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iPAD as a Communication Tool for Disabled Seniors: A Case Study

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Abstract—This case study responds to the current trends in ICT. Mobile Touch iPads can provide very good assistance to disabled seniors. The intuitive tablet environment, the possibility of the formation environment and its portability, has a very positive effect on the use of particular communication. For comparison, using a conventional PC/notebook, word processor, keyboard and computer mouse compared to the iPad and selected applications. The results of this case study show that the use of mobile touch devices iPad for seniors with mental retardation is a great benefit. These devices do not require high demands on graphomotorics like a standard PC devices.

Keywords—ICT, iPad, handicapped seniors, communication, computer, notebook, applications, text editor.

I. INTRODUCTION

THIS case study is focused on the knowledge and abilities of seniors on the level of communication via text editor when the senior can monitor the text in the letter form and send it as an email attachment later on. This study aims to find out whether a senior with a handicap or a moderate mental disorder which plays a dominant role is able to use PC/laptop actively and independently. If he is not able to do that there is an alternative form - a mobile touch screen iPad device. As for the seniors, use of ICT is largely influenced by their motivation. Motivation as internal and external [6]; internal motivation can be understood as the one which comes from a person himself. What we find pleasant and what makes us happy. External motivation compared to the internal one can be understood as the result of outer impulses when a person enters an education sphere without it being his personal wish. [3]. As for the usage among seniors, it is important to distinguish whether they are active in their personal lives, whether they need ICT for their work or whether they are in their passive, retirement period and only want to use ICT for communication with their surroundings. As for the seniors in their retirement period, we can distinguish whether they are or are not familiar with using of ICT or if they want to learn how to use such ICT.

II. METHODOLOGY

Case study is understood as a design of this contribution. Suitability for use is always viewed with respect to the research matter and characteristics of each case [5]. Writing of the case study means to be exactly where a direct action occurs, to obtain so-called first-hand data and evidence [1].

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Participated observation during work of our informant with his supervisor became a method of obtaining data.

III. ETHICAL POINT OF VIEW

Obtaining data was negotiated by personal consultancy with legal representatives to whom the purpose of the thesis was explained as well as the meaning of participated observation of their children, along with intended sharing of the gained experience with the legal representatives of the pupils followed by the signing of the informed consent with this activity. The same process for obtaining informed consent of the legal representatives of the pupils was repeated upon the need to write this thesis in accordance with law No. 101/2000 Coll. on the Protection of Personal Data; the pupils who participated in the research are to be named only by their initials [10]. For the same reason, neither the town nor the name and address of the school mentioned in the research took place is to be stated.

IV. CASE STUDY

- Person: M.L. (referred to in the study as Tomas)
- Year of Birth: 1957
- Age: 59-year old
- Sex: Male
- Diagnosis: Moderate to severe mental retardation, Glaucoma eye disease, and severely impaired fine motor skills.

A. Characteristics of Tomas' Disorder

Tomas is diagnosed with the health disorder -> mental: F 71 Moderate to severe mental retardation (IQ scale 35-49); the diagnostic term is a person with mental retardation or a person with mental disorder. This synonym is used in the Czech psychopedia. The syndrome itself is called mental retardation or mental disorder. By mental retardation it is understood a delay or disruption of normal child development from the mental perspective, while sense organ and musculoskeletal disorders as well as behavioural disorders may occur. Difficulties in the basic theoretical interpretation of mental retardation are shown through a variety of terms and definitions [11].

B. Characteristics of Tomas' Environment

Tomas lives in Bruntál regional town. As for his health he suffers from disorders and intercurrent eye disease, specific symptoms of his mental disease and age, and lives in sheltered housing for people with health disorders. The intention of sheltered housing for people with health disorders - Sagapo

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Bruntál - is to provide social services of home-type care to people, who due to their health disorders require the permanent care of other person and cannot live in a normal living environment [4].

C. Initial State of Tomas' Abilities

Tomas is younger of the twins and at the same time he is more handicapped of them. That is why he was treated as the weakest member of the family. Both parents took care of both sons the best they could, as stated by the supervisor. Both men during the time they lived with their parents had all their emotional and material needs met. Tomas has difficulties with his gross and fine motor skills due to the body discoordination caused by a severe eye disease, as well as bad eye-hand coordination, claw grip and left-handedness. Combined, these disabilities mean he is unable to cut, and manipulate tiny objects etc. However, in terms of self-sufficiency, there are activities which he manages despite his bad motor skills such as basic hygienic habits, simple manipulation of food, and passing a magazine or newspaper to his supervisor. Tomas is mildly communicative; he mostly gets by with one word replies. Despite his disorder he has a wide passive vocabulary. But it is very difficult to make him answer a question - even though it is probable that he knows the answer. He prefers to keep quiet. Demonstrations of non-verbal communication are very common - shaking of fingers, side movements of upper limbs, sounds of displeasure, fidgeting. Nevertheless, he likes expressing his opinion within the social welfare institution. He sits quietly and suddenly he speaks up for himself using sentences like "It is not possible", "I won´t do it". We can see that his willingness to work is closely bound to his favourite activity which is required from him by the supervisors. His cognitive sphere is highly unbalanced; mathematics images are at the range of 0 – 100; graphic demonstration - he manages to sign with his first name. He can read almost fluently with partial understanding, but he does not want to express himself. Still, reading newspapers and magazines is one of his most favourite activities. As his mother died in the course of last year, he was moved along with his twin brother, to the daily social welfare institution; his father had died two years earlier.

Once a diagnosis was determined for the current state of Tomas, the supervisor decided to focus on support measures: fluent strengthening of self-sufficiency regardless of the presence of the twin in the surroundings and on acquiring communication via ICT. The twins were visited by many members of the family at home. To support natural development of communication abilities in accordance with "I want to say what I know", "I´d love to" there were chosen methods and forms of work arising from cooperative work, group work or working in pairs when every member of the team introduces his results to the others. Acquisition of communicative skills via the text editor was chosen and respected as Tomas´ wish was to write letter to his friends and family members. Due to the poor disposition of his fine motor skills, the supervisor chose working in the text editor with the possibility of further sending to the addressee via email.

D. Description of Fulfilment of Activities for Communication Adoption

The process of communication adoption via ICT was divided into several thematic units. Due to the fact that Tomas lived with his parents for the most of his life, he did not have to learn how to work with a computer. That is why a process similar to a learning process with a strict set curriculum was chosen. Since ICT can make the everyday lives of seniors, and especially their social communication, much easier, a desktop computer seemed suitable to use. The iPad mobile touch screen device is a substitutional variant, provided to Tomas. Tomas, as well as his supervisor, do not own this mobile touch screen device.

The curriculum employed for the acquisition of communicative skills for Tomas include:
- basic function of the text editor,
- basic text editing (capital and small letters, click, removing and inserting of the text),
- copying and colour resolution of the text part,
- text layout on the page, and
- sending text via email.

Basic function of the text editor – on the computer with the use of Word text editor - Tomas found this curriculum highly problematic. Although he knows the computer and its functions from the one in his family home, he has never worked on the computer himself. Tomas´ twin brother stated that he never even noticed the computer at home, and it was only used as a music player for mp3 files or from YouTube etc.; however, the computer was also used passively by other members of the family. Due to his eye disease, Tomas only has 50% sight in his left eye and is blind in his right eye, and therefore, could not fluently focus on the icons offered by Word.

Basic text editing (capital and small letters, clicking on, removing and inserting of text) - as for the use of the computer and of the Word text editor a problem appeared, especially when Tomas had to grip the computer mouse. Eye x hand coordination and problematic fine motor skills became so dominant in the course of work that he could neither move the mouse on the work surface nor click anywhere. This task was impossible. He had the same problems with the keyboard. He was not able to click on a key with one finger. Additionally, Tomas had a problem pressing the keys. It was impossible to explain to him how to touch the key once and lift his finger off. He kept pressing and holding down one key at a time so there were many letters written on the screen. Unfortunately, negative emotions arose caused by his own failure and Tomas refused to continue in that activity any further. More and more often, a nonverbal shaking of both upper limbs appeared in the form of a rotating propeller accompanied by a simple sentence: "I can´t see it." The tone of his voice was clear, negative, unsuccessful, and implied not wanting to make any further attempts. Although many motivational features were tested - from his most loved music, to a reward (sweets), or even a relaxation activity, he just kept repeating: "No, no, no", which was accompanied with non-verbal gesturing of the upper limbs. Unfortunately, aware of the complexity of the

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task and his helplessness, no further attempts were made. iPad and Primary Writer application – Tomas got acquainted with the software keyboard at the beginning. But when Tomas attempted to use one of his fingers to touch the screen, another part of his palm or other fingers would touch as well. That is why we used a glove with one finger cut off. Entire palm could be leaned against the touch screen; however, the screen reacted only to the touch of the free finger. The environment of the Primary Writer application is highly primitive. Once the "Assisted access" activated when further function keys on the screen are forbidden, we get an empty screen with a keyboard for writing in block capitals what Tomas finds the most important. By wearing the glove and using assisted access, a highly homogenous work environment was created which enabled Tomas to work through the curriculum. The first sentences he typed in the keyboard were "What´s that?" and "It is writing". This was followed by an explosion of joy; no sound, only shaking of the upper limbs, and then by wide a smile and the sound "Iiiiijejejeje" at the end. It was clear he was happy. The pleasure of a job well-done - and that was from just one single touch. The shortcomings and difficulties resulting from his poor eye x hand coordination were quickly eliminated by the Primary Writer application. When Tomas touched any letter, he was able to immediately see it on the screen. The chance to see the keyboard and the monitor (a touch screen display) from the same distance supported his feeling of success. An iPad with a touch screen quickly gave back what the computer, keyboard and computer mouse took away. Along with that, Tomas´ self-confidence grew so that he was able to take dictation and copy simple texts. While familiarizing himself with the keyboard functions, he continually commented on any keyboard change with surprise: "What´s that?", as he tried to examine what had changed. He had to be reminded of a visible change within certain functions, for example, pressing the "shift", which he did not see on the first attempt due to his visual impairment.

Copying and colour resolution of the text part as a part of curriculum - on the computer and in the Word text editor – this task was carried out, nevertheless unsuccessfully due to his difficulties with fine motor skills and problematic eye x hand coordination and use of the computer mouse, keyboard x monitor. The iPad and Primary Writer application – the application works on a wholly different approach to that we are used to using in common text editors. As for Primary Writer or an iPad, the copying is initiated by a double click on a word. A menu appears allowing the user to choose the "copy" function. After that, it is enough to click anywhere on the page for the "paste" function to appear, and if clicked, the previously selected text is inserted. Tomas became familiar with this activity and could copy and insert his own written text wholly independently. He could deal with the colour resolution of texts with the help of the supervisor only. He was processing individual steps until he reached the goal. This activity took Tomas quite a long time. This activity was accompanied by the unwillingness experienced as in point 1 - when he was getting acquainted with the Word editor. He was literally saying: "No, I won´t" and "Not this one". He got very

angry but it was clear he was willing to manage that. That was the main determinant for why we did not finish that activity and did not skip to another one.

After several unsuccessful attempts Tomas uttered "Oh, well", and let out the sound "Ijejeje". At that moment the educator knew what was happening; his copying effort was successful. Text layout within the page – an attempt was carried out on the computer in the Word text editor, nevertheless unsuccessfully due to Tomas´ severe visual impairment. The iPad and Primary Writer applications – the content was not fully executed as Tomas used the largest possible font during his writing in application, which supported the Czech language. Left/right adjustment of the page is not supported by the application. Tomas is able to make one gap at the beginning of the text upon the individual setting. Sending via email - unfortunately, this activity was not carried out via a computer at all. We can say that Tomas was so fascinated by the iPad the moment he saw it that the desktop computer was immediately refused by him, which why sending the email was adjusted to work in iPad. Thanks to the iPad and Primary Writer application, sending an email can be done direct from the application with three touches with a finger, and thus logging into a standard email account is not needed. The first touch - share icon, the second touch – the content (entire book, this chapter, this page) and the third touch - choose the email. Then it is enough to select or set an email address and send. Tomas very quickly became familiar and was successful at this task.

E. Initial State of Tomas' Abilities

Curriculum of the text editor basic function – content cannot be applied onto the standard desktop computer/laptop due to Tomas´ diagnosis. The work environment, large quantity of Microsoft Word icons and functions is so complicated and extensive that Tomas showed ongoing negativism and lack of interest in this activity, accompanied by verbal expressions and motor gestures. It is also clear that due to his mental capacity and IQ score, he would not benefit from the text editor function. Work with a mobile touch screen device in the Primary Writer application on the level of basic functions was managed successfully and very fast. He was able to orientate independently and understand how such an application on his mobile touch screen device could be activated easily, how to control it and how to close it. Curriculum of basic text editing (capital and small letters, click, removing and inserting of the text) - he did not get acquainted with the curriculum via Microsoft Word; unfortunately, those attempts were unsuccessful. Eye x hand coordination = monitor x keyboard x mouse x monitor - were too complicated and not carried out. Motivation was unsuccessful. Negative verbal comments came very fast, Tomas´ rejection remained the same the entire time. As he kept repeating "Who is it?" and "What shall I do?" etc., the supervisor decided not to go through the curriculum. Work with the visual keyboard in Primary Writer application was accepted positively from the very beginning. Weakened fine motor skills were eliminated with use of a glove, which meant

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that the palm could lean against a display and the keyboard was controlled by one dominant finger, which was free of the glove. This was a highly beneficial and effective method. Writing on an iPad requires less graphomotor control and facilitates visual and sensory learning [2]. Vygotsky's notion of gesture being 'writing in the air' is pertinent here as we consider the iPad to be a new cultural tool that offers a different kind of engagement space for literacy [7]. Curriculum focused on copying and colour resolution of the text part - that curriculum via a computer, or via Microsoft Word text editor was not carried out due to individual difficulties of Tomas. Realization via iPad mobile touch screen device along with Primary Writer application was successful. Tomas manages text copying with the help of his supervisor. He requires is supervisor´s approval to confirm that he has the right approach to the task, "Really this one?" and "Shall I do this?" Once receiving confirmation, he executes the task of copying. He managed colour resolution step by step along with his supervisor. The benefit - he knows where to touch precisely and right = he gets oriented in the work environment. Curriculum focused on page layout - that curriculum was not fully executed due to Tomas´ mental abilities. Tomas is able to do a proper click just on mobile touch screen device and in the Primary Writer application and upon instruction from the educator only.

V. CONCLUSION ARISING FROM THE CASE STUDY

If due to health and mental difficulties we are not able to carry out communication with ICT via a computer, then we can use an alternative of the iPad mobile touch screen device and its applications, which can along with our goal and individual mental abilities of a person, enable them to carry out such expected outputs successfully. The biggest benefit of the work with a tablet - an iPad - against the work on a computer is the possibility of any actual position of a user. Rubber cases with adjustable stands can also be beneficial to patients using mobile tablets, especially when using a table or lying in bed [9]. Basic function of the text editor - we recommend to replace a desktop computer and common text editor for the mobile touch screen device and for the Primary Writer application. Simple application of block letters writing; it enables writing into lines, without lines, changing of the text colour, sharing the final text, printing of the text. "Gestures, it has been correctly said, are writing in the air, and written signs frequently are simply gestures that have been fixed" [8]. We can identify with his statement, as writing in the air can be compared to writing on the virtual iPad keyboard. Basic text editing (capital and small letters, click, removing and inserting of the text) runs direct in the application. The process is very simple. We can colour the text "into the block" and we can remove or insert by clicking with one finger onto a specific word or a sentence. Capital and small letters on the keyboard can be learnt via function key icons. Copying and colour resolution of the text part must be considered carefully in advance. The application enables changing the text colour but in a different way than we are used to from standard Word editing environment. For this reason, the activity must be carried out along with a student. Copying is executed by clicking with a finger onto the specific word or a sentence; we colour the text "into the block" and we can copy or insert. Page text layout, letter size, letter font, left/right page editing is set right at the beginning - permanently. The "share" key direct from application is suitable and simple for the sending of the written text via email. As for Tomas, implementation of the mobile touch screen device was found highly beneficial. The supervisor shall continue in acquisition of further activities with an iPad. Positive work and relationship to this mobile touch screen device led the supervisor to apply to the relevant department of social affairs for an iPad as a compensation tool for Tomas.

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