Use of Educational Computer Games in the Initial Assessment and Therapy of Children with Special Educational Needs in Bulgaria

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Abstract – **The present work analyses a study, conducted among Bulgarian speech and language pathologists - SLTs on the use of educational computer games in their practice, attitudes and perceptions, related to it, as well as the type of deficits they tackle, and its effects and expected outcomes. 103 participants answered 26 questions in a survey, designed by the authors, related to the educational computer games use. The study shows a widespread use of games without overuse and need of structured policy development for specialized educational computer games elaboration to support the work of the SLT in the country.**

Keywords – **Educational Computer Games; Children with Special Educational Needs, Speech and Language Therapy.**

1. Introduction

Educational computer games in the SLTs' practice have different aims – to improve attention, memory, reading and language skills, to develop strategies when handling tasks, winning and losing, to increase the speed of children's motor skills, to develop coordination skills, quick thinking and decision making, skills to assess the consequences of one's decisions, social adaptability. They could be used to assess children's knowledge and abilities, to diversify therapy material, and last but not least to give them some time to relax between educational activities. Strategically, the latter is often used by SLTs in their practice – to reward the children, to have them relax and to fill the time gaps between the sessions.

The easy access to a computer, TV, interactive board and tablet, as well as Internet, makes it possible for Bulgarian specialists to use different computer and Internet games in their practice with children with special educational needs. Unfortunately, there are not enough projects and programs, specifically developed to target children with developmental disorders. The aim of our study is to find out what is the ratio of the specialists that use educational computer games in their everyday practice, where do they source them from, and what is their attitude to the overall use and effect to justify more work towards development and funding of adequate resource.

Educational computer games (ECGs) - definitions and types Gee in 2003 [1], replaces the term "Video and computer games" by "Video games", and defines them as follows: "Games played on game platforms (such as the Sony PlayStation 2, the Nintendo GameCube, or Microsoft's XBox) and games played on computers". Tang et al., 2009 [2] defines "Educational games" as "Computer games for use in games-based learning" and discusses the similarities and differences between them and other games: Computer games and educational games share many common technical features, but they differ in their intended use and design of content. They are primarily designed for entertainment purposes, while educational games are intended to impart knowledge or skills development, although some educational and entertainment aspects exist in both fields. The purpose of the computer games is mostly entertainment, and the content includes fiction and fantasy, while educational games include tasks for

learning and acquiring skills. Therefore, the real distinction between computer games and educational games can only be further explained through the definitions of three design schemas - play, rules and culture. The play includes interactions, similar to the real-world ones, while educational games have specific interactions and dialogues. The rules in computer games follow the plot, while in educational games the rules follow specific learning outcomes. Cultural computer games present beliefs, norms and world setting for the purpose of the art and imagination, and the educational games present beliefs, norms and world setting that reflect the real world and are related to knowledge, Tang et al., 2009 [2].

Herz, 1997, introduced a taxonomy of video games reflecting the player's perspective [3]. The video games fall under the following seven categories: action, adventure games, puzzle, role-playing, simulation, sports, and strategy games. Furthermore, considering the innate specifics of the educational computer games, classification could be extended by adding some of the attributes of the computer games, related to the target learning outcomes, discussed by Wilson et al, 2008, such as cognitive, psychomotor, and memorization skills [4]. Finally, the national educational standards for the level of knowledge and skills of the pupils provide additional categorization criteria based on the standardized educational subject areas.

Educational computer games use in SLTs' practice

Many researchers report positive results from the use of digital games in education – boost of cognitive learning process, social and emotional learning, skills needed to play successfully with others. There is a significant improvement in skills, essential to the autonomous learner, goals setting, taking turns and sharing skills, decision-making skills, problem solution skills, sequencing, deductive reasoning and memorization, Chuang and Chen, 2009 [5], Hromek and Roffey, 2009 [6], Chandler, 2013 [7].

A European study (European Schoolnet (2009)) examines the use of digital games in the learning process with 528 teachers in 9 languages [8]. This study shows that 70% of teachers use games in the educational process. More than 80% report that digital games should be used at school and they themselves need more information about it. The same study reveals that the teachers use many games in classroom environment, focused in a particular subject area or specific skills: puzzles, digital console games, simulation games, adventure games. This study also points out that most of the games teachers and SLTs use are commercial and their use for teaching is more widespread than it is supposed to be. The most frequent reasons for digital games use

mentioned by the teachers are**: to attract pupils' attention, to increase motivation, to try to make kids learn outside school and to have fun**. Teachers also use digital games to test, repeat, and change the speed of learning, to reward the students and ensure their active involvement in the educational process.

Koh et al., 2011, after a careful study on the perception and attitude of teachers towards games use at school, conclude, that for the teachers, games play an important role in teaching and learning [9]. They divide the factors, playing an important role in the process in two groups: 1. Push factors - policies, curriculum, and environmental support; 2. Pull factors - personal interest and gaming mindset. They also conclude that the teaching subject, teaching level and years of experience influence the use of computer games at school.

The term "Special Educational Needs" usually refers to children who have problems in their ability to learn than most children of the same age. The problems and difficulties usually affect reading and writing, ability to understand and express oneself, behavior and social functioning, attention and memory, sensory and psychical problems.

The use of educational computer games in the field of special education could be classified according to the type of disorder, and to how often SLTs use games, developed for assessment and therapy of a particular disorder. Different groups can be divided according to the general use of games in different activities - assessment of skills and knowledge, therapy and entertainment in SLTs practice.

Fernández-López et al., 2013 measure the effect of using a special learning platform on children with educational needs and conclude, that there is an improvement in language, math, environmental awareness, autonomy and social functioning [10]. They also think that children acquire additional skills they did not have before, because they were able to work with customized content and interface. Other authors, Saridaki, 2010, report that children with special educational needs can play digital games to achieve a higher learning motivation [11].

Mark Griffiths, 2002, considers computer games useful, because the results achieved show advantages that do not exist in other learning strategies, for example the ability to choose different solutions to a difficult problem and follow the effect [12]. He also points that there is a risk of overuse and replacement of other effective techniques. Considering the generalization of the effect in computerized learning, the author thinks that the best opportunity includes games that are specifically designed to address a particular problem.

In Bulgaria there are no properly structured and developed programs, based on computer games for assessment and therapy of developmental disorders

and especially speech and language deficits. Use of technology is a matter of individual choice of the speech therapist, his/her experience and training and the resources available for the selection and use of educational games. In most of the educational institutions - kindergartens and schools in Bulgaria, SLTs have access to a computer and Internet. Many of them use laptops and/or tablets, provided by their organizations, some - desktop computers.

In order to assess the present situation, the opportunities and the needs to be addressed, a team of professionals put together and conducted a survey on the topic. The results are presented in tables and analyzed accordingly.

2. Materials and Methods

The study aims to gather information and analyze the educational computer games use in SLTs' practice in Bulgaria in the initial assessment and therapy of children with special educational needs.

The research questions cover, but are not limited to the following topics:

1. Do SLTs use computer games in their practice in assessment and therapy of children with special educational needs?
2. Which type of games are most useful and which types of disorders are most common for the application of educational computer games?
3. How often are educational computer games used and how do SLTs source the games?
4. How do SLTs evaluate the effect of the games use, and what do they think about its impact on children and parents?

The survey is designed by the authors, based on existing theory and research, related to computer games, as well as practical experience. It includes 26 questions concerning gender, age, length of practical experience (in years), and questions concerning the use of educational computer games in SLTs' practice. The participants are 103 specialists in Speech and Language Pathology in Bulgaria.

3. Results

Demographic information about the participants is presented in Table 1.

Table 1. Demographic information

	N	%
Gender		
Male	3	3%
Female	100	97%
Age		
20-30	12	12%
31-30	29	28%
41-50	44	43%
51-60	12	12%
60+	6	6%
Practice - years		
1-5 years	18	17%
6-10 years	18	17%
11-15 years	24	23%
16-20 years	24	23%
21+	19	18%

The first question tackles the use of educational computer games in general. For the purposes of our study, we have divided the possible answers into five groups:

1. Use of educational computer games for initial assessment of children with special educational needs.
2. Use of educational computer games for therapy of speech and language deficits of children with special educational needs.
3. Use of educational computer games for relaxation between the different tasks.
4. Non-use of educational computer games.
5. Other.

The results of the inquiry on different use of games are the following /more than one response is possible and the percentages have been calculated based on the total number of participants/:

Table 2. Use of Educational Computer Games

	N	%
Diagnostics and Assessment	37	36%
Therapy	68	66%
Time off	54	52%
Don't use	25	23%
Other	5	5%

The participants in the survey have specified that in the category "Other" they have included the option to start a lesson with a game in order to motivate the child for its involvement in the educational process.

The results show that only ¼ of our participants SLTs don't use educational computer games in their practice. Most of the SLTs use games in the therapy process, many of them use games for relaxation time between tasks. The smallest percentage refers to the use in the initial assessment and diagnosis. There are no computer games in Bulgaria specifically designed to assist the professional in the initial assessment of the speech and language development of children with special educational needs and to show standardized norms.
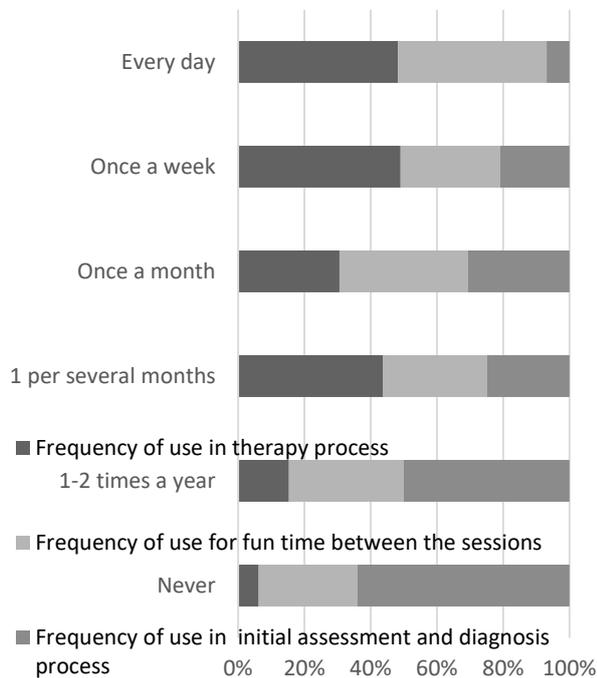

Chart 1. Frequency of Educational Computer Games Use in SLTs' Practice

The next question relates the frequency of the use of educational computer games in SLTs' practice.

The SLTs use most frequently educational games for therapy once a week, the other types of use are evenly distributed (Chart 1).

The types of educational computer games, used by the SLTs were divided in several groups, according to the accessibility, the number of players and learning outcomes expected. The next Tables 3. and 4. demonstrate the types of games used according to their accessibility and number of participants (every participant was given more than one answer option, therefore the percentages have been calculated based on the total number of participants who have indicated educational computer games use):

Table 3. Type of Games, Based on Sourcing

	N	%
Free Internet games	55	70%
Desktop computer games free of charge recommended by the government or other organization	45	58%
Paid games – onetime payment	23	29%
Paid games – subscription	10	13%
Games and products that require paid training and are being purchased	18	23%

According to the results, Internet-based free games are most commonly used by the SLTs. Unfortunately, they are the least structured and adapted to work with children with special educational needs, but the trend here suggests a need for more guidance from organizations, governments and professionals in the field of computer resources, and the interest of speech and language therapists in their use.

The other tendency to use mostly individual games Table 4. is related to their use mainly in therapy - to improve knowledge and skills, and in the breaks between the sessions - to relax (every participant was given more than one answer option; therefore, the percentages have been calculated based on the total number of participants who have indicated educational computer games use):

Table 4. Games used according to the number of participants

	N	%
Many participants	8	10%
Two participants	22	28%
Single player games	66	85%

As illustrated by Table N 4., SLTs prefer to use games that require a single player (85%). We presume that this is due to the specifics of the educational and therapeutic process, which usually requires the student to work/play by him/herself.

Chart 2. illustrates the use of Educational computer games sorted by game type. The games are related to cognitive functions – attention, memory, language, visual-spatial behavior, general knowledge, educational achievements – reading, mathematics, motor skills, and social interactions. Sports simulation games and adventure games are also included.
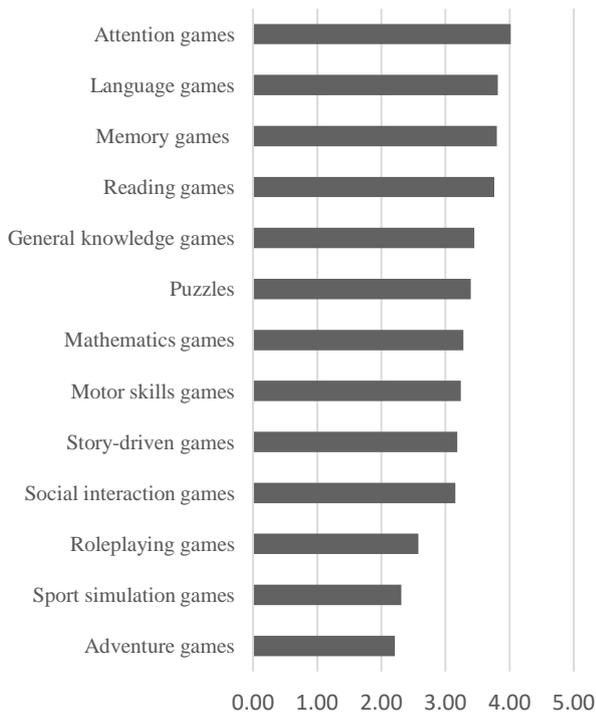
Chart 2. Games Use According to the Game Type

From the chart above we notice that attention, language, general knowledge, memory and reading games are on top of the list, which relates to the types of disorders that SLTs use educational games for (Ref. Table 6 – Educational Difficulties, ADHD) and the relevant purpose. Adventure and sports games are at the bottom, probably because of the element of excitement they carry, as well as their irrelevance to the educational process. Most probably SLTs use them to give students to have some fun time between the sessions.

The next section covers the type of device professionals use, playing computer games. Every participant was given more than one answer option; therefore, the percentage indicates the preference of choice of the professional. The results are the following: every participant was given more than one answer option, therefore the percentages have been calculated based on the total number of participants who have indicated educational computer games use.

Table 5. Type of Device Used by SLTs

	N	%
Desktop computer	51	0.65
Laptop	44	0.56
Smartphone	13	0.17
Tablet	29	0.37
TV	3	0.4
Interactive whiteboard	5	0.6

The last section of the survey is related to the specific disorder that the educational computer games are mostly used for, the resources and information about the games, necessary for the SLTs to use games in their practice and the expected learning outcomes (every participant was given more than one answer option, therefore the percentages have been calculated based on the total number of participants who have indicated educational computer games use):

Table 6. Educational Computer Games Used According to a Specific Disorder

	N	%
Educational Difficulties	65	83%
ADHD	49	63%
Autism	29	37%
Sensory Processing Disorders	31	40%
Mental Retardation	37	47%
Stuttering	22	28%
SLI	56	72%
Speech Disorders	37	47%
Dyslexia	46	59%
Emotional and Behavioral Disorders	37	47%

The next question tackles the sourcing information needed to find educational computer games. Most of the SLTs take the information and find useful games in professional sites and online resources, followed by information taken from colleagues and professional courses, conferences, seminars:

Table 7. Sources of Information on Relevant ECGs

	N	%
Colleagues	54	69%
Professional courses provided by the employer	21	27%
Professional courses provided by the oneself	29	37%
Conferences, seminars	34	43%
Patients and parents	24	31%
Professional sites and online resources	57	73%

Our last question explores the expected learning outcomes of Educational computer games use by the SLTs. Most of the specialists believe that the games could be used for acquisition of additional, rather than basic knowledge and skills.

Table 8. Expected Learning Outcomes

	N	%
Acquisition of basic knowledge and skills	46	59%
Acquisition of additional knowledge and skills	54	69%
Assessment of knowledge and skills	33	42%
Entertainment and time off	43	55%

4. Discussion

In general, SLTs in Bulgaria have a positive attitude towards the use of educational computer games in their work with children with special educational needs. They use them mostly in the therapeutic process, to give children some fun time between sessions, and last, but not least, for evaluation and assessment. A quarter of the SLTs participating in the study do not use educational computer games. This shows a need to create professional sites and resources specialized in working with children with special educational needs. The sequence of use is irregular - most of the SLTs use games once a week or once a month, rarely every day or several times a year. The most commonly used games are free web-based games, which shows that most of them are subjectively chosen by speech therapists for their work with children with special educational needs. The next group of games are those, recommended by state institutions and organizations, engaged in the integration of children with special educational needs. A small percentage of SLTs use resources with a fixed subscription, which are most often specifically designed for educational purposes and work with children with special educational needs. SLTs find it appropriate to use educational computer games with the following disorders: learning difficulties and language disorders followed by ADHD, dyslexia, speech disorders and mental retardation. This is probably due to the fact that many of the available games include language tasks and reading tasks. On the other hand, it is probably easier to design tasks for training cognitive functions - i.e. memory, attention. Surprisingly, autism is not among them, although many researchers point out the benefits of computer games for working with children with autism. Games are most rarely used with children with stuttering and speech disorders. The main expectations of the speech therapists are for the children to acquire additional knowledge and skills. They find the information about the games mainly on professional sites.

5. Conclusion

The study shows great opportunities for the creation and development of training and professional databases with information and games that can be used by speech therapists in their work with children with special educational needs. At the same time, it is clear that technology, and in particular games, are not overused and there is no danger that they replace the professional therapist. Computer games can be an additional support tool and provide support for the SLTs in the conventional therapy of children with special educational needs.

Acknowledgements

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