INDIVIDUALIZATION WITH TABLETS IN THE CZECH REPUBLIC - SPECIAL PRIMARY SCHOOLS

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ABSTRACT

This paper summarizes the results of the completed and defended dissertation on the topic of Categorization of pupil work with tablets in a special elementary school in the Czech Republic. This work was a two-phase research. Qualitative research - a four-year structured observation of pupils at a special elementary school, where categorization was subsequently proposed. Quantitative research - this categorization was verified in 361 special pupils throughout the Czech Republic. The process of personalizing pupils with pupils in selected pupils categories was described. We present the most important findings from this dissertation.

KEYWORDS

Individualization, Mobile Touch Technology, iPad, Special Educational Needs, Primary School

1. INTRODUCTION

Since there is not enough information on the issue of using tablets in the instruction of pupils with special educational needs, this paper tries to address it. Moreover, in the Czech Republic there is no recommended working method or categorization of pupils which would help teachers use tablets in an appropriate manner (expected outcomes are not defined). It would help teachers divide pupils with special educational needs into categories, providing a springboard for the future use of tablets. Therefore, the following research problem was defined: *"Using mobile touch devices (tablets) to individualize the instruction of pupils with special educational needs"*. As it emerged from the research, foreign resources link the theme of mobile touch devices and primary school special (and similar) exclusively to iPad tablets. That is why we have decided to devote our iPad tablet to iOS operating systems as part of our dissertation project. The latter, working with a functional "assisted approach", becomes a very adequate tool in teaching pupils in a special school. For example, the results of the iPad support study for mothers and their preschool children show that the iPad-enabled assistive technologies in the settings / accessibility tab apply to pupils with SEN in numerous areas such as reading, writing, communication, day-to-day structure, etc. Aram & Bar-Arm, 2016; Batorowicz, Missiuna, & Pollock, 2012). The iPad in Education (2012) study adds that introducing the iPad into special education pupils is a step forward.

A field study in selected European countries concluded that the iPad, thanks to its ability to access, significantly supports individualized learning that was highlighted as a major benefit of pupils' work with this device. Above all, the ability to control the iPad only visually is highlighted in a case study from Belgium where the iPad controls a SEN pupil who cannot move the upper and lower limbs (SENnet, 2014). IPad access can be used in a variety of ways to suit individual pupils, including those who rely on fingertip control, other parts of the body (nose, joint finger flexion, etc.). Pupils thus control applications that do not require a precise touch and are able to work with the iPad (Flewitt, Kucirkova & Messer, 2014); making accessibility helping to increase the independence of pupils with mental disabilities and helping them acquire

skills in the learning process (Flores, Musgrove, Renner, Hinton, Strozier, Franklin & Hill, 2012). The form of a combination of appealing sounds and visual ringtones that is triggered by a well-solved example positively enhances pupils' interest and motivation to work, especially pupils with Autistic Spectrum Disorders (Dohenyasa, Şimdi, Özcan, Çataltepe & Birkan, 2014) to successfully fulfill the curriculum (Kaur, 2017). Combined with effective pedagogy, work is a benefit to both educators themselves and pupils (Karney & Maher, 2013). Application Interactivity for iPad has clear benefits to support engagement with the potential to acquire new skills in other development areas (Camp, Stephenson & Cooper, 2016). Disabled pupils were able to test with applications that required less accurate touch, proving their emerging understanding of the cause and effect, and their involvement through implicit sensory motor learning and exploration (Kucirkova, Flewitt & Messer, 2014).

Digital touch technologies provide a unique advantage and opportunity for customization that traditional paper material cannot provide. The application can be either "closed" or "open". Both variants are interactive but only the second allows the user to modify or edit the content (Allen, Hartley & Cain, 2016). **Individualized learning** combines the advantages of individual work with group work (Valenta, Müller, 2003). Specific elements of individualisation can be, for example, the individual tasks of mass employment of all pupils, the assignment of homework, extended interpretation for some pupils, tutoring, respecting the individual style of pupil learning, non-classification of some pupil's manifestations (dyslektici), inclusion of silent work writing, reading), in practical activities, a greater share of work with visual material, etc. (Maňák, Švec, 2003). And for the inclusion of a tablet in this type of teaching (Johnson, 2013 b), one can then demonstrate another of the iPad's benefits - an easy way to organize teaching with selected apps that support the individuality of the pupil.

2. METHODOLOGY

In order for this kind of instruction to be realized, it was necessary to define categorization for the use of tablets (including the so-called expected outcomes, i.e. defining what a pupil in a particular category is able to achieve), which teachers could use to divide pupils into categories. The data necessary for proposing such categorization was collected through non-participant and structured observation in the education process, using **video recordings**, **pictures**, **text notes**, and **answers provided by** both the **pupils** (within their individual capabilities) **and participating special teachers** (the class teacher, the second teacher in the classroom). During this observation, particular attention was paid to the level of difficulty and self-sufficiency, respectively. We were interested to know how the pupils used the iPads. The pupil's individual diagnosis was not important. The research sample consisted of special elementary school pupils (the school was established pursuant to Paragraph 16 of Article 9 of the School Law). There were 21 pupils, who provided the basis for creating categorization (which is described in detail below). Instruction at this school is based on the current Framework Educational Program for Special Elementary School, Volumes I and II. The research was divided into two parts – qualitative and quantitative.

2.1 Determining the Level of Difficult of Tablet Use

The **level of difficulty** which the pupils could understand when using an iPad was monitored on several levels: *using a particular content-based application; using an iPad for creating one's own outcomes; operating an iPad – technical (turning it on/off); operating an iPad – hygienic (whether or not a pupil is able to keep their device clean and whether or not they even pay attention to it, etc.); using an application which allows the user to create multimedia content (e.g. a short film, a song, etc.); pupils' knowledge of what individual applications are used for and how they could use them; pupils' interest in particular applications*. Analysis – since each pupil is unique, the "pupil – iPad – schoolwork" interaction with this touch device is not uniform. Taking each pupil's deficiencies into account, the instruction needs to be individualized in a way that enables a pupil with moderate mental retardation (and related disabilities) to reach their full potential (school outcome) with regard to the particular curriculum.

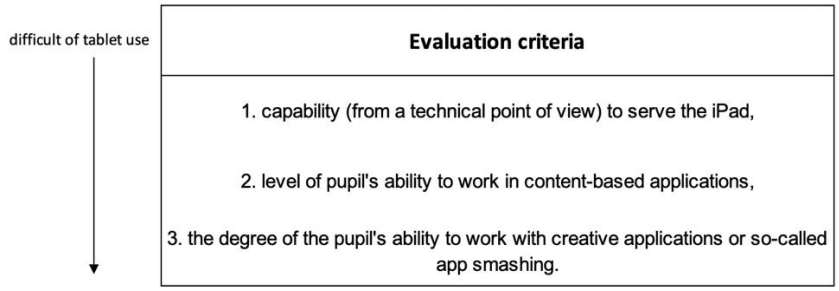

Figure 1. Established Criteria for "iPad Use Difficulty"

iPad use area starts at the most basic level "Operating an iPad", followed by "Use of content-based applications", i.e. applications that the teacher downloads and tells the pupil how to use them, with the pupils being able to use them immediately. The most difficult stage is the so-called *app smashing*, i.e. the process of using multiple applications to complete a task or a project – the pupil starts a task in one application, expands it in another application and completes it in a third application.

2.2 Determining the Degree of Self-Sufficiency when using an iPad

The following factors were considered when determining a degree of **self-sufficiency when using an iPad**: *if the pupils work alone; if they need to follow an instruction manual; if they work in groups; if they help one another; if they require the teacher's help; if so, in what way and to what degree the teacher helps them; if all the pupils are interested in using an iPad; if there is someone who is rejecting an iPad; does the same diagnosis predetermines the degree of self-sufficiency?*

Analysis – the research sample pupils were introduced to an iPad; were told how to use it, including charging the device and keeping it clean. During the academic year, the were taught how to use individual applications. During this instruction period the adequacy, repetition and "from simple to complex" principles were followed. Moreover, during this period the pupils were being observed by the teacher who took notes on each pupil's progress and then checked to see how it compared with the established criteria. The research sample was divided into 4 categories which reflected the degree of self-sufficiency when using an iPad.

Evaluation scale for criterion 1	can use iPad on their own	can use iPad with teacher's help	can use selected functions only with teacher's help	not interested
Evaluation scale for criterion 2	individual work	can use iPad with occasional help from teacher when all their disabilities are compensated for	can only use iPad with occasional help from teacher and assisted acces function on	is only slightly interested (visual/hearing interest) or completely rejects iPad
Evaluation scale for criterion 3	individual work with words of encouragement from teacher	works only with constatnt help (verbal and physical) from teacher	unable to use iPad	unable to use iPad/completely rejects iPad

degree of pupil's self-sufficiency when using an iPad →

Figure 2. Determining the Degree of Self-Sufficiency when using an iPad

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3. PROPOSING CATEGORIZATION FOR PUPIL'S USE OF TABLETS

The proposed categorization was based on the collected data. The first stage of the qualitative research (as part of a dissertation) took place from the first half of 2015 (spring) to June 2016. The observation was not scheduled and the researcher did not interfere with the teacher's work or influence the choice of topic of the class in which iPads were used. iPads were used in various subjects. At that time, the research sample pupils had already been using iPads for three years. Since the author of this research had actively participated in the project "iPad in instruction", the pupils were used to his presence in the classroom. This fact made observation easier as the pupils had already known the researcher and felt comfortable around him (i.e. no mediator was necessary). The fact that the author had already been familiar with the school environment and with how the pupils worked before the implementation of iPads proved beneficial. Moreover, the school management being open to testing new technology in instruction also played its part. This data collecting method was chosen because the author had unlimited time to complete the research. By the end of this research stage, the pupils had been using iPads for four years.

iPad use area	1. category	2. category	3. category	4. category
1. capability (from a technical point of view) to serve the iPad	can use iPad on their own	can use iPad with teacher's help	can use selected functions only with teacher's help	not interested
2. level of pupil's ability to work in content-based applications	individual work	can use iPad with occasional help from teacher when all their disabilities are compensated for	can only use iPad with occasional help from teacher and assisted acces function on	is only slightly interested (visual/hearing interest) or completely rejects iPad
3. the degree of the pupil's ability to work with creative applications or so-called app smashing.	individual work with words of encouragement from teacher	works only with constatnt help (verbal and physical) from teacher	unable to use iPad	unable to use iPad/completely rejects iPad

difficult of tablet use ↓

degree of pupil's self-sufficiency when using an iPad →

Figure 3. Categorization for Pupil's use of Tablets

4. VERIFYING THE PROPOSED CATEGORIZATION FOR PUPIL'S USE OF IPADS

Only special elementary school pupils (those with at least moderate mental retardation) participated in the verification process. Only pupils with this diagnosis can attend this type of school. In order for the proposed categorization to become functional (for a transient version to become a final version), it needed to be verified. Therefore, it was distributed to various special elementary schools in the Czech Republic. The target group consisted of special teachers who agreed to participate in the research. In order to give the teachers an idea about the individual areas of iPad use, the categorization of pupils included expected outcomes which the pupils of the original school should be able to achieve, i.e. the categorization was based on the 4-year experience of the 21 pupils from the Bruntál special elementary school. Special teachers used the information to divide their pupils into the individual categories. It should be stated that the pupils with limited mental ability could not fill out the questionnaire as they simply did not know whether or not an iPad helped them.

Therefore, it was the participating teachers who provided answers to these questions. The verification process had only one goal – to verify the proposed categorization. If, for some reason, the teachers were unable to place a large number of pupils into any of the categories, the "transient version" would have to be modified and then verified again. However, this situation did not occur (see below for statistical data). Moreover, it also needs to be stated that no hypotheses were established for the verification stage. The answers were processed and statistically evaluated (see tables and graphs below for details). The only condition was that pupils in the participating schools had been using iPads for at least one academic year prior to the research (that is how long it usually takes pupils to learn how to use the device).

The total number of pupils (recorded by the respondents) was 361. Therefore n=361. Since 361 pupils were enrolled for each category, we can assume that 1083 pupils were categorized for the whole category.

Category	Number of pupils	in %
1. category	194	18%
2. category	300	28%
3. category	340	31%
4. category	221	20%
not classified	28	3%

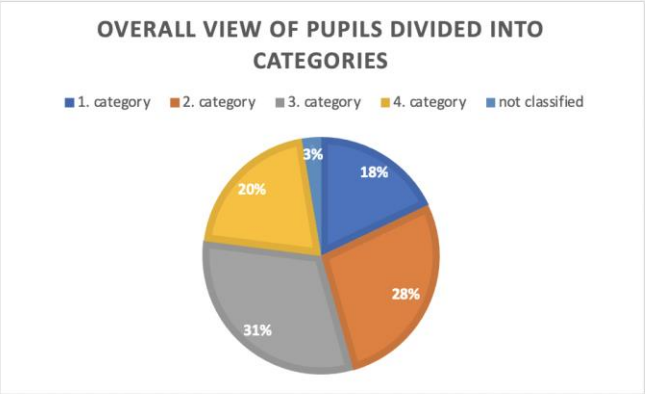

Figure 4. Overall View

The respondents' answers show that the proposed categorization for the use of iPads at special elementary school appears to be realistic. It can provide inspiration for teachers who are about to implement iPads into their instruction, giving them an idea of how their pupils can use iPads and what they are able to learn with their help. Since there are 1,446 pupils in Czech special elementary schools, we can proudly say that we worked with a sample consisting of 24.96% of those children (UIV, online, 2018).

5. DESCRIPTION OF INDIVIDUALIZATION PROCES IN SPECIAL ELEMENTARY SCHOOL WITH IPAD-BASED INSTRUCTION

5.1 Individualizing Instruction of Category 1 Pupil

Pupils in this category are able to use content-based applications on their own. Moreover, with occasional help from the teacher, the pupil is also able to use applications for the so-called app smashing. Since this pupil has a number of technical and content options, it is entirely up to the teacher which topic they choose to present. Therefore, pupils in this category are likely to achieve the learning objective.

Summary – Pupils in Category 1 individualize their work more or less on their own. The teacher becomes an observer. Only during the last stage, when the pupil needs to switch between applications and open content they created in the previous application, does the teacher provide words of encouragement. This pupil can operate an iPad, using a variety of applications and regular teaching aids. Usually it takes the pupil one class to complete the task at hand, completely fulfilling the stated objective. For this pupil the iPad is not as important as their own skills, which are developed to a certain degree.

5.2 Individualizing Instruction of Category 2 Pupil

The education process of a Category 2 pupil is only individualized when an iPad compensates for their disabilities. Most often it is motor disability which is a sign of moderate mental retardation. However, their disability is much worse than that of Category 1 pupils. Such compensation can be, for instance, in the form of a glove with only one finger – preventing accidental touching of the screen and allowing the pupil to place the entire palm on the iPad's screen. Another possibility is to enlarge the iPad's screen (and the icons) in order to make the use of the iPad more convenient for pupils with visual impairment. No other device is necessary to do so as the iPad already has this function.

Summary – Category 2 pupils' instruction is individualized with the teacher's verbal guidance, especially during more demanding tasks. These pupils can perform certain tasks on their own. However, the teacher should supervise their work and encourage and praise them. Compared to Category 1 pupils, these pupils can only work half the time. Therefore, the teacher should modify the tasks in order for the pupils to be able to fulfill the stated objective within a time limit. Even though the iPad is motivational, the pupil can become tired after a certain period of time. When individualizing this pupil's instruction, it is vital to make the iPad more accessible to them – the magnifying glass function, prevent accidental touching of the screen, changing the color of the screen, etc. This pupil's skills are at a secondary level. Compared to a regular computer or a laptop, an iPad is less demanding for these pupils in terms of graphomotor skills and eye-hand coordination.

5.3 Individualizing Instruction of Category 3 Pupil

Instruction of these pupils can be individualized, but not fully (as in the previous two categories). In order for Category 3 pupils to be able to use iPads, the Assisted access function needs to be on. This function reduces distractions, allowing the pupil to use the application selected by the teacher.

Summary – this pupil's knowledge and skills are not important. It is the Assisted access function that is vital as it allows the pupil to use the iPad even though they cannot operate it correctly. This function eliminates distractions and prevents accidental touching of the screen, allowing the pupil to complete the task at hand and thus fulfill the stated objective. Apart from eliminating distractions and anxiety, it also compensates for their lack of fine motor skills, allowing the pupils to be satisfied with their results.

5.4 Individualizing Instruction of Category 4 Pupil

Instruction of Category 4 pupils cannot be individualized through the use of iPads. The reasons are given in Case study 4.

Summary of the impact of iPads on individualization of instruction in the individual categories:

Table 1. Impact of iPads on Individualization – Summary

Pupil's level of self-sufficiency by category	Primary impact	Secondary impact
Category 1 (highest level)	Pupil's mental skills and abilities	- - -
Category 2	iPad accessibility	Pupil's mental skills and abilities
Category 3	Assisted access function	Pupil's mental skills and abilities
Category 4	- - -	- - -

Instruction can be individualized in Categories 1, 2 and 3.
Category 1 – iPad does not play a major role (as can be seen in the table).
Category 2 – iPad plays a major role – its accessibility.
Category 3 – iPad plays a major role – its function "Assisted access".
Category 4 – iPad cannot be used to individualize instruction.

6. CONCLUSION

This paper was aimed at individualization of instruction through the use of mobile touch devices, iPad tablets in particular. Considering that instruction at special elementary schools is mainly individual, we were interested in learning whether pupils with special educational needs could use tablets in an individualized manner, i.e. working at their own pace, be self-sufficient, fulfill the stated objective in allocated time. If it was possible, such instruction would be tailored to pupils' needs.

Nowadays, tablets are widely used at schools, leaving special teachers with no choice but to use the Internet to look for ways to incorporate them into the instruction of pupils with special educational needs. However, not all teachers are partial to this idea. And not all of those that are in favor of it are willing to use the trial and error method. That is why the presented research may be beneficial.

In order to be able to describe the individualization process, a classification table (and the method used to divide pupils) needed to be designed. Using the proposed criteria, the teachers could divide their pupils based on what they might be able to achieve using a tablet. Therefore, defining categorization for the use of tablets, which could serve as a guideline for teachers, was a necessity. This categorization was then verified. The final part of the paper was aimed at the individualization of instruction in all four categories.

The research showed that this particular tablet was widely used in special education as it can accommodate the needs of individuals with special educational needs, i.e. the Assisted access function. This function proved to be essential as it allowed pupils, who would otherwise not be able to concentrate on the task at hand, to use an iPad by eliminating distractions, limiting the functionality of the screen and thus enabling each pupil to participate in instruction. That is why the iPad was the main focus of the author's dissertation.

REFERENCES

Meys. School Act No. 561/2004, in its current version. [on-line]. Feeling. on 29 November 2017. Available on <http://www.msmt.cz/dokumenty-3/skolsky-zakon-ve-zneni-ucinnem-od-1-9-2017-do-31-8-2018>.

School Law. Paragraph 16 (9) of the Education Act. [on-line]. Feeling. on 29 November 2017. Available on <http://www.msmt.cz/dokumenty-3/skolsky-zakon-ve-zneni-ucinnem-od-1-9-2017-do-31-8-2018>.

Aram, D. & O. Ch. Bar-Arm. Mothers helping their preschool children to spell words: A comparison between interactions using the computer vs. pencil and paper. In International Journal of Child-Computer Interaction, Volume 7, 2016, pp. 15-21, [on-line]. Feeling. on 30 November 2017. Available on https://doi.org/10.1016/j.ijcci.2016.03.001

.Batorowicz, B., Missiuna, C. A. & N. A. Pollock. Technology supporting written productivity in children with learning disabilities: A critical review. Canadian Journal of Occupational Therapy, 79 (4), pp. 211-224. 2012.

Henderson, S. & J. Yeow. iPad in Education: A case study of iPad adoption and use in a primary school. 2012, [on-line]. Feeling. on 30 November 2017. Available at <https://www.computer.org/csdl/proceedings/hicss/2012/4525/00/4525a078.pdf>.

SENnet. Tablet computers and learners with special educational needs (case studies: Austria, Belgium, Denmark, Estonia, Italy, Portugal, Turkey), 2014, [on-line]. Feeling. on 30 November 2017. Available on <http://1url.cz/dt1uf]>.

Flewitt, R., Messer, D. & N. Kucirkov. New directions for early literacy in digital age: the iPad. Journal of Early Childhood Literacy, 2014. [on-line]. Feeling. on 30 November 2017. Available at <http://journals.sagepub.com/doi/abs/10.1177/1468798414533560>.

Flores, M., Musgrove, K., Renner, S., Hinton, V., Strozier, S. & A. Franklin. A comparison of communication using the Apple iPad and a picture-based system. Augmentative and Alternative Communication, 28, pp. 74-84, 2012. [on-line]. Feeling. on 30 November 2017. Available on <http://dx.doi.org/10.3109/07434618.2011.644579>.

Kaur, D. Preservice Teachers' Perceptions of Using iPads with Students with Learning Disabilities. The Qualitative Report, 22 (9), pp. 2428-2436. [on-line]. Feeling. on 30 November 2017. Available at <http://nsuworks.nova.edu/tqr/vol22/iss9/10>.

Doenyas, C., Şimdi, E., Özcan, E. Ç., Çataltepe, Z. & B. Birkan. Autism and tablet computers in Turkey: Teaching picture sequencing skills through a web-based iPad application. In International Journal of Child-Computer Interaction, Volume 2, Issue 1, 2014, pp. 60-71, [on-line]. Feeling. on 30 November 2017. Available on <https://doi.org/10.1016/j.ijcci.2014.04.002>.

Campigotto, R., Mcewen, R. & D. C. Epp. iPad video prompting to teach the young adult Especially social: Exploring the use of an iOS application in special needs classes, pp. 4-86. 2013, [on-line]. Feeling. on 30 November 2017. Available at <https://www.sciencedirect.com/science/article/pii/S0360131512001790>.

Allen, M. L., Hartley, C. & K. Cain. iPads and the Use of "Apps" by Children with Autis Spectrum Disorder: Do They Promote Learning? Front. Psychol. 7: 1305, 2016, [on-line]. Feeling. on 30 November 2017. Available on <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5004059/>.

Hendl, J. Qualitative research: basic theories, methods and applications. 2. Praha: Portál, 2005. 408 s.

Švaříček, R. And K. Šeďová. Qualitative research in pedagogical sciences. 1.vyd. Praha: Portál, 2007. 384 s.

Gavora, P. Introduction to pedagogical research. 1. vyd. Brno: Paido, 2000. 208 s.

UIV. Statistical Yearbook of Education. [on-line]. Feeling. on 30. 11. 2017. Available on <http://toiler.uiv.cz/rocenka/rocenka.asp>.

Müller, O. A M. Valenta. *Psychopedie.* 1.vyd. Praha: Parta, 2003. 443 s.

Maňák, J. A V. Švec. Výukové metody. Brno: Paido, 2003. 219 s.

Johnson, G. M. Using tablet computers with elementary school students with special needs: The practices and perceptions of special education teachers and teacher assistants. Canadian Journal of Learning and Technology, 39(4). 2013, [on-line]. Cit. dne 30. 11. 2017. Availeble on <http://files.eric.ed.gov/fulltext/EJ1029332.pdf>.