/>

Online application “Vcelka” improves reading levels and helps with reading difficulties. It is a teaching tool for students, parents, teachers and professionals. The application creates an individual set of exercises for every reader who adapts to his / her current reading skills.

<http://www.jazyky-bez-barier.cz/>

Without Barriers program support English language teaching of children and young people with dyslexia. The program involves a simple editor and special browser and adopts a less-than-traditional approach to compensate users with dyslexia in terms of their difficulties with sight and hearing perception, thus making the product a stand-out among standard teaching aids.

<http://www.kaminet.cz/index.php>

KAMINET Website is dedicated for dyslexic students to train Czech language, English language and mathematics. Website provide also games for enhancing the visual, hearing and spatial perception. This website is created and operated by Mrs. Kamila Balharová

<http://kamilabalharova.kamernet.cz/index.htm>, she is a language teacher, special education teacher, a specialist in the field of specific learning difficulties. Currently she is devoted to European research focused on support of dyslexic adults.

5. What can you say about the role and acceptance of special learning games by trainers, parents and youngsters?

Special learning games are very well accepted when they are officially recognized by an authority in the Czech Republic. It means it's important firstly communicate the games to the Czech Dyslexia Association and the network of pedagogical-psychological centres. Support by written letter might go from the Czech Ministry of Education. That was the situation when DYS 2.0 learning games were implemented in the Czech Republic. The games (Czech translation) was revised by the Czech Dyslexia Association and Psychology Department of Charles University Prague. The President of Czech Dyslexia Association, Doc. PaedDr. Olga Zelinkova, CSc, included the learning games DYS 2.0 into her courses provided for counsellors and teachers at pedagogical-psychological centres throughout the Czech Republic. DYS 2.0 was also presented at official events for teachers organized by Faculty of Education, Charles University. With that approach the games were very well received by teachers, counsellors and psychologists and became the integrated part of their work with dyslectic youngsters. At the second round the recommendation from teachers, using the games already, worked very well.

Since the time when DYS2.0 learning games were introduced in the Czech Republic, new interactive exercises and games were born here. The situation therefore has been slightly changed from absolutely nothing to better availability of tools for dyslectic persons. But there is still high need of gaming activities adapted for the needs of youngsters, most of the games available are for children, where more and more initiatives are coming. Aiming at 16+ is still a challenge, because it needs more reliability on the person itself (without teacher / parent support). There are not many subjects which can bring the tools and from DYS2.0 we have the evidence of interest of teachers, parents and youngsters themselves.

Germany

1. Is Dyslexia officially recognised in legislation?

If a person is under 18 years old, dyslexic according to ICD-10 can be diagnosed by

1. doctors for child and adolescent psychiatry and psychotherapy,
2. approved child and adolescent psychotherapists,
3. physicians or certified psychological psychotherapists who have proven experience in the field of mental disorders in children and adolescents.

At the age of 18 and above, only doctors for adult psychiatry and psychotherapy or licensed psychotherapists are competent for a diagnosis according to ICD-10. However, doctors in this category that can perform a diagnostic for dyslexic are rare, so in many cases, a purely psychological evaluation is recognised. But because the diagnosis is performed exclusively by a psychologist, it is therefore not a diagnosis according to ICD-10.

A diagnosis according to ICD-10 focuses mainly on medical aspects. But such a diagnosis is nevertheless important in order to exclude potential hearing, vision, or mental health problems. German health insurances usually pay the diagnosis for under 18 year old. For older people reimbursement must be clarified beforehand with health insurance and doctors.

Recognition of dyslexia is shown in two measures:

- compensations of disadvantage (Nachteilsausgleich), for example:
 - extension of working time in class work or exams,
 - providing technical aids like audio aids and computers, etc.,
 - use of methodical and didactic aids like reading arrow, larger fonts, visually clearly structured panels and worksheets, etc.
- deviations from the general principles of performance evaluation, for example:
 - greater emphasis on oral performance,
 - no evaluation of the reading and writing performance,
 - use of educational margin of discretion.

School

The resolution "Principles for the support of students with special difficulties in reading, spelling or in arithmetic" of the Ministers of Education Conference of 04.12.2003 in the version of 15.11.2007 provides the guidelines and the practical implementation in the individual federal states of Germany. Like Austria, Germany has a federal structure. Therefore, each federal state independently shapes its teaching and supporting policies and issues its own regulations.

Basis for the support of students are diagnostic activities with regard to

- the linguistic, cognitive, emotional and social, as well as motoric development stage,
- learning motivation in reading and writing
- the perceptual achievements and competences of the individual student or the student pupil with special learning difficulties.

Therefore, correctness of writing cannot and is and must not be the single basis of the individual performance assessment.

According to the resolution mentioned above, Individual support is supposed to be finished with the 10th grade. However, in vocational training schools support can be extended if specific difficulties in reading and spelling have not been resolved so far.

University

In order to claim a right to compensation measures, students must prove a long-term impairment that meets the criteria for disability. Here, the universities work in the framework of the definition of disability according to § 2 para. 1 of the German Code of Social Law (SGB IX). In this context, dyslexic students have the right to use compensations of disadvantages. These are individually determined and might include, for example

- extension of writing time for exams,
- extension of preparation times for oral examinations,
- extension of processing deadlines for homework and theses,
- change of examination form,
- permission to use technical aids and personal assistance.

2. What terms are used?

In Germany, the term "Dyslexie" is mainly used for acquired forms of literacy problems - especially with regard to written language - due to brain damage, for example, caused by accidents or tumours. Mostly, the term LRS is being used, LRS meaning "Lese-Rechtschreib-Störung", "Lese-Rechtschreib-Schwäche", or "Lese-Rechtschreib-Schwierigkeiten" (literal translations: reading-spelling-disorder, reading-spelling-weakness, reading-spelling-difficulties). Therefore, the term is often imprecisely used to describe any kind of reading or writing weakness. The German Federal Association for Dyslexia and Dyscalculia is using

the term “Legasthenie” as “Lese- und Rechtschreibstörung”, that is, reading and spelling disorder in contrast to (usually) temporary reading and spelling difficulties.

Whereas LRS in the context of reading and spelling difficulties is caused by various reasons like bad schooling, unsupportive family background, stress, but also impaired eyesight or hearing abilities, the causes for dyslexia are seen in genetics and neurobiological and/or neurophysiologic factors. These factors hinder the development of skill acquisitions like the recognition of visual patterns or the processing of auditory perception from an early age.

3. What support is offered for dyslexic youngsters?

At schools

Regulations in Germany vary with the respective federal state. For Bremen, the regulations according to the “Guidance on the application of disadvantage compensation” from 2017 are:

- Compensations of disadvantage are part of the strategy to implement accessible and inclusive schools.
- In order to get compensations of disadvantage, the students need a certificate/diagnosis.
- A medical diagnosis is necessary, however, the school decides on the compensation measures.
- When determining concrete measures, the school should act as far as possible in agreement with the parents or guardians or full-term pupils.
- A disadvantage compensation comes in form of individual support tailored to the particular needs of the individual student.
- Disadvantage compensation and deviations of the performance evaluation are always part of individual support measure that have to be documented and redefined each school year by the class conference.
- At 1st and 2nd grade, screenings are done to identify dyslexic pupils.
- Screenings are supported by teachers who are qualified in inclusive assessments and inclusive pedagogic.
 - Disadvantage compensation measures include
 - Avoid reading aloud in favour of individual reading samples and reading comprehension exercises,
 - Provision of technical and didactic aids (e.g. electronic word processing, dictionary),
 - Reading out tasks in all subjects,
 - Time extension e.g. for class work or other written work.

At universities

With regard to exams, writing a thesis or any exam situation, dyslexic students have the right to use compensations of disadvantages. For that, dyslexic students have to apply for this support and are required to present a document certifying dyslexia.

The real problem however exists in the day-to-day performance. With regard to reading and writing skills and speed, dyslexic students definitely have a major disadvantage compared to their fellow students. To make it worse, students at universities face the same problems as pupils in schools: teachers and lecturers are mostly not trained to teach dyslexic people. Even worse, most university lecturers have had no training at all in

didactic or educational methods of their field. Providing accessible lectures or seminars together with accessible materials is therefore a challenging task for everyone involved.

4. What are online training offers that exist for dyslexic youngsters?

There are some offers available for dyslexic youngsters, that is, offers for dyslexic children. One of these platforms aimed at dyslexic children and parents and teachers of dyslexic children is:

Tintenflex Legasthenie Software: <http://www.legasthenie-software.de/index.htm>

They offer software for use in schools and provide online sample exercises. Other platforms are:

Orientation training: <https://www.intellecta.de/spiele/>

Attention training: <https://www.eurolernspiel.de/>

Usually these online platforms offer a limited number of exercises. The full set is mostly available via CD-Rom or with Android and/or IOS apps. Android and IOS stores provide many applications that can be used for educational and training purposes for dyslexic learners, even if they are not designed with dyslexic learners in mind. Furthermore, accessible features of these operating systems like text-to-speech output, speech recognition or spelling correction are helpful tools for dyslexic learners.

Usage in schools is sometimes supported via class room licenses and multiple user/network capabilities. However, teachers in Germany do not always have the skills to deal with dyslexic children and/or do not have the technical means to use the software in the classroom.

All of these platforms provide training offers mainly for children. Offers for young adults and adults are practically nonexistent and if available, they come usually on CD-ROM and are aimed at improving writing skills. This situation is characterised by a quote of the Tintenflex main website: "Advice for dyslexic adults: Although the design of the program is primarily aimed at children, it goes without saying that all the exercises in the program are also suitable for dyslexic adults." You can argue with that statement. It is definitely true with regard to the type of the exercises and trainings. However, content aimed at young children combined with a child-optimised and child -friendly user interface is not necessarily motivating for young adults.

5. What can you say about the role and acceptance of special learning games by trainers, parents and youngsters?

Teachers and tutors agree that learning games or learning apps cannot replace dyslexia training, especially training that is tailored to the needs of the individual student. However, apps are regarded as very useful especially when a dyslexic person is no longer a student at school.

Advantages of computer-based training apps are:

Young people have grown up using a computer or a smartphone. They are familiar with downloading apps and have no anxieties about dealing with new technologies.

Training apps offer immediate feedback and are a motivating factor. If something does not work out as expected, learners usually try to "make it happen". In the worst case, the app gets the blame and not a teacher or tutor.

Software apps do not tire of presenting repetitive tasks that are often necessary to train certain skills.

Training apps written for smartphones can be used any time and anywhere. They do not need any space, preparation, loading times, or extra hardware (mouse, keyboard, loudspeaker, etc.)

Latvia

1. Is Dyslexia officially recognised in legislation? (font:12 cursive)

The phenomenon Dyslexia is understood as Specific reading disabilities.

General Education law Section 11 says, that:

- (1) A general educational institution shall be managed by the head of the institution.
- (2) The head of a general educational institution shall be responsible for:
 - 1) the implementation of educational programmes;
 - 2) the provision of the educational institution with educators;
 - 3) noting the special needs of students and their education in conformity with special educational programmes;
 - 4) ensuring the operations of the educational institution and the execution of the tasks of the institution;
 - 5) the rational utilisation of the financial and material resources of the educational institution;
 - 6) the conformity with the laws and regulations in the operations of the educational institution.
- (3) The head of a general educational institution shall be hired for the position and released thereof by the founder of the corresponding educational institution.

In Chapter VII, where Law is talking about Special education, Section 53 (Integration of Students with Special Needs in General Educational Institutions) says:

- (1) General basic educational and general secondary educational institutions, which have the appropriate provisions, may integrate students with special needs. The requirements to be brought forward for general basic educational and general secondary educational institutions in order to ensure integration of students with special needs in the mentioned educational institutions shall be determined by the Cabinet.
- (2) Access to appropriate support measures for students with special needs who have been integrated in a general educational institution shall be ensured by the educational institution. The educational institutions shall draw up an individual plan for acquisition of an educational programme for each integrated student with special needs.

Students with Dyslexia/Specific reading disabilities are included/integrated in main stream schools, but if they have the statement from pedagogical medical commissions, they get support measures, provided by support team, which are used both in lessons as well in exams.

2. What Terms are used?

In Latvia mostly the term *Dyslexia* is not used , but according to the ICD (International Classification of Diseases) 10, it is called F81.0 - Specific reading disabilities.

It can be also as a part of F81.3 - Mixed disorder of Scholastic skills (if it is combined with specific motor disabilities (Dyspraxia), or with specific mathematical disabilities (Dyscalculia), or with specific writing disabilities (Dysgraphia)).

We distinguish also reading disabilities caused by underdevelopment in speech and language development and this problem could be solved or diminished by speech and language therapists.

In Europe there is diversity, when using term *Dyslexia* in different countries. One thing is clear - all cases of Dyslexia are with problems in reading, but not all problems in reading are Dyslexia.

3. What support is offered for dyslexic youngsters?

In Latvia we pay great attention to age peculiarities. In pre-schools and basic schools speech therapists and special education teachers together with parents work on diagnosing of risk factors in speech development. The forms and methods differ according to the age group.

But anyway, if a school age child or youngster has a statement from pedagogical medical commission, that he has specific reading disabilities or learning disabilities, you have to write an application to the school headmaster to provide special educational program or support measures.

Then support team create an individual learning plan for this student, where everything is taken into account to be sure, that a student with the support will be successful in learning and achieving the learning goal. Actions, learning methods, support materials in every case can be different, according to the needs of a student.

Not all mainstream schools, but many of them have support teams and support measures not only for dyslexic students, but also for other special educational needs.

Support also can be extra time, memos.

If it is needed, special education teacher can join and give a support in the lesson, or sometimes they take students out of the class to explain the material individually. All this is to ensure the participation and equality in everyday learning.

4. What are online training offers exist for dyslexic youngsters?

There are some online resources for students with specific reading disabilities as well as for students with learning disabilities. Many teachers are working with IT and whiteboards and making learning materials by themselves.

There are also some other materials available. Different educational institutions are involved in making learning materials for students with reading disabilities.

Agency of the Latvian Language offers different materials for the language learning , including for dyslexic people.

<http://maciunmacies.valoda.lv/video-maci/vecaku-skola/8-maci/157-vecaku-skola-4-nodala>

Interactive games:

<http://maciunmacies.valoda.lv/video-maci/video-konsultacijas/8-maci/232-interaktivas-speles>

VISC (National Centre for Education (NCE) is a public administration institution directly subordinated to the Minister of Education and Science. The centre creates different materials for schools, children and parents. Support materials worked out in the ESF project “Support system for learners with functional disabilities” can be found in the following link:

https://visc.gov.lv/specizglitiba/metmat_esfpr.shtml

There are memos, work sheets and interactive materials for mathematics, languages etc.

5. What can you say about the role and acceptance of special learning games by trainers, parents and youngsters?

We definitely accept it and are sure, it works! We do not have deep research on this topic, but during the lectures for teachers, students and parents learning games are accepted as learning materials for different age groups.

Lithuania

1. Is Dyslexia officially recognised in legislation?

Dyslexia term not used in the legal acts of the Republic of Lithuania. In most cases, the term used in the scientific field, e.g. by scientists in papers and conferences. In the scientific papers, **dyslexia** term refers to the difficulties to read and write words accurately and fluently.

2. What Terms are used?

According to the decree No. V-1265/V-685/A1-317 “Approval of a description of the procedure for the identification of groups of students with special educational needs and the division of their special educational needs into levels”¹ approved on **13 July, 2011** by the Ministry of Education and Science, Ministry of Health and Ministry of Social Security and Labour of the Republic of Lithuania, the term **specific learning disorders** is used.

The group of **specific learning disorders** consists of:

reading disorders,
writing disorders,
mathematical learning disorders,
nonverbal learning disorders.

It is agreed to use **the student with the reading and writing disorders** and **the student with dyslexia** instead of **dyslexic child/youngster/dyslexic adult**.

¹ <https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.404013>

3. What support is offered for dyslexic youngsters?

The support system can be classified into two broad categories:

I. Assessment

II. Support:

- Teaching program modifications and accommodations
- Special educational remediation and psychoeducational intervention
- Testing modifications and accommodations
- Assistive technologies and programs
- Psychological counselling and therapy

Assessment. The first step in supporting students with the difficulties to read and write is to assess and diagnose if it reading and writing disorders (or dyslexia).

Assessment process:

1. 1st level: initial assessment at school. The teacher and/or parents express concern regarding the students' difficulties to learn to read and write. The Child Welfare Commission at school initiates the assessment process.
2. 2nd level: comprehensive assessment at the Pedagogical Psychological Service of a team of psycho-educational specialists consisting of a psychologist, special pedagogue, speech therapist, and neurologist. Pedagogical Psychological Services are available in each municipality of Lithuania. The team of the Pedagogical Psychological Service identifies the specific learning disorders (for example, reading and writing disorders) and recommends the support services based on the students' strengths and weaknesses.

Support services:

- **Teaching program modifications and accommodations**

The modification and accommodation of teaching programme for the needs of student with dyslexia is highly dependent on the teacher's knowledge and willingness to do this. The most applied modifications and accommodations are:

- no force for the student to read out loud in front of the class,
- allow the student do less exercises in the class and for the homework (shortened version),
- not to count students' typical dyslexic mistakes as mistakes in the written papers,
- allow the student to use calculator and multiplication table,
- allow the student to sit near the teacher in the class,
- allow the student to give oral answers instead of written.

In some cases, the student is allowed to do the written exercises, to write a dictation separately from the class with the special pedagogue at his/her classroom.

- **Special educational remediation and psychoeducational intervention**

Special pedagogue and speech therapist are key specialists in helping students with dyslexia. If needed, special pedagogues work with students not only in primary schools, but also in gymnasiums. Speech therapists more focused on the oral language problems in primary school children.

There are ***no empirically based special education and psychoeducational intervention programs*** for the students with dyslexia in Lithuania.

- **Testing modifications and accommodations**

The special order of the Minister of Education and Science "About the assessment of basic education achievements, language enrolment, the implementation of the exam assignment form and the assessment of instruction for pupils, former pupils and externals with special educational needs" describes the modifications and accommodations for students with reading and writing disorders in exam situation.

Students with reading and writing disorders, or dyslexia need to have the certificate from the Pedagogical Psychological Service for the testing or exam modifications and accommodations.

- Extended time for exams
- According to this order, **extra time (25 per cent)** is given to the students with reading and writing disorders taking exams in grades 10 (basic education) and 12 (maturity).
- Different testing environment
- According to this order, students with reading disorders is allowed to check basic education achievements **in a separate room**.
- Written instructions of tasks read aloud
- According to this order, the examiner **can read** the written instructions of tasks **aloud** to the students with reading disorders.
- Specific mistakes are not considered as mistakes

In assessing the performance of a basic education achievement test and a maturity exam of the Lithuanian language and the mother tongue in writing, for students with writing disorders, **specific mistakes are not considered** as mistakes, if the students mislead clearly similar phonemes with letters or letters having graphically similar shapes.

▪ Assistive technologies and programs

- Audiobooks: The recorded textbooks of different school subjects and audiobooks can be used from the **Lithuanian library for the blind** to compensate slow and inaccurate reading. Still, not so common practice is to use this kind of accommodation.
- Speech recognition software
- Word processors with spell checkers
- Videotapes

▪ Psychological counselling and therapy

Psychological counselling and therapy could be recommended to the student with dyslexia to deal with the feelings of frustration and helplessness, low academic motivation, low academic self-esteem, high levels of stress and anxiety, etc.

4. What are online training offers exist for dyslexic youngsters?

There is no unified platform on the page of state institution, where all online training tools for the specialists, parents, youngster to develop reading and writing skills were placed.

Two institutions - **National Centre for Special Needs Education and Psychology** and **Education Development Centre** affiliated to the Ministry of Education and Science are responsible for providing educational support in the field of pre-school, primary and general education.

One of the activities of *National Centre for Special Needs Education and Psychology* is to provide methodical support for Pedagogical Psychological Services and to collect the information about the different training resources for the students with special educational needs. On the page of this institution,² one online training tool is provided:

Digital learning tool for learning Lithuanian language (Grades 1-4)

Lietuviu1-4.mkp.emokykla.lt

On the page of *Education Development Centre* (EDC)³, online training tools for Grades 5-6 and 7-8 are presented.

<http://lietuviu5-6.mkp.emokykla.lt/lt/temos/>

Website "Lithuanian language course for grades 5-6".

The Lithuanian language course for grades 5-6 consists of 10 topics. Each topic has 6 activities: reading, listening, watching, writing, creating texts, games. 385 learning objects (interactive reading and listening kits, videos with interactive tasks, words, texts, sounding dictation, punctuation exercises, comics, mind maps, essays, charts, newspapers, flyers, letters, presentation templates, educational games, guide). For each topic, 20 test assignments are prepared, from which tests of various complexity can be made.

Each learning object presents learning objectives and methodological recommendations. After examining the subjects of each topic and performing the tasks, the student can evaluate how they understood presented material. Completed tasks from the website can be sent to the teacher via e-mail or stored on student's computer.

Learning objects are intended to develop not only subject but also general competences.

<http://lietuviu7-8.mkp.emokykla.lt/>

Website "Lithuanian language course for grades 7-8".

The Lithuanian language course for grades 7-8 consists of 10 topics. Each topic has 6 activities: reading, listening, watching, writing, creating texts, games. Thematic activities include learning objects: interactive reading and listening kits, videos with interactive tasks and task sheets, word dictation, sounding dictation, language system cognitive tasks, comics, mind maps, interviews, instructions (or ads), history, diary (or travel impressions), templates for a narrative essay, discussion article, tutorial, guide. For each topic, 20 test assignments are prepared, from which tests of various complexity can be made.

Each learning object presents learning objectives and tips for the learners. After examining the subjects of each topic and performing the tasks, the student can evaluate how they understood the material presented. It is possible to evaluate it using the self-assessment statements prepared by the learning object or the digital "Viewpoint" tool. Completed tasks can be saved on student's computer and sent to the teacher via e-mail from the website.

The teacher's library will provide methodological recommendations for the application of all subjects and different types of learning objects.

Learning objects are intended to develop not only subject but also general competences.

<http://www.lietutis.lt/>

² www.sppc.lt

³ <https://www.upc.smm.lt/>

Lithuanian letters simulator - educational online game "Lietutis" will not only improve the skills of the fast writing using computer keyboard, but also will also successfully develop student's literacy, widen the vocabulary, and will teach always use Lithuanian letters when writing in computer.

The player, using the keyboard, must write the falling word literally. Each word contains at least two special letters of the Lithuanian alphabet. If player manage to write a word without falling down, he earns points (the higher the selected level and the higher the speed, the more points are given). Failing to write the word in time, the player loses the corresponding amount of points.

5. What can you say about the role and acceptance of special learning games by trainers, parents and youngsters?

The brief survey was made among several special pedagogues and speech therapists who were using www.dys2.org special learning games. Special pedagogues and speech therapists mention that, these games were the perfect helper in the remediation of dyslexia, where the student could develop disruptive functions involved in the development of smooth reading and writing skills. During the practical workshops with students they gave students the individual tasks at the computer and also recommend to do some tasks at home. It was a good "workout".

Special pedagogues and speech therapists who use educational games mention:

1. It makes the remediation process more interesting and students willingly perform the tasks.
2. The use of ICT (various educational games, applications) promotes learning motivation.
3. Students become less tired, can work longer.
4. While playing, students can improve their pronunciation, expand vocabulary, learn grammar, develop coherent language, and develop reading and writing skills. Therefore, the impact of games on students with reading and writing disorders is huge.

Comparative analysis of the Situation in the partner countries (Austria, Germany, Bulgaria, Czech Republic, Lithuania and Latvia)

Comparative analyses aim to provide a brief common information on partner countries situation regarding dyslexia and support to overcome its difficulties. It is a short descriptive information about the understanding of the concept “dyslexia”, its reflection in regulations, existing support system and possibilities of introducing learning games that correspond more to the raising of motivation of learning of younger generation. The comparative national analyses were prepared to have a common understanding of the problem to find the proper support means for dyslexic young adults.

The partner countries follow the definition of the concept dyslexia given by International and European Dyslexia Associations, World Health Organisation (ISD-10, DSM-5,OECD).

“Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.”

<https://dyslexiaida.org/definition-of-dyslexia/>

At same time it is necessary to mention that in Europe there is diversity, when using term *Dyslexia* in different countries. One thing is clear - all cases of Dyslexia are with problems in reading, but not all problems in reading are Dyslexia

Dyslexia presents concerns and challenges for millions of children and adults across Europe and in the world. These challenges require major changes for governments, policymakers and organisations to improve attitudes, legislation and positive practice in education and the workplace. Because of that all partner organizations answered to the question- Is Dyslexia officially recognised in legislation? The results are seen in the table below.

Many of the issues relating to dyslexia can be improved through raising awareness of dyslexia and what can be done to adapt to it. That is why the vision of the EDA is to ensure that “every child and adult with dyslexia has the right to access and receive appropriate support and opportunity to achieve their full potential in education, training employment and life” It is said in the document of European Association of Dyslexia. This once more confirm the topicality of the project - Learning games for young dyslexic adults. The characteristics of support system confirms the fact, that there is a lot of good practices, but mainly for children.

The small scale research carried out by partners reveals a lot of problems in the field of supporting young dyslexic people such as: readiness of teachers to work with assistive technologies: teachers and lecturers are mostly not trained to teach dyslexic people. Even worse, most university lecturers have had no training at all in didactic or educational methods of their field. Providing accessible lectures or seminars together with accessible materials is therefore a challenging task for everyone involved.

National analysis of the situation of young adult dyslexic learners are summarized in the tables below.

1. Used terms and understanding of them					
Austria	Germany	Bulgaria	Czech Republic	Lithuania	Latvia
<p>The term “Legasthenie” = dyslexia is rarely used in German everyday language. Most people use the term “LRS”. But this use is often inaccurately in everyday language since some see LRS as a partial-achievement-weakness, others a reading-weakness, a spelling-weakness or both. The technically correct term for dyslexia is read-spelling disorder = LRS = Lese- und Rechtschreibstörung.</p>	<p>Mostly, the term LRS is being used, LRS meaning “Lese-Rechtschreib-Störung”, “Lese-Rechtschreib-Schwäche”, or “Lese-Rechtschreib-Schwierigkeiten” (literal translations: reading-spelling-disorder, reading-spelling-weakness, reading-spelling-difficulties). The German Federal Association for Dyslexia and Dyscalculia is using the term “Legasthenie” as “Lese- und Rechtschreibstörung”, that is, reading and spelling disorder in contrast to (usually) temporary reading and spelling difficulties.</p>	<p>The term “dyslexia” is used for a wide range of specific learning difficulties. Along with terms “dysgraphia”, “dyscalculia” are also used to describe difficulties in the specific areas of learning.</p>	<p>The concept dyslexia is understood as a specific learning disability that causes difficulties in reading, despite good teaching, home practice and adequate (sometimes even above-average!) intellectual capacities. Dyslexia concerns the ability to decode a written text and manifests itself when reading accuracy and fluency are not automated.</p>	<p>The concept Dyslexia, in most cases, is used in the scientific field, e.g. by scientists in papers and conferences. In the scientific papers, dyslexia term refers to the difficulties to read and write words accurately and fluently. It is agreed to use - <u>the student with the reading and writing disorders and the student with dyslexia instead of dyslexic child /youngster/ dyslexic adult.</u></p>	<p>Dyslexia is understood as specific reading disabilities. In Latvia mostly the term <i>Dyslexia</i> is not used, but according to the ICD (International Classification of Diseases) 10, it is called F81.0 - Specific reading disabilities.</p>

2. Official Recognition of Dyslexia in legislation					
Austria	Germany	Bulgaria	Czech Republic	Lithuania	Latvia
<p>The Article 16 of the Austrian “Regulation on Performance Assessment in School” also the Ministry Letter 32/2001 specify language issues in case of assessment-.for the assessment correctness of writing cannot and must not be the sole basis of the performance assessment.</p> <p>Austria has a federal structure, therefore, additional specific educational regulations are in force (http://www.schulpsychologie.at/lernen-lernerfolg/lese-rechtschreibschwaeche/regionales) - mainly focused on the organisation and implementation of appropriate support. In University dyslexic students have the right to deviate examination methods in accordance with §59 (1) Z 12 UG.</p>	<p>The resolution "Principles for the support of students with special difficulties in reading, spelling or in arithmetic" of the Ministers of Education Conference of 04.12.2003 in the version of 15.11.2007 provides the guidelines and the practical implementation in the individual federal states of Germany.</p> <p>Universities work in the framework of the definition of disability according to § 2 para. 1 of the German Code of Social Law (SGB IX). In this context, dyslexic students have the right to use compensations of disadvantages. These are individually determined.</p>	<p>In September 2015 The Parliament ratified the changes in the Ordinance №1 on the education of children and young people with specific educational needs and chronic diseases. Among the specific educational needs for the very first time were listed dyslexia, dysgraphia and dyscalculia. In December 2017 the Ordinance №1 was replaced by a new document called An Ordinance for Inclusive Education. In this document dyslexia, dysgraphia and dyscalculia are in the list of special educational needs and children and students who are officially diagnosed can receive support at school.</p>	<p>For pupils and students with specific learning disabilities (including dyslexia) studying in basic and secondary schools there is applied the regime enshrined in the Education Act and its relevant decrees. At level of tertiary education (universities) there is no legal regulation regarding the students with specific learning disabilities. For adult students with dyslexia no legal regulation exists - support for adult dyslexic students is left to abilities and willingness of teachers.</p>	<p>The decree No. V-1265/V-685/A1-317 “Approval of a description of the procedure for the identification of groups of students with special educational needs and the division of their special educational needs into <i>levels</i>” approved on 13 July, 2011 by the Ministry of Education and Science, Ministry of Health and Ministry of Social Security and Labour of the Republic of Lithuania, <u>specifies the groups with specific learning disorders including reading and writing disorders- the student with dyslexia</u></p> <p>https://e-seimas.lrs.lt/portal/legalAct/TAD/TAIS.404013 https://e-seimas.lrs.lt/portal/legalAct/TAD/TAIS.404013</p>	<p>For pupils and students with specific learning disabilities (including dyslexia) studying in basic and secondary schools there is applied the regime included in the Education Act and its relevant documents. At level of higher education there is no legal regulation regarding the students with specific learning disabilities.</p>

3. Support for dyslexic youngsters					
Austria	Germany	Bulgaria	Czech Republic	Lithuania	Latvia
<p>Dyslexic students can use all word processing programs e.g. that include spell checkers. Teachers.</p> <p>Learning consultants for LRS</p> <p>Courses for dyslexic students.</p> <p>At Universities- Student organizations offer support e.g. exchange of lecture and seminar docs. Special regulations for examinations are in force.</p>	<p>“Guidance on the application of disadvantage compensation” from 2017</p> <p>Basing on medical diagnosis the school decides on the compensation measures.</p> <p>Individual support tailored to needs.</p> <p>At 1st and 2nd grade, screenings are done to identify dyslexic pupils.</p> <p>Avoid reading aloud in favour of individual reading samples and reading comprehension exercises,</p> <p>Provision of technical and didactic aids (e.g. electronic word processing, dictionary),</p> <p>Reading out tasks in all subjects,</p> <p>Time extension e.g. for class work or other written work.</p> <p>At universities -providing accessible lectures or seminars together with accessible materials</p>	<p>Support providers for children and adults with dyslexia as well as for teachers dealing with dyslexic children are currently limited to NGOs, private specialists and academic groups in some Universities.</p> <p>Support forms: form of extra lessons, assistance by subject teachers or individual counselling; sitting near the teacher in the classroom; not to be made to read aloud in from of the class; to have oral examination instead of written one; extra training on ICT in their schools, assistive technologies (Spell checkers).</p>	<p>School counseling center, Pedagogical-Psychological Centers</p> <p>Support of non-governmental organizations, Czech Society DYSLEXIA ,</p> <p>Counselling provided by Mrs. Olga Zelinková, DYS centrum.</p>	<p>Teaching program modifications and accommodations.</p> <p>Special educational remediation and psycho educational intervention</p> <p>Assistive technologies and programs- audiobook, speech recognition software, word processors with spell checkers, video tapes</p> <p>Psychological counselling and therapy</p> <p>Testing modifications, accommodations: extended time for exams, different testing environment written instructions of tasks read aloud, specific mistakes are not considered as mistakes</p>	<p>Providing of special educational program or support measures.</p> <p>Support teams in schools.</p> <p>Creation of individual learning plan for the student.</p> <p>Actions, learning methods, support materials in every case are different, according to the needs of a student.</p> <p>Support also can be extra time, memos.</p> <p>If it is needed, special education teacher joins and gives a support in the lesson, or sometimes they take students out of the class to explain the material individually.</p>

4. Online training offers existing for dyslexic youngsters					
Austria	Germany	Bulgaria	Czech Republic	Lithuania	Latvia
<p>The Austrian Dyslexia Association lists several online training offers https://www.legasthenie.at/category/software/. The offers are widely used - but they are for children. Examples:</p> <p>Searchpictures https://www.suchbilder.com/suchbild-des-tages/ (visual discrimination) Wordpuzzle https://wort-puzzle.at/ (visual memory) SpeechCare https://www.speechcare.de/die-apps/kinder/lese-rechtschreibschwaeche-lrs/ Find the pairs https://www.gedaechtisspiel.com/ (visual memory) Orientation https://www.intellecta.de/spiele/ (spatial position) Attention training https://www.eurolernspiel.de/</p>	<p>TintenKlex Legasthenie Software: http://www.legasthenie-software.de/index.htm They offer software for use in schools and provide online sample exercises. Other platforms are: Orientation training: https://www.intellecta.de/spiele/ Attention training: https://www.eurolernspiel.de/</p>	<p>No offers.</p>	<p>https://www.tablexia.cz https://www.vcelka.cz/cs/ http://www.jazyky-bez-barier.cz/ http://www.kamernet.cz/index.php http://kamilabalharova.kamernet.cz/index.htm,</p>	<p>Lietuviu1-4.mkp.emokykla.lt</p> <p>On the page of Education Development Centre (EDC), online training tools for Grades 5-6 and 7-8 are presented.</p> <p>http://lietuviau5-6.mkp.emokykla.lt/lt/temos/</p> <p>Website "Lithuanian language course for grades 5-6".</p> <p>http://lietuviau7-8.mkp.emokykla.lt/</p> <p>Website "Lithuanian language course for grades 7-8". http://www.lietutis.lt/</p>	<p>http://maciunmacies.valoda.lv/video-maci/vecaku-skola-8-maci/157-vecaku-skola-4-nodala</p> <p>Inter active games: http://maciunmacies.valoda.lv/video-maci/video-konsultacijas/8-maci/232-interaktivas-speles</p> <p>https://visc.gov.lv/specizglitiba/metmat_esfpr.shtml</p>

5. Role and acceptance of special learning games by trainers, parents and youngsters					
Austria	Germany	Bulgaria	Czech Republic	Lithuania	Latvia
<p>Austrian teachers/tutors emphasize that apps cannot replace a dyslexia training. But, apps are certainly a useful addition to the training. This is a “common understanding” among trainers.</p>	<p>Teachers and tutors agree that learning games or learning apps cannot replace dyslexia training, especially training that is tailored to the needs of the individual student. However, apps are regarded as very useful especially when a dyslexic person is no longer a student at school.</p>	<p>The brief survey, made among several teachers/trainers, students (16+) with reading/writing difficulties and their parents, shows that there is not a practice to use special computer learning games as a tool in the learning process. At the same time all interviewed shared the opinion that learning games can be of great help for all students and especially for those with learning difficulties to improve their study skills and to achieve better results, as far as learning through games engages all senses, is more interesting and motivating for children and youngsters.</p>	<p>Special learning games are very well accepted when they are officially recognized by an authority in the Czech Republic. It means it’s important firstly communicate the games to the Czech Dyslexia Association and the network of pedagogical-psychological centres. There is still high need of gaming activities adapted for the needs of youngsters, most of the games available are for children, where more and more initiatives are coming. Aiming at 16+ is still a challenge, because it needs more reliability on the person itself (without teacher / parent support).</p>	<p>Special pedagogues and speech therapists mention that, games from previous project were the perfect helper in the remediation of dyslexia, where the student could develop disruptive functions involved in the development of smooth reading and writing skills. During the practical workshops with students they gave students the individual tasks at the computer and also recommend to do some tasks at home. It was a good “workout”.</p>	<p>We definitely accept games and are sure, it works! These games have to correspond to the age group, as to the content - they have to be contemporary, interesting, passionate to make the youngster to be interested to play these games. Today of course we cannot compete with Google as to raising of interest of youngsters, but nevertheless the game has to fulfil its role - to promote the learning. Today we have to view games in a complex way. They have to promote not only reading but also learning. The games have to correspond to the principles of teaching and learning for dyslexic persons.</p>

Chapter 2: Description of transferable and adaptable elements (experience, methods, best practice, media, etc.) of former projects to mobile learning games

Partner E-Learning concepts/Austria

- 1. What of your previous projects or projects/ initiatives/ approach/ offer you know are relevant to DYS2GO with respect to experience, methods, best practice, media, etc.?*
- 2. Give a short description of the project/ initiative/ approach/ offer*
- 3. Describe the potentially transferable and adaptable elements*

ADYSTRAIN (2006-2008)

There were 12 handbooks/guides developed for teachers and managers on how to include dyslexic adults in teaching and working. The project results are still relevant for DYS2GO, they are available in German and EN.

The handbooks provide a

- (1) general overview on aspects that describe the situation of dyslexic adults in learning and working and
- (2) general recommendations on how these situations can be changed into inclusive situations.

The layout of the ADYSTRAIN handbooks was specially developed in a dyslexia-friendly manner by applying the right font type (Arial), font size, short sentences, pictures, well-structured text. Partners had in mind, that there are many dyslexic readers among targeted teachers and managers ... if 10% of persons are dyslexic.

Suggestions for Transfer / Adaptation:

- The handbooks can “deliver” contents for the development of DYS2GO training materials.
- The slogan “dyslexia friendly is user friendly” should be also taken consequently into account when developing DYS2GO materials.

EDYSGATE (2006 - 2008) / DYS 2 (2009 - 2011)

EDYSGATE - there were developed app. 175 learning games for dyslexic youngsters in EN, DE, ES, Danish, BG. The games cover the seven areas relevant for a perception training. The partners laid big attention on preferences and accepted styles by youngsters. Dyslexic youngsters were involved in the creation process of ideas.

DYS 2 aimed at improving the EDYSGATE games by adding new game types, new languages and so-called configurators. At the project`s end there were app 275 games in EN, DE, BG, LT, GR, CZ available. The configurators were developed for a self-creation of games by uploading own images or sounds. The navigation was improved by adding a visual index. A classroom functionality was also added. However, this functionality was rarely used by teachers.

Teachers reported that the games were used as a relaxation during the training or as a “gift” after the training. They also expressed that game benefits are also that there is no competition among players and no time stress.

The short handbook described what is the difference between these learning games and “usual” games and how these games could be used.

The EDYSGATE games were very well accepted by teachers and youngsters although a possible / positive impact of the training by using games could not be verified at that time since no interested researchers could be identified for a cooperation. During the last 10 years the situation has been changed. Studies were performed that demonstrate a positive impact of playing digital games by dyslexic persons. Examples:

Action video games improve reading abilities and visual-to-auditory attentional shifting in English-speaking children with dyslexia <https://www.nature.com/articles/s41598-017-05826-8#additional-information>

Review of Android and iOS Tablet Apps in Spanish to Improve Reading and Writing skills of Children with Dyslexia <https://www.sciencedirect.com/science/article/pii/S1877042817302008>

Developing effective educative games for Arabic children primarily dyslexics
<https://link.springer.com/article/10.1007/s10639-018-9750-2>

Suggestions for Transfer / Adaptation:

- Create a navigation in text, audio and images.
- Create / develop DYS2GO games without the implementation of a competition between players and without a time stress e.g. as an indicator of achieved performance.
- The DYS2GO handbook shall extent / improve the contents with respect to self-learners.
- Contacts to business schools and student organisations shall be considered by partners. It is known that there is a gap of support when dyslexic youngsters leave the school and start their study at university or start their professional education.
- Contacts to researchers shall be established from the project beginning.
- The EDYSGATE games were very well accepted by teachers and youngsters although a possible / positive impact of the training by using games could not be verified at that time since no interested researchers could be identified for a cooperation. During the last 10 years the situation has been changed. Several studies were provided that demonstrate a positive impact of playing digital games on improvements in the area of attention and perception.

ORSEN (2010 - 2012)

ORSEN - Online resources for persons with Special educational needs. The general strategy in teaching and learning has been changed from “Integration” to “Inclusion”. The project was focused on inclusive education at regular schools. The outgoing point was: ICT have the potential for reducing discrimination and providing more opportunities to engage

people with disabilities in all aspects of life including teaching and learning. ICT offers a range of specialized software and hardware solutions for communicating, accessing and inputting data/information to/from web applications.

More specifically, Web accessibility means that all people can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web. Accessibility is the quality of a system that makes it easy to learn, easy to use, easy to remember, error tolerant, and subjectively pleasing. The WCAG 2.0 were further developed; in June 2018, the WCAG 2.1 was published as a W3C Recommendation (Web Standard).

The main project result was a handbook that provides general instructions to assist and support schools and their teachers for promoting inclusive education within the ordinary mainstream classroom teaching. Attention was laid on the use of accessible online resources. Online resources should be used in natural and substantial ways and should be built into activities, rather than tacked on. The utilization of technology is only one part of any instructional solution. This reflects the common understanding of teachers / trainers specialised on dyslexia. However, youngsters usually fall out of the support system...

Suggestions for Transfer / Adaptation:

- The games shall meet the challenges of the mobile devices (restricted areas, several systems) and the challenges of accessibility WCAG 2.1 (font type and size, individually selection of background colours, understandability of text, navigation etc.)
- An approach shall be defined by the partnership that can insure a “full” self-organised training by youngsters.

ALDO (2013 - 2015)

The **ALDO (Adults with a Learning Disability - Observatory of Best Practice)** project is instigating a series of European research studies to identify successful educational projects in the area ICT in education and training of disabled people. The project developed an assessment mechanism to evaluate the projects based on especially defined criteria and provide a virtual laboratory for teachers and trainers who work in this area to support them in engaging with the best practice models identified.

36 Best Practices have been selected, projects previously implemented all over Europe, which focus on adult persons with learning disabilities. All these Best Practices were collected and presented in a so-called **ALDO Online Observatory**. For this a common assessment system was developed and applied.

Suggestions for Transfer / Adaptation:

DYS2GO shall apply also an assessment mechanism for pre-selecting the game types to be developed within the project. Criteria shall be defined by all partners.

Done: Three criteria were identified at the Kick-off meeting. The selection criteria are

Criterion 1: The pedagogical type / game is “advanced” e.g. it fits optimal to the area or can be rarely found in the internet or has an interesting / attractive / cool

theme relevant to youngsters. Example: There are many, many online memory games available. But memory games that show elements relevant to technical professions or with “moving faces” on the cards are rarely available.

Criterion 2: The pedagogical type / game is easy understandable i.e. it`s game mechanics is simple or well-known already. Example: it should be possible to skip the explanation on “what to do” or formulate it in 1-2 simple/short sentences.

Criterion 3: The pedagogical type / game presents an optimal game character / performance i.e. the game can motivate dyslexic youngsters to try again and again. Example: the game is not too simple and not too challenging for dyslexic persons.

Partner Dyslexia Association Bulgaria

CALLDYSC (2006-2008)

A set of games for mobile devices were created to help dyslexic pupils to manage English language learning in easier and more attractive way. Games aimed at learning/expanding pupils' vocabulary, reading, understanding and writing simple language structures. Some of the games were designed in a way, so teachers and children could create/add content depending on their needs. For each successfully completed game children got “a golden cup”, the number of cups collected was registered, and children were motivated to play more in order to receive more cups, this way doing more exercises.

To transfer/adapt:

Players should have a chance to add their own contents in the game's frame, and this way to create new variations of the games. If players know next time there may be some new games, they will be motivated to come back and try new ones.

DESSDYS (2009-2011)

Full name: Developing Study Skills of Dyslexic learners

The project aimed at providing support directly to young adult learners with dyslexia in the form of e-learning tailored to their specific needs. The course developed by partners included several sections: Using assistive technologies; Reading and Writing skills; Listening and Note-taking; Preparing for and taking exams; Time management/organizational skills.

The materials developed included: An online e-book, A Guide for lecturers, A set of Templates for key tasks - all were available in EN, BG, IT, TR, HU. Now materials in Bulgarian are available from DABG's website.

To transfer/adapt:

Some of the materials should be taken into account when developing training handbook in Dys2Go.

Direct involvement of dyslexic learners in all stages of the project (starting from survey on their needs, development of the materials and their pilot testing)

DYSLEXIA VETO (2009-2011)

A Transfer of Innovation project. The British system of standards for so called “Dyslexia Friendly Quality Mark” was adapted for VET schools in Bulgaria, Romania, Hungary and

Italy. During the piloting period VET schools in all partner countries tried to implement the system. As a result in Bulgaria three VET schools were awarded with a Quality mark of being Dyslexia friendly.

To transfer/adapt:

To take into considerations some of the standards of Dyslexia Friendly Quality Mark;

Active participation of the young dyslexics in all stages of the DFQM implementation in schools

SMART (2013- 2015)

The project was based on the use of RoboBraille (online converting software). The aim of the project was to implement into practice a new methodology for developing of educational materials in different formats that are more suitable for people with reading difficulties (dyslexia) and visually impaired people. The materials developed by partners include a guide and a series of presentations in several topics:

Characteristics of the inclusive education

Developing materials in Accessible formats

Assistive technologies (including RoboBraille service)

Converting educational materials into DAISY books

Converting educational materials into e-books, etc.

All materials are available in several languages (EN, BG, PL, HU, DK, RO and German).

In English: <http://robobraille.org/resources/smart-training-course>

In Bulgarian: www.dyslexia-bg.org

To transfer/adapt:

Some of the materials could be used for training handbook in Dys2Go, especially the section about accessible formats

MoDYS (2014-2016)

It was a KA2 (adult education) project which objective was to improve the mobility and availability of educational services for adolescents with dyslexia and other specific learning disabilities (SLD) in general education. Partners prepared an analysis of the situation in partner countries (Latvia, Bulgaria, Czech Republic and Turkey) and used it as a base to create a training course for teachers (plus a related handbook). Only in Bulgaria more than 100 teachers/trainers who work with young adults (16+) in VET schools, upper secondary schools, training centres took part in the Pilot training, and the most of them (over 80%) admitted the usefulness of the materials provided.

To transfer/adapt:

Some of the materials could be used for training handbook in Dys2Go, especially the sections about learning preferences/learning styles and use of ICT in connection with dyslexia.

The projects below have already been mentioned by other partners:

ADYSTRIN (2006-2008)

A set of 12 handbooks in electronic format is still available in Bulgarian (Could be downloaded from <http://www.adystrain.project-platform.eu/bg/index.html>)

EDYSGATE (2006 - 2008) / DYS 2 (2009 - 2011)

CALDYS2 (2010-2012)

DYSLANG (2012-2013)

DYSVET (2012-2014)

Partner Euroface / Czech Republic

Caldys2 (2010-2012)

The project has created 6 flexible game structures, which were filled with specific content and there were almost 200 games that support the teaching of English as a second language and aimed at developing problem areas of students with dyslexia.

www.caldys2.eu

Suggestions for Transfer / Adaptation:

- Involvement of teachers, counsellors and dyslexia experts into creating the learning content
- Easier games (for understanding and use, e.g. hangman) are more used in practice than more complicated games (e.g. development the whole story)
- Need to be careful on updating pictures, relevant to youngsters

DYSVET (2012-2014)

The main aim of the project was to raise the level of dyslexia awareness among trainers, teachers, tutors in VET, managers, employers, Human Resources personnel.

Specific project objectives were:

- Provision of reliable knowledge on dyslexia as well as physiological and educational consequences and the barriers faced by dyslexic individuals in accessing education and the labour market along with ways of eliminating them,
- Developing an active attitude in teachers and managers supporting dyslexic individuals as regards access to knowledge and the labour market,
- Equipping teachers, tutors and others who have a duty of care towards the dyslexic student with the ability to teach and support them successfully and efficiently.

www.dysvet.eu

Suggestions for Transfer / Adaptation:

- Use the structure of modules for training handbook in DYS2GO
- The modules were developed in different format (text, audio, reader) - there are easy ways how to transfer the text into other format and make it dyslexia friendly

DYSLANG (2012-2013)

This project supported the multilingual dyslexic individuals in learning an additional curriculum language. The main aim of Dyslang was to develop and implement an e-learning course and best practise guide for teachers and parents so they will be able to support the multilingual individual in learning an additional language that is different to his/ her mother tongue. www.tatadoma.cz/dyslang

Suggestions for Transfer / Adaptation:

- Dyslexic friendly environment of the website, attractive and up-to-date images (or neutral)
- Involvement of teachers in all participating countries in piloting the project products
- Partners shall cooperate from project beginning with relevant organisations and institutions. The support of national dyslexia associations in the partner countries was the main factor for getting the wide acceptance.

Partner Gedonsoft / Germany

Projects ALLVIP, ELLVIS, VET4VIP, ALL4WELL, MOLLVIS

Gedonsoft developed language learning programs for blind and visually impaired people. The language courses trained listening comprehension and oral communication. Reading and writing skills were not trained. Due to the user interface, blind learners were able to perform learning activities that are usually reserved to sighted learners like, for example, drag-and-drop activities.

All programs were designed for Windows desktop systems. With the Mollvis project, the training approach was transferred to mobile systems (Android, IOS, and Windows phone). Whereas the language learning tasks of the programs represent pretty much standard computer-based training activities, some of the user interface elements of the programs are worthwhile to be evaluated for the DYS2GO mobile learning games. These are:

1. Menu System

The menu structure developed for blind learners was designed to be easily accessible. This meant no folding list menus (like directory entries in the left part of the Windows file manager) as those required using the mouse and were rather filigree. Instead, the programs used a simple button-based main menu screen with buttons that lead to different units. Each unit was then shown with its own sub-menu. This menu system allowed quick navigation even for blind users and worked as well with the smaller physical screen space of smart phones.

2. Program messages

All program messages were presented via audio files. This also concerned text on buttons and tooltips (tooltips are explanatory text lines that users see when the mouse moves over a button or control element).

3. Help System

Each task or training activity was supported by audio information that always followed the same pattern and were played in the same sequence:

- Orientation: Where am I in the course or game?
 - Information: What is shown on the screen and how do I carry out the task (from a technical or practical point of view. For example, how to drag and drop objects within the screen area)?
 - Instruction: What to do or what to solve.
- Each type of information was also available on demand at any time during the task or exercise. In case of sighted learners, this kind of audio support does not need to be as extensive as for blind users. However, providing the support in form of audio information will probably assist the target group of dyslexic learners.

4. Using Text-To-Speech (TTS)

The audio files for program messages were created by using TTS technology. This had two advantages:

- Program messages could easily be changed or added, because there was no recording required.
- Although some TTS voices were very good, they were always a bit artificial. However, that made it easier to distinguish between program messages and the language training content.

5. Consistency

The design and behaviour of a task or exercise once introduced did not change during the course. The “no surprises design” was very important for blind learners and is probably for dyslexic learners, too.

Partner SPI / Lithuania

SIMOLA - Situated Mobile Language Learning

2010 - 2012

EU Lifelong Learning Programme KA3 ICT

SPI team participated in SIMOLA project implementation. During the SIMOLA project it was developed a mobile application for the Android Mobile OS (LingoBee) to meet the specific needs of in-situ language learners. It includes capture and uploading of text, photos, audio and video, group discussion areas, RSS syndication and widgets to embed in social network profile pages.

LingoBee is a mobile app to support situated mobile language learning and to help the learners in linguistic and cultural diversity.

Based on the ideas of situated learning and contextualized learning it was designed to capture language elements that learners come across in their everyday lives, whenever and wherever they are. Ideas of crowdsourcing and social networking have been used to collect, share and annotate the contributions of all learners in a shared online repository.

It allows users to easily create memorable entries for words or phrases through the addition of user-generated multimedia elements, such as a photos or voice recordings. Learners are also able to add new descriptions to already existing entries. Each entry contains multimedia elements such as a picture or audio as well as web links.

Suggestions for Transfer / Adaptation:

- Players should have a chance to add their own content in the game's frame and to create new variations of the games.
- Players should have possibility to give a rating to the game (ex, stars rating).
- It's important to establish contacts and cooperate from project beginning with relevant stakeholders: with national associations (dyslexia, speech therapists'), vocational schools, colleges, universities and student organisations.

Partner University Riga / Latvia

1. What of your previous projects or projects/ initiatives/ approach/ offer you know are relevant to DYS2GO with respect to experience, methods, best practice, media, etc.?

Agency of the Latvian Language offers different materials for the language learning, including for dyslexic people.

<http://maciunmacies.valoda.lv/video-maci/vecaku-skola/8-maci/157-vecaku-skola-4-nodala>

Interactive games:

<http://maciunmacies.valoda.lv/video-maci/video-konsultacijas/8-maci/232-interaktivas-speles>

VISC (National Centre for Education (NCE) is a public administration institution directly subordinated to the Ministry of Education and Science.

There are VISC (NCE) Methodological materials worked out in the ESF project "Support system for learners with functional disabilities"

https://visc.gov.lv/specizglitiba/metmat_esfpr.shtml

There is National Research Project (NRP), which is not finished yet, but one of the aim groups are youngsters, among them some with dyspraxia (and it could be together with dyslexia also).

Innovative solutions for social telerehabilitation in the schools of Latvia in the context of inclusive education or INO(vative solutions for) SOC(ial) TE(le) REH(abilitation in the context of) I(nclusive education)

Summary about the program:

NRP INOSOCOTEREHI includes interdisciplinary research, which meets all three objectives of the priority axis (5.1.) *Sustainable development of the country and society* and is related to the second and third objectives of priority directions of science complying with a number of priorities of Smart specialization strategies. (Faculty staff is involved in this project)

<http://www.telerehabilitation.lv/en/node/187>

Faculty of Education, Psychology and Art has acted as a coordinator of TICTC

-Teachers ICT competences a way to Effective Learning for children with hearing difficulties (Socrates Comenius) Project (2006-2009), that was implemented by 7 partners, The goal of the Project was to promote learning through IT competencies of teachers, special educators and social educators as well as other professionals working with students suffering from severe learning difficulties. The output of the project was analyses of the situation in the countries, the course description and schedule for teachers, the course materials “The integration of ICT in the study process for children with hearing difficulties” (for the use in DE form; and printed version for blended learning), the advice book “Some hints for using ICT in the core subjects”. The only material that included suggestions for games was the last mentioned one.

Faculty as a partner was involved in ERASMUS + project RoboESL (www.roboesl.eu) (2015-2017). It was a robotic based project, to develop learning interventions for preventing school failure and early school leaving. Educational Robotics is a modern learning practice providing learning experiences that promote children’s creative thinking, collaborative spirit and problemsolving skills. The created materials can be used in different subjects.

Faculty every year has about 20 projects that are connected with education, psychology and art, but **DYS2GO** is the only one connected with dyslexia (reading problems) and learning games.

2. Give a short description of the project/ initiative/ approach/ offer

DYS2GO project is a challenge to use interesting game elements from previous projects, implemented by our project partners, as well as experience of our VISC and the Latvian language Agency “keeping in mind” the following factors:

- the functions of the games,
- age (young adults),
- the content of the games has to be contemporary, attractive, passionate
- the game has to serve the aim - to improve reading abilities,
- the game has to be created for different levels of dyslexia,

it would be good to integrate training of

- visual discrimination,
- visual memory,
- visual sequence,
- auditory discrimination,
- auditory memory,
- auditory sequence and
- spatial position

in games, not giving separately. Then the game would become more interesting, more corresponding to the age.

The instruction of the game - as simple as possible. It will give the possibility young adults to play the games when she/he wishes, not under the guidance of the teacher.

Summary

Recommendations and suggestions provided by DYS2GO partners in this section that are relevant for DYS2GO:

Game Design
<ul style="list-style-type: none"> • Easier games (for understanding and use, e.g. hangman) are more used in practice than more complicated games (e.g. development the whole story). • Need to be careful on updating pictures, relevant to youngsters. • Users should have a chance to add their own contents in the game's frame, and this way to create new variations of the games. If players know next time there may be some new games, they will be motivated to come back and try new ones. • Menu System The menu structure developed shall be easily accessible. This meant no folding list menus (like directory entries in the left part of the Windows file manager) as those required using the mouse and were rather filigree. • Program messages All program messages shall be presented via audio files. • Help System Each type of information shall be available on demand at any time. However, providing the support in form of audio information will probably assist the target group of dyslexic learners best. • Using Text-To-Speech (TTS) It shall be checked where TTS technology can be used. Program messages could easily be changed or added, because there was no recording required. Although some TTS voices were very good, they were always a bit artificial. However, that made it easier to distinguish between program messages and the language training content. • Consistency The design and behaviour of a game once introduced shall not change during the course.
Usability

<ul style="list-style-type: none"> • The games shall meet the challenges of the mobile devices (restricted areas, several systems) and the challenges of accessibility WCAG 2.1 (font type and size, individually selection of background colours, understandability of text, navigation etc.) • The slogan “dyslexia friendly is user friendly” should be also taken consequently into account when developing DYS2GO materials. • To take into considerations some of the standards of Dyslexia Friendly Quality Mark; • Dyslexic friendly environment of the website, attractive and up-to-date images (or neutral). • Create a navigation in text, audio and images. • Create / develop DYS2GO games without the implementation of a competition between players and without a time stress e.g. as an indicator of achieved performance.
<p style="text-align: center;">Training material</p>
<ul style="list-style-type: none"> • The handbooks (Dessdys, SMART, Adystrain, EDYSGATE, Dyslexia Veto, MoDYS, DYSVET) can “deliver” contents for the development of DYS2GO training materials. • The DYS2GO handbook shall extent / improve the contents with respect to self-learners. • An approach shall be defined by the partnership that can insure a “full” self-organised training by youngsters. • The modules shall be developed in different format (text, audio, reader) - there are easy ways how to transfer the text into other format and make it dyslexia friendly
<p style="text-align: center;">Acceptance</p>
<ul style="list-style-type: none"> • Direct involvement of dyslexic learners in all stages of the project (starting from survey on their needs, development of the materials and their pilot testing). • Involvement of teachers, counsellors and dyslexia experts into creating the learning content. • Partners shall cooperate from project beginning with relevant organisations and institutions. The support of national dyslexia associations in the partner countries was the main factor for getting the wide acceptance.
<p style="text-align: center;">Impact</p>

- Contacts to researchers shall be established from the project beginning.
- The EDYSGATE/DYS games were very well accepted by teachers and youngsters although a possible / positive impact of the training by using games could not be verified at that time since no interested researchers could be identified for a cooperation. During the last 10 years the situation has changed. Several studies were provided that demonstrate a positive impact of playing digital games on improvements in the area of attention and perception.

Chapter 3: Definition of broad (learning) goals for the planned games

Introduction

The game has always occupied an important place in the lives of people from an early age and throughout their lives. The game in its huge variety is a means of exploring the world, mastering skills, establishing relationships and learning different role models.

Child development specialists believe that playing games is critical to the mental, physical, and emotional development of each child: the game is not only joy and fun; through it children develop their personality, the positive attitude towards themselves and realize their potential.

With the time and the age games, of course change, but their role in human's life doesn't lose its importance. Game-based learning has shifted focus from learning with lectures and written tasks to learning with games and it has become an indispensable part of modern education.

The role of the game in the learning process

Using games as an element of the learning process provides opportunity to create a safe atmosphere for acquisition of new skills or improving those who are not well enough developed; for trying new situations without fear of failure.

The practice shows that the knowledge and skills acquired through game-based learning are retained longer than information from other learning methods. The reason that game-based learning often is more effective than the traditional (instruction-based learning) is that the learner is while playing the learner is fully involved in what he/she is doing. Of course, in order to make learning effective, it is necessary to offer the learners games that are well designed and have well implemented learning tasks. A well-designed educational game means that the learning objectives are properly combined with the fun. Games designed specifically for learning purpose can motivate self-learning and problem-solving skills to a great extent.

One of the key aspects of game-based learning is that the learner/player receives immediate feedback on their performance, if even there is no evaluation aspect directly included (like score or time limit). And no matter if a game provides an opportunity to compete with the others or with just yourself, this factor helps learners to maintain their motivation to be truly good at something. This is a serious problem caused by all systems and scales of assessment that surround learners (from first grade at school, throughout all school years and later in life) and most often affect their self-esteem. In the process of growing, negative feedback is not the most appropriate method for a child or youngster to learn more about a topic. Of course, there is no way to avoid the assessment element in any activity one engages in, but the games allow learners to evaluate their own knowledge in an un-harmful way.

Pedagogical goals

In general language we tend to use terms “goals” and “objectives” fairly interchangeably.

Goals tend to be more general than objectives. Goals describe what the learner will be capable of doing after the lesson (learning session), not the activities that he/she will perform during the lesson.

When we talk about pedagogical objectives, we mean the specific expected learning outcomes: what new skills the learner will be able to perform after the activity; what specific new knowledge will he be able to demonstrate.

The objectives of each activity should be clear before we design the activity. Otherwise how will we know what activities to plan and use in order to reach the objectives.

When we determine the objectives of each learning activity we should ask and answer three main questions:

Question 1 - What results we want to achieve?

Question 2 - How will we verify/assess these results?

Question 3 - What kind of instructions will we give to the learners, so the task is clear to them?

DYS2GO games - how they can help dyslexic learners

Dyslexia, together with dysgraphia and dyscalculia form the group of developmental disabilities known as Specific Learning Disabilities (SLD) or Special Education Needs (SEN). The main characteristic of these difficulties is that they are “specific”, that is, they affect a specific range of abilities in a significant but selective way, leaving intact the general intellectual functioning. SLD/SEN have a major impact both at the individual and at the social level. They frequently lead to a lowering of academic performance and/or early dropping out of secondary school, and they reduce the potential in social and work environments.

Dyslexia affects 1 in 10 persons around the world. Most people reduce dyslexia to just a reading and writing difficulty. But dyslexia is a multi-faceted problem that effects not only literacy acquisition, but also the way information is processed, stored and retrieved, with problems of memory, speed of processing, time perception, organisation and sequencing. Dyslexia is a lifelong condition; it doesn't go away after finishing school; it affects all parts of one's life.

A dyslexic person needs to train his or her perception skills on a regular base, otherwise inclusive education measures, for example, in VET, higher education or adult continuing training may fail. Such training is a prerequisite for phonological and orthographic processing. Inclusive learning requires accessibility of individual learning resources (for example, digital learning tools tailored to general or specific learning needs) to learn in a variety of ways that compensate deficiencies. Interactive exercises can help dyslexic persons to train specific skills.

On the other hand, the user's ability to choose the time and place of the "training" itself, its duration, and the level of complexity of the game task creates prerequisites for greater freedom and privacy.

Studies have shown that people with dyslexia have certain deficits in one or more of these following areas: attention, perceptions, memory, spatial orientation, sequence handling.

The good functioning in the mentioned areas is determined by the specialists as a prerequisite for the seamless acquisition of basic skills such as reading, writing, calculus,

and learning as a whole. They are essential to the overall functioning of a man, and hence to his good realization in education, labour market, and social sphere.

Attention

A very important component in this list of specific areas is attention. Attention is the behavioural and cognitive process of selectively concentrating on a discrete aspect of information, while ignoring other perceivable information. Attention has also been referred to as the allocation of limited processing resources (Anderson, 2004).

The basic properties of attention concern: fastness, concentration, distribution, switching and attention volume. It is possible that one of these aspects is well developed while another one is not in such a good level.

Fastness is a time characteristic of attention and refers to the duration of attraction of attention to the same object. Concentration of attention is the ability to focus the required object, its components, ability to understand the task. Development of concentration required conscious efforts and results in the individual's ability to perceive, understand and learn new information. One's ability to concentrate depends on: commitment, enthusiasm for the task (motivation), skill at doing the task, the emotional, physical and psychological state at the time, and the environment.

Attention stability is how long one can stay focused on the object; it is the "duration" of voluntary attention and is defined by the period of time one can keep his attention at its initial quality level. Another very important factor is the ability to re-focus the attention from one object or activity to another one when necessary, which we call switching or redirection. The special feature here is that the individual makes a conscious evaluation of the newly occurred stimuli and finding that in a changing situation it has greater significance than the previous one, the individual switches his attention to the new object/action. Any shift of attention requires voluntary efforts.

Visual and auditory perception

Visual perception starts to develop from the birth. But it needs some time to allow the eyes to focus, to practice eye movements, to form binocular vision, perception of perspective (depth), hand-eye coordination and so on. When we talk about the visual perception we do not mean problems with vision, but the skill, which is associated with the perception of an object. This is a skill to recognise a form, no matter what size or colour, or material it is, or what is its location; a skill to distinguish that form from any other form, and the perceived visual information to be remembered (stored in the memory) and retrieved when necessary.

Auditory perception is the ability to "structure the auditory world and select those sounds which are immediately pertinent to adjustment" (Myklebust, 1954). A person with auditory perceptual deficits can hear sounds but are unable to recognize them for meaning (Berry and Eisenson, 1956). When we talk about the auditory perception we need to mention four main aspects of it:

Auditory discrimination - the ability to hear similarities and differences between sounds;

Auditory differentiation - the ability to select and attend to relevant auditory stimuli and ignore the irrelevant;

Auditory blending (also known as auditory analysis and synthesis) - the ability to synthesise individual sounds which form a word;

Auditory sequencing - it is the ability to remember the order of individual sounds in a given stimulus.

Visual and auditory memory

A classical model of memory developed in the 1960s assumed that all memories pass from a short-term to a long-term store after a small time period. This model is referred to as the "modal model" and has been most famously detailed by Atkinson and Shiffrin (Atkinson and Shiffrin, 1968). Short-term memory is the ability to store information in mind in an active, readily available state for a limited period of time, such as visual images (i.e. form or a face of a person) and/or aural/auditory information (ie. phone numbers somebody said or sentences). Information can remain that way for a few seconds. Short-term memory plays an important role, because thanks to it, we can process a huge amount of information, saving the potentially useful and forgetting the rest.

Long-term memory determines a person's ability to retain information for longer periods of time. Long-term memories can last for just a few days, or for many years. The capacity of long-term memory is virtually unlimited, as the time for storing information in it. Access to information in long-term memory and ability to intentional and unintentional remember depends on how well it is organised.

Depending on the channel of perception, we divide the memory into visual and auditory, and both play equally important role when it comes to learning in general.

Visual Memory is the ability to remember for immediate recall the characteristics of a given object or form. It describes the relationship between perceptual processing and the encoding, storage and retrieval of the resulting neural representations. Visual memory is a form of memory which preserves some characteristics of our senses pertaining to visual experience. It occurs over a broad time range spanning from eye movements to years in order to visually navigate to a previously visited location (Berryhill, 2008). We are able to place in memory visual information which resembles objects, places, faces, etc. in a mental image.

Auditory memory is the ability to process information presented orally, analyse it mentally, and store it to be recalled later. Unlike visual memory, in which our eyes can scan the stimuli over and over, it is impossible to do with the auditory stimuli. Auditory stimuli are received by the ear one at a time before they can be processed and understood. The auditory memory is like a "holding tank" concept, because a sound is unprocessed (or held back) until the following sound is heard, and only then can it be made meaningful (Clark, 1987). This particular sensory store is capable of storing large amounts of auditory information that is only retained for a short period of time, up to 3-4 seconds (Radvansky, 2005).

Spatial orientation

Another area of human's development that plays an extremely important role in formation of skills, necessary not only for learning but for normal functioning on every-day basis, is spatial orientation.

Spatial orientation is crucial for adapting to new environments and getting from one point to another. Without it, we would walk around in endless circles, would get lost, but also - would have a lot of other problems we don't even suspect (Maxwell, 2013). In early childhood the children accept everything that surrounds them according to their body, body movement and its location in relation to other objects. The early childhood movement patterns like rolling, creeping, crawling, rocking and later walking, running, climbing, swinging all build a sensory "map" in the child's brain of where he is in space at any particular time (Murphy, 2013). This ability facilitates the formation of children's school readiness and the acquisition of reading and writing, and for learning in general.

Sequencing refers to the person's ability to perceive visually and/or auditory items in a particular order, to remember this sequence and to be able to retrieve it later. This is how we can say the days of the week, or the months of the year, or the letters in alphabetical order, or even a recipe for cooking our favourite dish. When we need to remember or reconstruct the order of sounds we use our auditory sequencing ability. Another relation between sequencing and reading is the specific skill to control the eye-movement from left to right, following the text lines. During this process our eyes perceive letters in each word one by one from left to right, to recognise them, to combine in the correct order, so our brain could read and understand the word. Reading the words in the correct order we can understand the meaning of the sentences, paragraphs, etc. Sequencing ability is also very important when we need to re-produce what we have read in the correct logical order.

Based on the facts mentioned above, the focus in the suggested games will be on the areas that are known to be a weak point for many dyslexic individuals:

1. Visual discrimination,
2. Visual memory,
3. Visual sequence,
4. Auditory discrimination,
5. Auditory memory,
6. Auditory sequence,
7. Spatial orientation

The fact that the games developed within previous projects EDYSGATE (2008) AND DYS2 (2011) were very well accepted by young adults with dyslexia and got a lot of positive feedback from this target group, but also from teachers/tutors who work with dyslexic youngsters has proven the importance and necessity of such a tool. The technologies have been changing very fast during the last decade. Mobile devices have indeed become immensely powerful (not only from a technical point of view) and popular especially with young adults and offer huge opportunities for learning "anywhere and anytime". Which means - there is a growing request for a mobile version of such games.

Expected results

The games address are young dyslexic adults. They will benefit from the new knowledge and experience they will gain, but also the new tools (games developed the way to best match their specific needs) will help them to develop new skills so important in their efforts to overcome the difficulties caused by dyslexia and to find a better realisation of their potential in all aspects of life. Mobile apps will enable dyslexic young adults to train

from any location and at any time. The exercises allow individual and anonymous training of the persons concerned. Acquiring better skills and competences by this group of persons will also enhance their mobility giving them the chance not only to have appropriate jobs, but also a choice where they like to live and work. Furthermore, DYS2GO games will provide a highly motivating and stimulating learning environment for a carefully selected range of skills known to be important for young dyslexic adults, addressing the areas of particular importance for development of vocational skills. Plus, the principles behind the exercises are designed to be not-language dependent so they can be used by anybody who is interested and who needs such a training, no matter of his native language.

DYS2GO games, of course, could be used as part of the structured classroom/group activities, so they will be a valuable tool for teachers, trainers, tutors and other specialists who work with dyslexic young adults.

Chapter 4: Pre-Selection Results

Introduction

Task Description:

There are 51 pedagogical types of learning games known for meeting the training needs of dyslexic persons. 35 pedagogical types shall be selected. 4-5 single games shall be developed to each pedagogical type. The number of types / games per area was not defined. A list of preferred types/ games will be developed by applying the criteria that were defined by partners at the Kick-off meeting.

The selection criteria are

1. **Criterion 1:** The pedagogical type / game is **“advanced”** e.g. it fits optimal to the area or can be rarely found in the internet or has an interesting / attractive / cool theme relevant to youngsters. *Example: There are many, many online memory games available. But memory games that show elements relevant to technical professions or with “moving faces” on the cards are rarely available.*
2. **Criterion 2:** The pedagogical type / game is **easy understandable** i.e. its game mechanics is simple or well-known already. *Example: it should be possible to skip the explanation on “what to do” or formulate it in 1-2 simple/short sentences.*
3. **Criterion 3:** The pedagogical type / game presents an **optimal game character / performance** i.e. the game can motivate dyslexic youngsters to try again and again. *Example: the game is not too simple and not too challenging for dyslexic persons.*

The evaluation will be quantified by

5 = “I completely agree” 1 = “I completely disagree”.

The EXCEL sheets calculated the evaluation summary per type / game in this way: criterion 1 * 2 + criterion 2 + criterion 3 : 2. Thus, 17,5 x 5 partners = 88,5 is the maximum evaluation result of a type/ game. The EXCEL sheets are attached to the Framework.

Results:

A list of preferred pedagogical types / games that will form the basis for structuring the development process: This is not a dogmatic preference list. It reflects a ranking that is based on the known implementation of the pedagogical types. There shall be finally a careful look at potential improvements if the pedagogical type is important for training and/or cannot be found easily in the net.

A general feedback on potential improvements of the pedagogical types / layouts / themes / game character with respect to needs / preferences / styles etc. of dyslexic youngsters: thus, several games / pedagogical types can be combined in one game if levels of difficulty will be implemented (* they have a “flow” potential). A matrix of single games and combined games shall be developed at the next meeting e.g. stories / themes that cover a whole area and/or cover all auditory or all visual areas. A common game mechanics shall be discussed at the next meeting that allows a play in different modes.

Pedagogical types of the Auditory Areas

Nr	Auditory Discrimination		Auditory Memory		Auditory Sequence	
	Short	Name	Short	Name	Short	Name
1	ad_4	Snap*	am_2	Compatible sound*	as_4	Play a sequence - music*
2	ad_3	Initials*	am_1	Same sound*	as_5	Do you speak Klingon?
3	ad_2	Rhymes*	am_3	Rhyme pairs*	as_3	Aligning pictures with noises
4	ad_5	Acoustic images	am_4	Word-sound pairs*	as_2	Pack one's bag
5	ad_1	Intonation	am_5	wrong area	as_4	Play a sequence - noises
	More?		More?		More?	
	am_5	Snap- acoustic images		none	as_1	Questions to a story

❖ Auditory Discrimination

1. **Snap(ad_4)** - The pedagogical type SNAP has the potential for a typical mobile game with “flow”. It shall be discussed whether there should be single games e.g. with many rounds of rhythms or should rhythms, noises etc. united in one game. In case of the last there could arise instruction problems.

2. **Initials (ad-3)** - The pedagogical type INITIALS is a well known type, however, its relevance for Latvian language shall be checked. It has the potential for a typical mobile game with “flow”.

3. **Rhymes(ad-2)** - The pedagogical type RHYMES is a well known type, but is it relevant for all languages? For German / Czech languages it is relevant. It has the potential for a typical mobile game with “flow”. It is not recommended to show the words, since the game is for training the auditory discrimination.

4. **Acoustic images(ad_5)** - it is for dyslexic persons a challenging type. More crazy situations shall be developed. Most interesting situations for youngsters are when “something is broken, happened crazy”. A relevant “situation photo” could be put in the background. It has not a real “flow” potential, it is more a single game. However, it could be integrated in a story e.g. do that / press that when you hear the bells 3 times ringing etc.

5. **Intonation (ad_1)** - it is an important pedagogical type, that means the overall implementation shall be much improved. There are many typical sentences that youngsters do not like to hear ... e.g. *You have to be at home at 9 o'clock, why you are not at school.* The type has not a “flow” potential, it is a classical single game. Levels of difficulty are possible.

❖ Auditory Memory

1. **Compatible sound (am_2)** - the type is well known as a visual game, an auditive game can be rarely found in the net. Levels of difficulty can be easily added. Levels from easy to challenging not only by increasing the number of cards, but also by increasing the difficulty of sounds starting e.g. from names, city names... music ... noises. It has a “flow” potential.
2. **Same sound (am_1)** - the type is also well known as a visual game, an auditive game can be rarely found in the net. Levels of difficulty can be easily added. Levels from easy to challenging not only by increasing the number of cards, but also by increasing the difficulty of sounds starting e.g. from names, city names... music ... noises. It has a “flow” potential.
3. **Rhyme pairs (am_3)** - is this an important type with respect to partner languages? Yes, for German and Czech.... Levels of difficulty by number of pairs, by words in a sentence or finding rhymes among non-rhymes... there is a “flow” potential
4. **Word-Sound pairs (am_4)** - Similar like Rhyme pairs, but great since it combines the understanding of meaning and the sound of a word. Very useful game type. Requires additional attention in development process - careful selection of words /translations. Easier version: pic-sound pairs. It has a flow potential.
5. **Snap-acoustic images (am_5)** - this type seem to be wrong in Auditory memory, it is a version of the existing acoustic image games under AD.

❖ Auditory Sequence

1. **Play a sequence - Music (as_4)** - it is a “standard” game, such apps can be found easily in the net. However, it is funny... Generally, a graphical difference between Noises and Music sound games should be implemented. Examples could be short known music sequences classic and modern (attention: IPR). The type has a “flow” potential.
2. **Do you speak Klingon? (as_5)**- interesting, using Klingon is still attractive for youngsters. Made-up languages are popular and therefore we could use them more, e.g. Elves (Tolkien). However, the noises presented in EDYSGATE are hardly to differentiate. The task is to recognise the noise and remember the sequence, therefore the noises must be of good quality (this is not an audio test!), otherwise all efforts will be spent on differentiating between the noises. Look for more attractive background.
Flow potential is questionable.

3. **Aligning pictures with noises (as_3)** - the games noises / traffic could be united by crime stories (levels of difficulty) in order to increase their attractiveness substantially. E.g. *what did you hear, did they leave by car or bike etc.* Attractive relevant photos! Flow potential could not be identified.
4. **Pack one`s bag (as_2)**- it is a standard game, well known even from offline training. The graphic shall be substantially improved. Max. 7 items? Flow potential is questionable.
5. **Play a sequence - noises (as_4)** - no beating idea for improvement has been reported. Maybe, a background crime story can be created... Flow potential could not be identified.
6. **Question to a story (as_1)** - it is the only one type that trains the understanding/meaning of a content. It is very important... It should be checked, how it can survive in DYS2GO as a single game e.g. by an interesting text to a band, film, game, international politics (?)... This type has rarely a potential for a game with "flow".

Games of the Auditory Areas

❖ Auditory Discrimination

Top games:

1. ad_4_4 Snap - Rhythms total 68,5

Start the exercise! You will hear some rhythms. If a rhythm is heard twice, press Stop!

Criterion 1:... it is advanced 20 out of 25

Criterion 2:... it is easy understandable 21 out of 25

Criterion 3:... it has an optimal game character / performance 15 out of 25

2. ad_4_3 Snap - Music tones total 66,5

Start the exercise! You will hear some tones. If a tone is heard twice, press Stop!

3. Ad_3 Initials total 64,0

Start the exercise! You will hear 3 word pairs. One pair will start with the same letter. Which one is it?

Further:

4. Ad_2 Rhymes total 63,0

Start the exercise! You will hear 4 word pairs. One pair will rhyme. Which one is it?

5. Ad_4_5 Snap - Noises total 61,5

Start the exercise! You will hear some noises. If a noise is heard twice, press Stop!

6. Ad_4_1 Snap Music and ad_4_2 Snap Noises total 60,5

Start the exercise! You will hear some names/noises. If a name/noise is heard twice, press Stop!

7. Ad_5 Acoustic images / all games total 58,5

Start the exercise and listen to the scene! Count how many times.....! Write the number in the space provided.

Lowest score:

8. Ad_1 Intonation total 52,0

Start the exercise! You will hear the same sentence four times. Each time the stress will be different. Then you will hear one sentence repeated. Which one was it?

❖ Area Auditory Memory

Top games:

1. am_2_3 Compatible sound - Music instruments; total 75,5

Click on a card: You will hear an instrument. Every instrument will play a high note loud and then a lower note. Find the pairs!

Criterion 1:... it is advanced 22 out of 25

Criterion 2:... it is easy understandable 22 out of 25

Criterion 3:... it has an optimal game character / performance 19 out of 25

2. am_1_3 Same sound - Percussion rhythm; total 69,5

Click on a card: You will hear a rhythm. Each rhythm will be heard twice. Find the pairs!

3. am_1_5 Same sound - City names; total 66

Click on a card: You will hear city names. Every city name will be heard twice. Find the pairs!

Further:

4. am_1_2 Compatible Sound - Traffic noises and am_2_2 Traffic noises; total 65

Click on a card: You will hear a traffic noise. Every noise will be heard twice. Find the pairs!

Click on a card: You will hear a traffic noise. Every noise will be heard loud and then quiet. Find the pairs!

5.am_3 Rhyme pairs; total 64,5

Click on a card: You will hear a word. For every word there will be another word that rhymes with it. Find the pairs!

6.am_1_4 Same Sound - Names; total 64,0

Click on a card: You will hear names. Every name will be heard twice. Find the pairs!

7.am_1_1 Same sound - Ringtones; total 63,5

Click on a card: You will hear a ringtone. Every ringtone will be heard twice. Find the pairs!

8.am_2_5 Compatible sound - City names; total 62,5

Click on a card: You will hear the name of a city. Every city will be announced twice - once with a male voice and once with a female voice. Find the pairs!

9.am_4 Word-Sound pairs; total 61

Click on a card: You will hear a word or a noise. For every word or noise there will be a matching noise. Find the pairs!

10.am_2_1 Compatible sound - Ringtones; total 61

Click on a card: You will hear a ringtone. Every ringtone will be heard short and long. Find the pairs!

Lowest score:

11.am_5 Snap-Acoustic images; all games; total between 49-54

Start the exercise and listen to the scene! If a....., press Stop!

❖ Area Auditory Sequence

Top games:

1.as_4_4 Play a sequence Music sounds 1 and as_4_5 Music sounds 2; total 68

First try to use all the keys! Then start the exercise. You will hear 3 different tones. Repeat all 3 (4) tones.

Criterion 1:... it is advanced 18 out of 25

Criterion 2:... it is easy understandable 23 out of 25

Criterion 3:... it has an optimal game character / performance 18 out of 25

2.as_5 Do you speak Klingon; all Lessons, total 63,5

Try all keys. Each key has an effect. Start the exercise: You will hear ... words. Try to repeat the words with using the keys.

3.as_3_4 Aligning pictures with noises - Traffic noises 1; total 61

Start the exercise and listen in what order the vehicles appear. Use your mouse to put the vehicles into the right order!

Further:

4.As_3_1 Aligning pictures with noises - Supermarket; total 57,5

Start the exercise and listen in what order items go into the cart. Use your mouse to drop and drag the items in the same exact order into the cart!

5.As_3_2 and as_3_3 Aligning pictures with noises - Coming home 1 and 2; total 56,5

Start the exercise and listen to the exact order of noises. Use your mouse to put the matching picture next to the noise that fits. Use the exact same order as before!

6.As_3_5 Aligning pictures with noises - Traffic noises 2; total 53,5

Start the exercise and listen in what order the vehicles appear. Use your mouse to put the vehicles into the right order!

7.As_2 Pack one`s bag; total 53

You see a couple of things for a sport bag. Start the exercise and listen to what goes in the bag! Use your mouse to drag and drop the things into the sport bag in exactly the

8.as_4_1.as_4_2, as_4_3 Play a sequence Noises 1,2,3; total 49,5

First try all keys! Then start the exercise! You will hear ... noises. Repeat the ... noises!

Lowest score:

9.As_1 Question to a story; total 48,5

Start the exercise! Listen to the message and answer the question!

Pedagogical types of the Visual Area

Nr	Visual Discrimination		Visual Memory		Visual Sequence	
	Short	Name	Short	Name	Short	Name
1	vd_7	Untitled*	vm_6	Mirror*	vs_5	To be continued*
2	vd_3	Find the same	vm_5	Moving letters*	vs_1	Driving
3	vd_6	Find the differences 2*	vm_2	Compatible pictures*	vs_6	Poem
4	vd_4	One picture is missing*	vm_3	Picture - Initial letter *	vs_7	Don` t smoke!
5	vd_2	Picture in picture*	vm_4	Find the object	vs_3	Hieroglyphics
	More?		More?		More?	
	vd_5	Joint the dots*	vm_7	Forms*	vs_4	Klingon*
	vd_1	Find the differences 1*	vm_1	Same picture*	vs_2	Pack one`s bag*

❖ Visual discrimination

1. **Untitled (vd_7)** - this type can be rarely found in the net, these geometric shapes are more attractive for youngsters than images; levels of difficulty are possible: number of elements, time. It has a flow potential.
2. **Find the same(vd_3)** - is an important type, can be implemented via different motives, possible implementation in a crime story, a flow potential is questionable.
3. **Find the differences 2 (vd_6)** - this type can be rarely found in the net. Levels of difficulty e.g. by an increasing number of moving elements, but it is a graphical challenge. Check whether another implementation approach is possible by combining videos e.g. an open window with moving clouds, a movie running on tv or laptop... etc. It has a flow potential.
4. **One picture is missing (vd_4)** - interesting type, many motives are possible, levels of difficulty are possible, it has a flow potential
5. **Picture in picture (vd_2)** - The type is challenging, many motives are possible as well as levels of difficulty (motives!), it has a flow potential
6. **Joint the dots (vd_5)** - I is an important type, these geometric shapes are more attractive for youngsters than images; it has a flow potential
7. **Find the differences 1(vd_1)** - this type is well known, there exist app with 1.000 levels ;-), many interesting motives are possible, but, should DYS2GO compete with

the well known apps? the type can be integrated in a crime story. It has a flow potential.

❖ Visual Memory

1. **Mirror (vm_6)** - many possible motives of moving things (including advertisement) can be implemented. The task is funny, but also difficult for dyslexics, therefore, a careful selection of levels is recommended. It has a flow potential.
2. **Moving letters (vm_5)** - the instruction should advise where to put attention, however, after the first game it is known how it works. The game mechanics should be re-thought e.g. Suggestion: To make the game more interesting - to see the letters for a few seconds, then to see the word written in "empty" letters (just contours) and the player has to colour the letters the same way they were in the original word. All "moving letters" games to be united into one game with increasing difficulty level (starting with 4-letters words, and then increase the number of letters). It has a flow potential.
3. **Compatible pictures (vm_2)**- it is a well known type, but a MUST-have. Attractive motives can attract youngsters to this even well known type e.g. cars, sport, music, professions, science... It has a flow potential.
4. **Picture-Initial letter (vm_3)** - difficult type, cannot be easily found in the net. Backgrounds of photos and letters should be different otherwise it is confusing. More simple versions should be also implemented (levels). It has a flow potential.
5. **Find the object (vm_4)** - cannot be found easily in the net (alternative to shooters), thus, the movement of the object and the changing environment is important. Consider the use of attractive photos / videos. It is a Memory as well as a discrimination game! An easier version could be: a meesi room with a lot of different objects. Then several (5-8) names of objects appear and the player has to find these objects in the room and to click on them. After all objects are found he can proceed to the next room, etc. A flow potential is questionable.
6. **Forms (vm_7)** - it is surprising that this important games failed to the end... Interesting levels could be added e.g. what figures stick each to another, on is moving the other not etc. However even simple photos could be implemented of "usual" things. It has a flow potential.
7. **Same picture (vm_1)** - simple game, well known game, but with much more attractive /surprising photos is could be widely accepted... It has a flow potential.

❖ Visual sequence

1. **To be continued (vs_5)** - endless game, it is well known and available in the net, improvable, can the line be changed e.g. after three sequences, it has flow potential.

2. **Driving (vs_1)** - old fashioned ;-), there are so many endlessRacer games available with much better layout, the idea shall survive e.g. using videos. The flow potential is questionable.
3. **Poem (vs_6)** - does it fit to the F in the AFS-method or is it already a reading training game? If so, use texts of famous songs e.g. in EN! The way this game is now, it requires just a mechanical movement of the pieces/words in order to second the order. Even with the three levels of difficulty, it in fact doesn't become more difficult, because the player sees the text all the time. Suggestion: It could be done differently: the player sees a sentence for a few seconds (enough the sentence to be read), then the text disappears and the player has to choose among certain number of given words and to put them in the correct order to reconstruct the sentence. Then he presses: OK: and the original sentence appears again so the player can check. With the levels the text can become longer. A flow potential is questionable.
4. **Don` t smoke! (vs_7)** - a useful game, the mechanics shall be improved. Some innovation might be developed, e.g.in the most difficult level, the text will dissapear and the learners will compose words according to what they remembered. A flow potential is questionable.
5. **Hieroglyphics (vs_3)** - idea is fine, but could be implemented in more attractive way e.g. pieces could appear one by one (max 7), users have to repeat the order, a flow potential is questionable
6. **Klingon (vs_4)** - nice idea, all games that require to put words, symbols etc in the same order can be combined in one game. Then there is a flow potential.
7. **Pack one`s bag (vs_2)** - - nice idea, all games that require to put words, symbols etc in the same order can be combined in one game. Then there is a flow potential.

Games of the Visual Area

❖ Visual Discrimination

Top games:

1.vd_7 Untitled; total 76,5

*Choose the level * (easy), ** (medium) or *** (advanced). Find the differences between the two Pictures! Use the mouse on the picture on the right!*

Criterion 1:... it is advanced 22 out of 25

Criterion 2:... it is easy understandable 23 out of 25

Criterion 3:... it has an optimal game character / performance 19 out of 25

2.vd_3_1 Find the same - Landscape; total 73,5

Here are some blurred pictures, once in colour and once in black and white. Find the pairs with your mouse!

3.vd_4_3 One picture is missing - Graffiti; total 71,5

Two areas with picture elements. On one side an element is missing. Find the missing element and mark it by mouse click.

Further:

4.vd_2_4 Picture in picture - Art; total 70,5

Find the part of the picture which was zoomed in the clipping! All in all 10 clippings. Use your mouse!

5.vd_2_2 Picture in picture - Graffiti; total 70,0

Find the part of the picture which was zoomed in the clipping! All in all 10 clippings. Use your mouse!

6.vd_4_1 and vd_4_2 One picture is missing -Bike and ornaments; total 67/68

Two areas with picture elements. On one side an element is missing. Find the missing element and mark it by mouse click.

7.vd_5 Joint the dots, all games; total between 65 - 67

Click on the point that is marked with a circle. Then another point will appear in a circle on the upper left. Find this point on the field and click on it! And so forth.

8.vd_6 Find the differences 2, all three games between 62,5 - 64,5

*Choose the level * (easy), ** (medium) or *** (advanced). Find the differences between the two pictures! See the number of differences on the middle of the top. Use the mouse!*

9.vd_2_3 Picture in a picture - Collage; total 64,0

Find the part of the picture which was zoomed in the clipping! All in all 10 clippings. Use your mouse!

10.vd_3_3 Find the same - Door viewer; total 62,5

Blurred faces, once in full colour and once in a single colour. Find the pairs with your mouse!

11.vd_1_3 Find the differences 1 - Manga; total 61,5

Find the differences between the two Pictures! See the number of differences on the middle of the top. Use the mouse!

12.vd_4_4 One picture is missing - Wedding, total 61,5

Two areas with picture elements. On one side an element is missing. Find the missing element and mark it by mouse click.

13.vd_1_2 Find the differences 1 - Strong and beautiful; total 57,5

Find the differences between the two Pictures! See the number of differences on the middle of the top. Use the mouse!

14.vd_3_4 Find the same - Characters; total 56,5

Blurred letters, each in two different fonts. Find the pairs with your mouse!

15.vd_3_2 Find the same - Faces; total 56,0

Doodled faces! Each face appears twice, but with different doodles. Find the pairs with your mouse!

16.vd_4_5 One picture is missing - Body impressions; total 53,5

Two areas with picture elements. On one side an element is missing. Find the missing element and mark it by mouse click.

17.vd_2_5 Picture in picture - Sole of Foot; total 50,0

Find the part of the picture which was zoomed in the clipping! All in all 10 clippings. Use your mouse!

18.vd_1_1 Find the differences 1 - Love for ever; total 45,5

Find the differences between the two Pictures! See the number of differences on the middle of the top. Use the mouse!

Lowest score:

19.vd_1_5 Find the differences 1 - Sensitive foot, total 43,0

Find the differences between the two Pictures! See the number of differences on the middle of the top. Use the mouse!

❖ **Visual Memory**

Top games:

1.vm_6 Mirror, all three games; total from 75 - 76,5

*Choose the level * (easy), ** (medium) or *** (advanced). Click on any square! You see a picture. Every picture appears twice. Find the pairs!*

Criterion 1:... it is advanced 22 out of 25

Criterion 2:... it is easy understandable 23 out of 25

Criterion 3:... it has an optimal game character / performance 19 out of 25

2.vm_5 Moving letters, all five games ; total from 75 - 75,5

Start the exercise and keep your eyes on everything! At the end, there will be a question.

3.vm_2_5 Compatible pictures - Chinese; total 70,5

Click on any square! You will see a picture. For every picture there is another picture that fits. Find the pairs!

Further:

4.vm_2_3 Compatible pictures - Character 1; total 70,0

Click on any square! You will see a picture. For every picture there is another picture that fits. Find the pairs!

5.vm_2_4 Compatible pictures - Character 2; total 67,0

Click on any square! You will see a picture. For every picture there is another picture that fits. Find the pairs!

6.vm_2_1 Compatible pictures - Cars, total 66,5

Click on any square! You will see a picture. For every picture there is another picture that fits. Find the pairs!

7.vm_3 Picture-Initial letter, total 66,5

Click on any square! You will see a picture or a letter. The marked letters are initials of the things on the pictures. Find the pairs.

8.vm_2_2 Compatible pictures - T-Shirts; total 64,5

Click on any square! You will see a picture. For every picture there is another picture that fits. Find the pairs!

9.vm_2_5 Compatible pictures - Shoes; total 63,0

Click on any square! You will see a picture. For every picture there is another picture that fits. Find the pairs!

10.vm_4_1 and vm_1_2 Find the object - Balloon 1 and Balloon 2; total 56,5

Start the exercise. First you see a building. Now you take a balloon ride. When you find this building and you have it in the finder, click on the camera.

11.vm_7 Forms 1 and Forms 2; total from 56,0 - 58,0

*Choose the level * (easy), ** (medium) or *** (advanced). Click on any square! You see a picture. Every picture appears twice. Find the pairs!*

12.vm_1_5 Same picture - Cars, total 55,5

Click on any Map! You see a picture. Every picture appears twice. Find the pairs!

13.vm_4_3, vm_4_4, vm_4_5 Find the object - Sailing, total 54,5

Start the exercise. First you see a sail boat. Now you take a sailing trip. When you find this sail boat and you have it in the finder, click on the camera.

Lowest score

14. vm_1 Same picture, four game Shoes 1 and 2, T-Shirt 1-2, total from 48, 5 - 49,5

Click on any Map! You see a picture. Every picture appears twice. Find the pairs!

❖ Visual Sequence

Top games:

1.vs_5 To be continued - Linea 1-5; total 77

Continue the zig zag line by clicking the appropriate points.

Criterion 1:... it is advanced 22 out of 25

Criterion 2:... it is easy understandable 23 out of 25

Criterion 3:... it has an optimal game character / performance 20 out of 25

2.vs_1_4 and vs_1_5 Driving - Advertising; total from 68,0 - 69,5

Start the exercise and keep your eyes on everything! At the end will be a question.

3. vs_6 Poem; total 67,5

*Choose the level * (easy), ** (medium) or *** (advanced). Start the exercise. Read the poem. You see the text pieces below. Use your mouse to drag and drop the text pieces exactly into the same order.*

Further:

4. vs_1_1, vs_1_2, vs_1_3 Driving - Trees 1-3; total 65,5

Start the exercise and keep your eyes on everything! At the end will be a question.

5. vs_7 Don't smoke !, total 55,5

*Choose the level * (easy), ** (medium) or *** (advanced). Start the exercise. Read the warning. You see the text pieces below. Use your mouse to drag and drop the text pieces exactly into the same order.*

6. vs_3 Hieroglyphics - Papyrus 1-5; total 55,5

Here you see a papyrus with old Egyptian hieroglyphics. Use your mouse to drop and drag the hieroglyphics from below into the blank papyrus in exact the same order!

7. vs_4 Klingon - mu`ghom 1-5; total from 53,5 - 54,5

Use the keys for writing the Klingon word sequence into the blue line.

Lowest score:

8. vs_2 Pack one`s bag, total 51,0

You will get a list of items that that go in the bag! Use your mouse to drag and drop the things into the bag in exact the same order.

Pedagogical types of the Spatial Position Area

Nr	Spatial Position	
	Short	Name
1	sp_8	Poem puzzle
2	sp_5	Tangram*
3	sp_4	Board game
4	sp_3	Lambada
5	sp_6	Right-Left
	More?	
	sp_1	Puzzle
	sp_2	Puzzle rotated
	sp_7	Austronat

1. **Poem Puzzles (sp_8)** - understandable text, not understandable text, songs, article of constitution... Story (crime?): scraps of paper/docs. Flow potential is questionable.
2. **Tangram(sp_5)** - does a rotation by fingers makes sense on a mobile? Is the implementation of the type possible without using fingers...? Tangram is popular, it is a MUST have. It could have a flow potential.
3. **Board game (sp_4)** - important type. Other situation shall be implemented e.g. Labyrinth, moving on street... Levels of difficulty by speed, acceptance of failures... there could also be division between left right and up-down Flow character is questionable
4. **Lambada (sp_3)** - funny game, funny type, more different dances. Flow potential is questionable.
5. **Right - left (sp_6)** - it is a MUST-have game (body knowledge), levels of difficulty; only text, only sound, different bodies. Flow potential cannot be identified.
6. **Puzzle (sp_1)** - the games of this type were evaluated very differentially. This demonstrates that an attractive theme is expected. Levels of difficulty: with background, no background, number of pieces, colours or b/w, 3 D (?), famous /well known faces, professions, time. It has a flow potential.

7. **Puzzle rotated (sp_2)** - does a rotation by fingers makes sense on a mobile? Is the implementation of the type possible without using fingers...? It could have a flow potential.
8. **Astronaut(sp_7)** - is childish, it could be combined with right left as a level. Photos of professionals and their equipment. Flow potential is questionable.

Games of the Spatial Position Area

Top games:

1.sp_8 Poem puzzles, all games (except Lipertis) ; total 80,0

*Choose the level * (easy), ** (medium) or *** (advanced). Start the exercise! Use your mouse to drag and drop the puzzle pieces to the correct places.*

Criterion 1:... it is advanced 22 out of 25

Criterion 2:... it is easy understandable 25 out of 25

Criterion 3:... it has an optimal game character / performance 22 out of 25

2.sp_5 Tangram, all games except dinosaur total 79,0

Form the figure! Rotate the parts by clicking in the right position before you drag and drop them with the mouse to the right place.

3.sp_4 Board game; total 77,5

Click the field down left and follow the instructions. You can do this exercise by mouse click, by cursor keys or by some other input control.

Further:

4.sp_3 Lambada; total 74,0

Make your choice of following the man's or woman's steps. In the frame (bottom right) perform the spoken instructions by mouse click, by pressing the control number block

5.sp_6 Right-Left; total 73,0

*Choose the level * (easy), ** (medium) or *** (advanced). Start the exercise! Use your mouse to drag and drop the cards to the correct places.*

6.sp_1_3 and sp_1_4 Puzzle - Graffiti from Mexico and Spain; total 70,5

Use the mouse to drag and drop the puzzle pieces to the right place.

7.sp_1_5 Puzzle - Machine, total 68,5

Use the mouse to drag and drop the puzzle pieces to the right place.

8.sp_2_1 and sp_2_2 Puzzle rotated - Hot-air balloon and Art, total 65,5

Drag the puzzle pieces using mouse into the field and drop them at the right place! Turn the puzzle pieces by clicking on while the ALT-button is pressed into the right position and drag and drop them with the mouse to the right place.

9.sp 7 Astronaut, total 62,5

*Choose the level * (easy), ** (medium) or *** (advanced). Start the exercise! Click the highlighted object. Hear where the astronaut wants to have it. Use your mouse to drag and drop the object to the right place.*

10.sp 1 1 Puzzle - Industry nostalgie, total 62,5

Use the mouse to drag and drop the puzzle pieces to the right place.

11.sp 1 2 Puzzle - Evening mood, total 60,0

Use the mouse to drag and drop the puzzle pieces to the right place.

12.sp 2 4 Puzzle rotated - Longing, total 54,0

Drag the puzzle pieces using mouse into the field and drop them at the right place! Turn the puzzle pieces by clicking on while the ALT-button is pressed into the right position and drag and drop them with the mouse to the right place.

Lowest score:

13.sp 2 5 Puzzle rotated - Beautiful and dangerous, total 44,0

Drag the puzzle pieces using mouse into the field and drop them at the right place! Turn the puzzle pieces by clicking on while the ALT-button is pressed into the right position

Chapter 5: Proposed Hardware and Software Requirements

General Considerations

Hardware and operating systems (OS) might change dramatically in the lifetime of a two - year project. Especially with Windows and Android systems, developers will encounter an enumerable combination of hardware and OS versions. Therefore, as a rule of thumb, the software will be made for the newest currently available OS version and the available hardware. The software will usually also run on older hardware and older OS versions, however, there are limitations to a downward compatibility. These will be explained in more detail in the following paragraphs. Although the estimated hardware requirements for the DYS2GO software are not high, they do depend on the final design of activities and the media being used. Therefore, the exact hardware requirements for the different devices will be evaluated during the test runs of the software.

Microsoft Windows

Microsoft stopped the development of Windows for mobile phones. Therefore, the training app will only be available for Windows desktop system or Windows tablets based on AMD or Intel processors. As Microsoft's official support for Windows 7 is running out in 2020 (the support for Windows 8 versions stopped in 2018, extended support is available until 2023) and Microsoft provides updates for Windows 10, the software will be designed to work with Windows 10. It will probably run without problems on Windows 7 and 8 systems, but there will be no extra DYS2GO support for these systems.

From a hardware point of view, the software should run on any computer or tablet that has a running Windows 10 system installed. The official minimum system requirements to install Windows 10 are:

- Processor: 1 GHz (or faster) processor
- RAM: 1 GB for 32-bit OS or 2 GB for 64-Bit OS
- Hard disk space: 16 GB for 32-bit OS or 32 GB for 64-bit OS
- Graphics card: Supports DirectX 9 or higher with WDDM 1.0 driver
- Display: 800 x 600 pixels

However, as these basic requirements for a Windows 10 system are rather low, the DYS2GO software might be slowed down by under-dimensioned hardware.

Google Android

Android-based systems account for about 87% of the smartphone and tablet market. The DYS2GO app will support Android version 9 (Pie) which is available with the start of 2019. So far, smartphones and tablets with Android versions 6-8 (Marshmallow, Nougat, and Oreo) account for approximately 70% of all devices. Therefore, the project aims at supporting these OS versions as well. Android devices come from a lot of manufacturers and range from basic low-cost versions to high-end gadgets. Because of the diverse combinations of devices and OS versions, the project will test the software with the most popular brands. As the software does not have high hardware requirements, it should run smoothly also on low-cost devices.

Apple IOS

The project will support the current Apple IOS version 12 that was introduced in 2018. The project will also aim to support versions 11 and 10 (version 10 being the latest version that supported the iPhone 5 and the iPad 4). Apple hardware is standardized, therefore the software should run smoothly on all supported iPhones and iPads.

Chapter 6: Overall concept for training materials, especially interactive learning designed for mobile devices

Introduction

What is a learning game? ICT in education. Interactive learning on mobile phone.

What is the purpose of DYS2GO games?

Who are the games for? Who can benefit from learning games?

Structure of games - overview of areas

(1. Auditory discrimination, 2. Auditory memory, 3. Auditory sequence, 4. Visual discrimination, 5. Visual memory, 6. Visual sequence, 7. Spatial position)

What defines learning game?

Do DYS2GO games are funny and motivating to try again and again?

Do DYS2GO games are dyslexia friendly?

Do DYS2GO games match /correspond the definition of “learning game” or “training exercise⁴”, “cognitive exercise”, “psychoeducational exercise”?

Do DYS2GO games help to gain knowledge or change behavior?

Do DYS2GO games match learning concept, e.g. gradual success and proficiency?

What is the purpose of DYS2GO games in regard with the scientific conception of dyslexia⁵?

Does DYS2GO games improve reading and spelling skills?

How DYS2GO games should be implemented? How long should the person play them to gain the benefit?

How the person with dyslexia will gain benefit from playing these games?

⁴ **Game** is defined as “an activity that one engages in for amusement or fun” (*Collins English dictionary*, 2009).

Learning is defined as “the act of gaining knowledge or any relatively permanent change in behaviour that occurs as a direct result of experience” (*Collins English dictionary*, 2009).

Learning game supposed to mean a fun activity gaining knowledge and changing behaviour.

Training is the process of bringing a person to an agreed standard of proficiency by practice and instruction (*Collins English dictionary*, 2009).

Exercise is defined as “mental or other activity or practice, in order to develop a skill” (*Collins English dictionary*, 2009).

⁵ **Dyslexia** is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling. Weaknesses at the cognitive level that might explain reading and spelling difficulties are: 1. *phonological awareness* (the ability to attend to and manipulate sounds in words), 2. *phonological memory* (memory for speech-based information), and 3. *naming* (providing the spoken label for a visual referent) (Snowling, Duff, Petrou, Schiffeldrin, 2011).

How games with the structure of AD, AM, AS, VD, VM, VS and SP are related to the improvement of reading and spelling skills?

Why in the structure of games there are no games/exercises for improving reading speed, reading accuracy, spelling accuracy etc.?

Guidance material

- How to register (by email)
- Structure of the learning games according to pedagogical types
- Technical background - availability of learning games apps (supported operating systems on mobiles, tablets, computers)
- How to start and operate the games - explanation of abbreviations, help
- Score - period of playing, finished games etc.
- Assessment

Chapter 7: General concept of user interface

General

The title of the DYS2GO project “Learning games for dyslexic young adults” emphasises the game-like approach of the learning or training modules for dyslexic people. This approach is supported by the fact that DYS2GO does not strive to teach content but aims to improve auditory and visual skills as well as spatial awareness.

Within the classroom, a teacher or tutor will use the learning games as an add-on to their materials and as an occasional change of training method. Outside of a learning environment, the situation is different. Young adults usually have a lot of experience with computer games played either on desktop systems or on smart phones and tablets. Therefore, with the emphasis on “games”, expectations might be very high for a DYS2Go app. If DYS2GO does not fulfil the gaming aspect, it might be downloaded and tried out, but not played for a longer period.

The DYS2GO app cannot compete with video games or other games based on the fact that its ultimate goal is the training of skills. However, some general aspects of game design should be taken into consideration when developing the DYS2GO software.

- **General Game Design**

A mere succession of individual games is not a game. There should be a purpose behind a game sequence. In this context we are not talking about improving the skills of dyslexic users, but the purpose, mission or goal of a main game that contains a sequence of smaller games.

- **User Interface Design**

The user interface needs to be easy to use, consistent and visually attractive for the target group.

- **Mission Design**

Every game needs a goal, doing a task within a certain time frame, solving a puzzle, beating other players in a game, or even discovering of what the mission is. See also “General Game Design”.

- **Level Design**

A lot of games provide different entry levels or difficulty levels. Usually, the general course of the game does not change with a new level. New levels can include restrictions like having less time to solve a task or introducing higher numbers (like solving a puzzle with more puzzle pieces). Depending on the game, it lets the player either choose a level or the player sometimes has to progress through different levels.

- **Scorings**

Game players are used to scoring. Indeed, reaching certain scores/goals or improving your gameplay is essential for a game. Giving feedback for a solved learning game is fine (this is the learning part), but a scoring system that keeps track of individual improvements can be a very motivating factor for playing the game again. And this is what DYS2GO want to achieve: continuous training of skills by playing the learning games.

- **Game Types**

Most learning activities/games used for DYS2GO are well known and should not come as a surprise to the user. Therefore, these games need to be visually attractive, not just from the user interface point of view, but also from the media files being used (images, icons, animations, and sound).

- **Sound and Music**
Sound effects, voice recordings or music can be used as either an entertaining, supporting or deliberately distracting element of a game. In this respect, sound and music can have a more critical impact on a game than images or animations.
- **Images and Animations**
As with sound, the budget of the DYS2GO project does not allow for the production of high-quality media files. However, as long as the game concept and the individual games are attractive, this is not necessarily a disadvantage as long as the visual style of the app and its games stays consistent. That is to say, DYS2GO should aim to develop and display its own visual style.

Technical: WCAG 2.0

The World Wide Web Consortium (W3C) has published a set of Web Content Accessibility Guidelines (WCAG 2.0 - 2008; WCAG 2.1 - 2018), within the framework of Web Accessibility Initiative (WAI). WCAG 2.0 establishes a first level of accessibility. Generally, accessible documents and applications are more usable for all users and not for persons with difficulties or disabilities.

The WCAG 2.0 standard talks about four principles of web accessibility and twelve guidelines which contain 61 *testable* success criteria. One of the most important changes that the standard makes is its application on all types of web content e.g. HTML contents, Adobe PDF files, Microsoft Power Point presentations and Microsoft Word documents etc. These most common formats for Internet documents must comply with the four accessibility principles: *perceivable*, *operable*, *understandable* and *robust*. WCAG 2.0 explains how to make content

Perceivable (e.g. by addressing text alternatives for images, captions for audio, adaptability of presentation, and colour contrast);

Operable (e.g. by addressing keyboard access, colour contrast, timing of input, seizure avoidance, and navigability);

Understandable (e.g. by addressing readability, predictability, and input assistance);

Robust (e.g. by addressing compatibility with assistive technologies).

- *DYS2GO outputs (that will be available to everybody) shall meet these requirements e.g. project website, training material, games. The development of these outputs shall be based on meeting WCAG 2.0 requirements and checked against them after completion. See Appendix WCAG 2.0 Checklist*

WAG 2.1 provides to WCAG 2.0 seventeen additional criteria that address **mobile accessibility**, persons with low vision and persons with cognitive and learning disabilities.

1.3.4. Orientation (AA)

The criterion “orientation” refers to how the user can view and access a website on a mobile device. It is expected to design the apps in such way that they should support both the landscape and portrait orientations.

- *DYS2GO: A decision shall be made with respect to the games*

1.3.5. Identify Input Purpose (AA)

It is required to reduce the amount of typing. The goal is to ensure that an AutoComplete works as expected.

- *DYS2GO: AutoComplete is not required*

1.3.6. Identify purpose (AAA)

In content implemented using markup languages, the purpose of User Interface Components, icons, and regions can be programmatically determined. This success criteria requires the author to add the context, purpose, and meaning of symbols, regions, buttons, links, and fields so that users know what they do and can adapt them to make them understandable for the users. It is achieved by adding semantics or metadata that provides this context.

- *DYS2GO: this can be helpful for dyslexic users that have a memory and/or attention disorder.*

1.4.10. Reflow (AA)

Avoid scrolling horizontally. Horizontally scrolling is frustrating for users that enlarge the font size.

- *DYS2GO: the game templates will fit to a defined mobile standard.*

1.4.11. Non-Text contrast (AA)

One of the most complex WCAG success criteria is the one about colour contrast. Text against the background must meet either a 3:1 or 4.5:1 ratio, depending on the size and weight of the text. WCAG 2.1 takes this a step further by noting that "user interface components" (such as buttons, form controls, and links) as well as some graphics, have a ratio of 3:1 against the surrounding environment.

- *DYS2GO: additionally to this recommendation it shall be considered the possibility for changing the background colour and the text colour. Possible Alternative (?): the use of layer apps.*

1.4.12. Text-Spacing (AA)

Spacing can make or break how your content is digested. The criterion aims to make sure that users have the option to override paragraph, letter, and word spacing, as well as line height, so they can adjust the text accordingly without losing the functionality of the site. Example: People with dyslexia may increase space between lines, words, and letters to increase reading speed.

- *DYS2GO: the games do not contain "big" contents. However, this criterion shall be considered for the index, the instructions...?*

1.4.13. Content on Hover or Focus (AA)

The criterion addresses the display of additional information while hovering over graphics. For dyslexic users this interaction can be distracting and have a negative impact on the user's overall experience. Under WCAG 2.1, the user must be able to close/dismiss and interact with the additional content without it disappearing. Additionally, the content must remain present until the user actively closes the pop-up.

- *DYS2GO: avoid displaying additional information when hovering over graphics. Make everything understandable without using "add info"*

2.1.4. Character Key Shortcuts (A)

Some users use Gmail's single-letter commands to archive, delete, or reply to messages. Imagine that somebody walks into user's room and says "Hi, Sean" while the micro is active. In Gmail, the first message would be starred, then archived, then a reply-all message would open on the next email, and finally enter the letter "n" in the body of that message. Under WCAG 2.1, this situation can be avoided

Turn off single-letter shortcuts

Remap the shortcut to use one or more modifier keys (e.g. Control or Alt)

Make the keyboard shortcut active only when a component is in focus

- *This is not relevant for DYS2GO, or is it?*
<https://www.w3.org/TR/WCAG21/#character-key-shortcuts>

2.5.1. Pointer gestures (A)

WCAG 2.1 says that there must be an option for single-finger operation, unless an action such as a two-finger pinch is essential (perhaps in a free-hand drawing app).

- *DYS2GO: is this criterion relevant?*

2.5.2. Pointer Cancellation (A)

Take a touch-screen device. Users are familiar with how to scroll a page: place the finger on the screen, and—without removing your finger—drag up or down. Imagine, though, if the touch-screen only recognized your tapping as clicking before you removed your finger. Pointer cancellation aims to avoid this by requiring that certain events only be triggered when the user removes their pointer (finger) or easily get back to what the user hoped to do.

- *DYS2GO: the criterion shall be considered since there will be drag-and-drop activities. Sufficient techniques: Activating a control using the up-Event in HTML, iOS and Android*

2.5.3. Label in Name (A)

When labels include text or images of text, the name must contain the text that is presented visually. Example: If a link to game visually says "auditive memory," don't label the button with ALT text that says, "auditive game". Why? Because when users of dictation software say, "click link auditive memory" the software won't be able to recognize that

they meant to click on the link that's labeled "auditive game". Furthermore, contrary to what many people think, the largest group of screen-reader users are sighted people with learning disabilities who rely upon the screen-reader audio and text on screen to match. Indeed, these multiple streams of information helps those with learning disabilities cognitively understand what they're seeing. When there is a mis-match, this benefit becomes a point of confusion.

- *DYS2GO: the seven training areas and each game, the navigation buttons etc. will be presented also by images, thus, the criterion is relevant*

2.5.4. Motion Actuation (A)

Many mobile apps and websites require physical action in addition to touching or clicking, such as shaking or tilting. The design should allow for the function to be performed with user interface components in replace of any physical action. On an iPad, after entering text, users can shake the phone to undo that typing. In addition, above the iPad keyboard, you'll find a button that takes the same action and the user can disable the "shake to undo" in settings.

- *DYS2GO: a "shaking" could be an add interesting action instead of clicking a button e.g. new game in case of memory games... ;-)*

4.1.3. Status Messages (AA)

A status message, like the one that appears when you submit a form or answer a poll, is often so subtle that it can be hard to notice that anything happened if a user has low vision or a cognitive processing disorder. Status messages can be programmed to be announced through a user's assistive technology so that they can be sure that any action they perform is completed.

- *DYS2GO: this should be taken into account when developing the game specifications: when will make what sense...*

Navigation

DYS2GO partnership shall identify a balance between approved training concepts and game concepts. The game concept shall follow a personalisation approach: the user decides about the training situation that should be created.

Why? Even if the requirements of any activity appear objectively adequate and constant, the abilities of the individuals differ. A game that purely statically tries to create a sense of flow cannot work in the long run. It shall be possible to adapt the use dynamically to the individual abilities and the concrete situation.

1.Quick play mode for full control = single game as we know it, the user can choose a timer additionally

2.Adventure mode of a single game with levels. A higher level can be reached e.g. after a defined number of successfully completed games or via difficulty or..., the

user can choose a timer additionally, the result can be stored (?) in a hall of fame...(?) is visible to others (?)

3.Random play mode for each area. The single games in the adventure mode, but the user can choose next and turn to the next single game of this area

4.Endless random play mode for fun. This mode could be structured into stories...

That means that a clear vision of the stories shall be defined before starting to work on the themes/layouts of the single games. Let us look next at the gamer types (by Richard Bartle):

- **Killer = competition.** The training of dyslexic persons shall not include any competition. This is the common view of dyslexia specialists. However, a gaming character includes several kinds of competition between trainees.
- **Achiever** - score, hall of fame, building up something when completing a defined number of games or levels? What about action points that can be spent... e.g. getting a configurator for a self-made game?
- **Socialiser** - team building, connections via social media, creating online game characters ...
- **Explorer** -relevant and interesting themes/layouts, levels, stories... the user could select a role in the stories by a dice (attention: this requires a development of at least 6“ways & ends” to each story...

The relevant themes/stories shall be defined when working on O3.

Attachments:

Pre-Selection Excel sheets are provided in form of separate files.