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ABSTRACT

In the three-year Special Educational Needs Network (SENnet: http://sennet.eun.org), Work Package 2 has the task to deliver each year a Thematic Study presenting recent research and studies in the field of special education needs and ICT in the partner countries and in the wider European and global context. In this third study the theme is the use of tablet computers by school students with special needs.

The study is divided into two parts: Part 1 focuses on the international overview and research findings; Part 2 comprises national case studies exemplifying the use of tablets by students with special needs, many of them in mainstream classes.
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INTRODUCTION

In a few short years what we think of as a ‘computer’ has moved from large desktop computers to laptops and now lightweight hand-held devices, with wearables and ‘invisible’ devices on the horizon. Tablet computers are now a ‘must have’ consumer item; sales are expected to overtake PCs in 2015, and some manufacturers (e.g. Samsung) are ending production of laptops.

A tablet computer, or simply a tablet, is a mobile computer with display, circuitry and battery in a single unit. Tablets come equipped with sensors, including cameras, a microphone, an accelerometer and a touchscreen, with finger or stylus gestures substituting for the use of computer mouse and keyboard. Tablets usually feature on-screen, pop-up virtual keyboards for typing. Tablets are typically larger than smart phones or personal digital assistants 18 cm or larger, measured diagonally.¹ Johnson defined tablets as “a single panel computer with a touch screen as input device (Johnson, 2013) and McMahon/Walker use the term mobile devices to refer generally to a wide variety of phones, tablets, and readers (McMahon/Walker, 2014).

Apple’s iPad is the best-selling tablet in 2014, followed by products from Samsung, Google, HP, LG, Asus, Microsoft, Sony and others.

In the United Kingdom, tablet computers have replaced the TV in the bedroom as the must-have gadget for children, with over one-third of those aged from five to 15 owning their own tablet, and over six in ten children use a tablet at home (Ofcom, reported in The Guardian, October 2014).

Tablets are used in schools in ever-increasing numbers, as prices come down in a competitive market, and with the added attraction of over 100 000 free or low-cost educational apps, and the arrival of tablets specially designed for schools (e.g. the LearnPad). There are many examples of 1:1 classrooms where every student has a laptop or tablet computer (present in 47,000 schools in Europe in 2013 it is estimated (Balanskat, A/ Bannister, D, et al. (2013)), the devices provided either by the school or otherwise under ‘Bring Your Own Device’ arrangements (particularly in Spain, Norway and Sweden (European Schoolnet for the European Commission, 2013). Their use is being evaluated in projects such as the Creative Classrooms Lab².

A number of trends in education and technology identified in the Horizon Report Europe: 2014 Schools Edition combine to favour even more use of tablet computers in schools in the coming years, notably cloud computing, social media, online learning, games, non-formal learning, and mobile learning (New Media Consortium, 2014). As the authors note:

“Visually compelling and highly portable, they are ideal tools for browsing the Internet, viewing presentations and videos, and accessing apps, giving

¹ http://en.wikipedia.org/wiki/Tablet_computer
² http://creative.eun.org
school leaders reason to position tablets at the centre of teaching and learning.”

If tablets are to be at the centre of teaching and learning, they must be usable and effective for the 15 per cent of students with special educational needs (SEN) in schools, and, crucially, teachers need to be aware of the accessibility features built into the operating systems of tablets and of the range of apps for students with special needs. What evidence is there that this is the case?
In this section evidence of the benefits of using tablets for SEN students and some related challenges are summarized. Reference is made, where available, to existing papers and reports. In other instances, interesting findings from articles, blog entries etc. are highlighted (in this case, also the month of the publication is referenced in the text).

1: TABLETS AND SPECIAL NEEDS

Although tablet computers were not designed to be educational tools, the device quickly moved into schools (Grezlak, 2011; Jackson, 2011; McCrea, 2010). Educators at all levels are adopting mobile devices and are finding exciting ways to use them in their instruction (McMahon/Walker, 2014). These hand-held devices offer students with and without disabilities easy access to learning opportunities, information, organizational systems, communication, and, interestingly, emotional support (Newton/ Dell, 2011). The same features that appeal to the general user (simple interface, portability, speed, affordability, built-in camera, internet connection, location services, variety of apps) make them a valuable tool that can enhance teaching and learning (Schaffhauser, 2013).

Several features make the tablet unique compared to other devices.

The touch screen offers multiple advantages to students with special needs. They can access a tablet much more effectively than a PC. Products like Avaz that support children special needs and their caregivers have added momentum to the shift towards tablets and away from larger devices (Mitra, May 2013). Using a touchscreen offers immediate feedback, as what is seen and heard emanate from where the fingers are on the device. Some tablets also react to shaking, rotating and other movements. This immediate feedback helps to keep students engaged who may get bored/ frustrated easily with delayed feedback. The touch screen offers a variety of sensory input and experiences. The most successful teaching with children with special education needs involves visual, auditory and kinesthetic (tactile) learning. This kinesthetic piece was missing from learning software and from many classrooms, according to education professor Mary Cronin. Tablets include a hands-on element that is easy to use. Even though it is not as sensory as true tactile learning, it still uses that part of the brain (Dwight, 2013).

The possibility for highly individualized use is a further advantage, via the personal selection and organization of applications (Johnson, 2013b).

Tablets also support the move to cloud-based and web-based software, which Ian Swain, In Technology & Design professor at Bournemouth University, identified as the biggest push in assistive technologies at the moment. With earlier education software being installed on one single computer, the student was usually stuck on a single computer. Now, a student with special needs can switch easier between different devices, depending on his needs and activities (Schaffhauser, 2013).

Two particular benefits of tablets for students with special needs are emerging: they motivate (Johnson 2014) to learn (as of course do other technologies) and they enable more personalized learning, as it is easier to individualize instruction and track progress and to erase, change, customize content to suit individual students’ needs (Robinson, June 2014).
In this way, tablets help differentiate between different styles of learning and learning abilities and give alternative ways of accessing and presenting knowledge to those students that struggle with traditional ways. Education professor Cronin has found that technology generally is making it easy to personalize a student’s instruction. Software is self-paced and allows students to skip through parts they are strong in and spend more time on the parts they struggle with. “It can be so easily individualized,” she says. “Which is ultimately what special education is about” (Dwight, 2013).

A further appealing aspect of tablets for students with special needs is their inclusivity: to bring them closer to their classmates. The Tablets for Schools report published in 2013 in the UK suggests as one of its most exciting findings that tablets are opening up a new world of possibilities for SEN students. One finding was that “with the right apps, SEN students were able to keep up with other students in the class and do assignments using the same device as their peers, in addition to receiving immediate feedback” (Tablets for schools, 2014c) and that using tablets enables students with special needs to gain a sense of achievement in learning the same material as other students in the class (Tablets for schools, 2014c).

Students with special needs use the same device as the other students and thus are not set apart (Clarke/ Svanaes/ Zimmermann, 2013). For example, Hanan Elattar, a music teacher in the United Arab Emirates, created an orchestra that includes students with special needs by replacing instruments with iPads. The orchestra included students with Down’s syndrome, autism and physical disabilities (Nazzal, June 2014). Research for the UK Tablets for schools report showed that SEN students gain a sense of achievement when they use the same apps as other students (Tablets for schools, 2014c).

Interestingly, according to the Tablets for schools report, most of the apps that were found to be beneficial for SEN students were not specifically designed for such students. Teachers participating in the research tended to recommend multipurpose apps (e.g. dictionaries or mindmaps) for students with special needs. However, the lack of SEN-related apps is expected to change as tablet manufacturers realize the importance of catering to all types of student. The types of apps will need to depend on the special need – it may be learning difficulties, or a teacher may simply want to account for students’ different sensory needs when it comes to processing information. Even so, specific apps for students with special needs are very useful.

While student academic achievement as a result of iPad use was the least likely benefit mentioned in the survey conducted by the Curtin University (Australia), enhanced student motivation and ease of individualized instruction are likely to result in improved student competencies (Johnson, 2013).

2: BENEFITS FOR PARTICULAR SPECIAL NEEDS

Early research results on the benefits for SEN students in general (Clarke/ Svanaes/ Zimmermann, 2013; Johnson, 2013) and for particular groups like autistic children (O’Mally/ Lewis, 2013) or the visually impaired (Cranmer, 2014) suggest that tablets are increasingly perceived as essential in special education classrooms (Dunn, 2012). Small-scale US study carried out by the Kennedy Krieger Institute with autistic children found that “iPads can be an effective instructional tool to enhance learning and independence” (O’Mally/ Lewis, 2013). The survey carried out by the Curtin University (Australia) also supports these findings. The teachers and teacher assistants surveyed were extremely positive about the value of the
iPads for SEN students, particularly for students with autism, attention deficits and limitations of fine motor control (Johnson, 2013).

TABLETS AS ASSISTIVE TECHNOLOGY

Unlike some specialized assistive technologies, tablets have the capacity to include a comprehensive array of activities (Johnson, 2013) and travel with the person whatever the individual needs of that person may be (Niemann, 2014). Almost instantly ‘on’, rather than having to wait for the device to load software, tablets offer a variety of accessibility features such as VoiceOver, Zoom and Large Font, White on Black Display, Closed Captioning and Mono Audio or Voice Control (Dunn, 2012). With these features, tablets can provide a person with a ‘voice’, enable blind learners to access texts and provide speech or symbol support to reading and writing where text is a barrier (GoLearning, August 2013).

With these functions, tablets can replace specific assistive technologies in some cases: For example, students with autism or speech disorder can use tablets with voice output or communication board app instead of a traditionally used communication board (Schaffhauser, 2013). Unlike earlier technologies for students with special needs, the tablets are indistinguishable from devices used by other students (Robinson, June 2014). SEN students do not stand out as using something different any more (Schaffhauser, 2013). Therefore, tablets have the potential to become a powerful inclusive device. They can serve as a bridge between students with and without disabilities (Dwight, 2013). Another advantage is that using tablets and free applications is much less expensive than assistive technologies. Therefore, they are also easier and quicker to replace in case of loss. According to Samuel Sennott, the fact of SEN students starting to use tablets has put pressure on developers to produce more attractive AAC systems (Dixon, October 2011). Mainstream devices like tablets put pressure on the market for assistive technologies. Until 2011, the average price for AAC systems in the US has fallen from $7,000 to $700. The price drop presents an innovators’ dilemma for the incumbent AAC-focused companies, but it is a huge opportunity for the field to serve a greater number of people (Dixon, October 2011).

AUTISM

Nowhere has the interest in technology been greater than for students on the autistic spectrum (Robinson, June 2014). Findings of a small-scale study carried out by the Kennedy Krieger Institute suggest that iPads can be an effective instruction tool to enhance learning and independence of autistic children (O’Mally/ Lewis, 2013). General advantages that tablets offer to autistic students are versatility in programming, relative ease in use and a center of attention that attracts students (the Forecaster, December 2012). They provide instant feedback, which is particularly important for students with autism (Tablets for schools, 2014d). Tablets can help autistic children to communicate, learn socialization skills and structure their daily environments, no matter where they fit in on the wide autism spectrum (the Forecaster, December 2012). One example of how to use tablets to structure daily routines is a program where a screen changes colour to show elapsed time students likely would not understand otherwise (the Forecaster, December 2012).

As children with autism often have trouble communicating, AAC apps are of particular interest to parents and teachers (Tablets for schools, 2014b). Apps provide alternative ways
of communication and simplify interaction, as interaction with an app is predictable (Robinson, June 2014). Examples of useful apps are Voice4u3, Avaz4 and Avaz FreeSpeech5. The “Tablets for schools” report identified a need for more good apps for older students, and students higher on the autism spectrum; e.g. apps about social situations and language usage in everyday life (Tablets for schools, 2014b).

ATTENTION DEFICIT

Specific tablet applications might also offer benefits to children with attention deficit hyperactivity disorder (ADHD). They might benefit from mind mapping and visual based organization tools, for example visual timetables, that help to organise thoughts in a visual way. Examples are Simple Mind TM and Mindmeister. “Focus GPS”6 is an app developed in particular for users with ADHD that helps them to improve executive functions of memory, concentration and organization. The app uses memory-by-association and multiple pair comparison tools to walk users through complex thought processes. These exercises are designed to help users learn how to organize unrelated complex thoughts and better manage changing priorities, as these are tasks students with ADHD typically struggle with (Namahoe, February 2012).

DYSLEXIA

Early evidence shows that students with dyslexia and problems to decode texts can benefit from using personalized settings and predictive text/speech output. Students report having more control through the interface to set up the options they need, e.g. the font size and colour, background, colour and speech support, alongside with the easy to highlight words, and the zoom in to see more detail (GoLearning, August 2013). Students who have difficulty reading can just listen to the text and comprehend as much as possible. Moreover, students who cannot write can use speech recognition programs from Microsoft, Nuance and others that allow them to transcribe anything with their words. Both possibilities can be a ‘game changer’ for these students, allowing them to go to college and do other things. That way, a tablet can act as a virtual education aid (Schaffhauser, 2013).

LIMITED FINE MOTOR CONTROL

With its variety of input and output methods, the tablet provides easy access to a variety of users. For students with motor skills impairments, the touch screen is easier to use because they do not need to control their finger as precisely as with keyboards or other writing utensils. Tablets are also used to contribute to the development of these skills (Johnson, 2013; The Forecaster, December 2012). While other technology solutions exist, none is as easy to use as a tablet (Tablet Computer News, February 2012).

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3 http://voice4uaac.com/
4 http://www.avaapp.com/
5 http://avaapp.com/freespeech/
Though a device with a touch-based interface that relies heavily on the use of vision may not strike as being helpful to visually impaired, pre-installed features like VoiceOver\(^7\) and Talkback and apps like Brailletouch\(^8\) render tablets of great use to them (Cassidy, September 2014). While VoiceOver reads out everything on the screen, BrailleTouch allows visually impaired to type on their phone, using a touchscreen braille keyboard. Talkback is a pre-installed screen reader that provides spoken feedback, e.g. when an app is opened. In addition, vibration feedback can be set up and sounds assigned to different actions (GoLearning, August 2013). For some visually impaired, the same setting options to change font, size and background colours that benefit dyslexic students can be very helpful.

The Lancaster University is currently conducting a small-scale exploratory study on how young people who are blind or visually impaired and educated in mainstream schools use computers and the internet for learning in and out of school. Early findings suggest that digital technologies are having a huge impact on learning, particularly in terms of nurturing the students’ independence, as students learn to develop the skills to self-manage and self-direct their learning. Tablets are enabling some students to take charge given the ease with which a student can capture an image of a whiteboard or other resource using the camera, zoom the text, brightness contrast so they can gain access to it independently. Finally, first findings also highlight that tablets help reducing the stigma, as visually impaired use the same tools as their peers (Cranmer, 2014).

### 3: SOME CHALLENGES

Providing tablets to SEN students raises many of the same concerns that giving them to general education students does (Robinson, June 2014), and more generally the introduction of any other emerging technology into schools. Those concerns are, for example, the cost of hardware and the lack of teacher skills and understanding (Wang & Reeves, 2013). Other reported challenges included administration (e.g. purchasing appropriate applications) and security (e.g. lost and stolen tablets) (Johnson, 2013). In some countries, there are grants for the purchase of assistive technology, but they do not cover the purchase of tablets. Finally, unrealistic expectations to what change any technology in school can enable can be problematic (Robinson, June 2014).

Two reasons that often hinder successful implementation are lack of training on how to use the device and the lack of a pedagogical framework on how to include the device to meet the needs of diverse learners. Rather than believing that the iPad is going to drastically change education on its own, it is more reasonable to think of the iPad as a tool that supports what educators are already doing in the classroom (McMahon/Walker, 2014). For tablets to offer solutions to problems faced by students with special needs, providing them with the device (or any other technology) needs to be combined with adequate training (of students, parents, and professionals), careful assessment and decision-making, detailed implementation plans, and persistence in follow-up if we are to see gains in student learning (Newton/Dell, 2011).

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\(^7\) [https://www.apple.com/accessibility/osx/voiceover/](https://www.apple.com/accessibility/osx/voiceover/)

\(^8\) [http://brailletouchapp.com/](http://brailletouchapp.com/)
In 2011, the Coordinating Committee of Special Interest Group 12, Augmentative and Alternative Communication expressed concern about starting with a device of any sort, instead of completing a comprehensive assessment to determine what best matches the students' needs. Because iPads are cost-effective as well as more socially acceptable, parents and districts often move directly to these devices without doing the assessment and/or engaging the right professionals in the process (Dixon, October 2011).

Software is not replacing direct instruction from teachers of course, and it is only as good as the teacher using it. If teachers aren’t trained in using tablets or other assistive technology, their students won’t get the best results, Cronin says. Because of the pace that new technology is being developed, teachers can become overwhelmed, she said (Dwight, 2013).

Further research and guidance is necessary on which students benefit in particular from specific activities using tablets. Students' needs and abilities vary, and, as is the case for general education students, technology is more successful with some students than others. Some specialists believe that autistic children respond particularly well to tablets, because the tablet apps behave in consistent, predictable ways. But even among autistic students, where it seems to hold the greatest promise, technology is not always successful. Some students have no interest in their electronic devices, while for others they become a kind of obsession (Robinson, June 2014). Therefore, teachers need more guidance on questions like: Which apps and activities work well for particular groups of SEN students? How to best assess what activities/apps work best for a particular student? How to maximize the potential that tablets offer to students with special needs (Tablets for schools, 2014c)? Students will only fully benefit from the potential that tablets offer if educators consider the right device and applications with features their students need. Tablets offer different opportunities to the wide range of different students with disabilities. The next sections outline current evidence on how tablets can benefit students with special needs.

As developers continue to design a huge array of products, hopes are running high (Robinson, June 2014). While early small-scale studies exist, definitive research is still scant, as with so much in the world of educational technology (Robinson, 2014). One issue in particular is the small sample size of existing research, for example 12 teachers and assistants for the survey carried out by the Curtin University (Australia). This small sample size matters because SEN students vary so widely in their needs and abilities (Pedro, June 2014). It would be useful if there was a body of research evidence to guide teachers in their effective of tablets in inclusive classrooms. Sadly this is not the case yet; technology seems to be outstripping research on its educational benefits, as noted in a recent US analysis on the topic. While first small scale studies present promising results, more research in the field will be crucial to provide teachers with sufficient guidance.
PART 2: CASE STUDIES

This section is devoted to some original and inspiring case studies from SENnet partners on students with special needs and tablets, summarized first and then presented in more detail.

SUMMARIES

AUSTRIA

This case study describes the benefits of using tablets for augmentative and alternative communication (AAC) for children with Down’s Syndrome or autism spectrum orders in integration classes at the Johann-Eisterer-Landesschule. Benefits of the tablet use were higher level of concentration and better motivation and communication. Currently, the use of tablets at the school highly depends on the commitment of some pioneer teachers, because a consistent strategy and opportunities for professional development are missing.

The Case Study video⁹ shows examples of how tablets can empower SEN students to make their own decisions by using tablets to communicate.

BELGIUM FLANDERS

This case study describes how a 12 year-old visually impaired student uses a tablet in a mainstream school, supported by an expert from a school for the blind and visually impaired. He uses the tablet for typing in ADIBooks (digital versions of the textbooks) and as a board-camera. The student not only uses an iPad, but also a television reading glass, a computer, ADIBooks (adjusted digital versions of the schoolbooks) and a bright lamp. Using the iPad helped the student to be better integrated into the class, score better test results, be more digitally competent and more confident to try new things in the future.

The case study video¹⁰ shows how an iPad and other tools help the student succeed in his school.

DENMARK

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⁹ http://youtu.be/TpbUhfC63U0
¹⁰ https://www.youtube.com/watch?feature=player_embedded&v=kA8c4qGA2fo
The topic of this case study is the evaluation of students’ portfolio and class activities. In this students use the app “Write to read” to increase their motivation and skills to work with the written language. The students’ products showed a marked improvement after using the app. However, for all students there is evidence that in working with the app they are motivated to write, and they write complete sentences, unlike in the past, with the tablet, where they mainly wrote single letters or words.

The video case study shows students using “Write to read” improve their writing skills.

ESTONIA

Käo Pohikool is a school for students who have special educational needs who has a recommendation by the Advisory Committee to study by simplified national curriculum. The school provides students with SEN with an opportunity to study while receiving rehabilitation during the school day. Teaching is based on the principles of comprehensive education.

The video case study shows how students at the Käo Pohikool school use tablets.

ITALY


12 [http://media.videotool.dk/?vn=25_2014072122302737195016414765](http://media.videotool.dk/?vn=25_2014072122302737195016414765)

The case study is about the use of iPads in Key Stage 3, in the lower secondary school of Cadeo and Pontenure, Emilia Romagna. The student Roberto who cannot move his arms nor legs decided to attend this school, because the use of iPads is advanced and he has to use the iPad to communicate. Several apps are used and an example of collaborative activity is given to illustrate how the class is working in an inclusively.

The video case study\textsuperscript{14} describes how the student Robert is integrated in the lower secondary school of Cadeo and Pontenure, Emilia Romagna.

\textbf{PORTUGAL}

The case study describes the observation and analysis of the school situation of a student with special educational needs in the 1st year of primary school regarding the use of a tablet: need, implementation and results. The student observed presents comprehensive global delayed psychomotor development with characteristics of Pervasive Developmental Disorder.

The video case study\textsuperscript{15} describes how the student Luis (7) with a pervasive development order uses a tablet at the Levante da Maia School Cluster.

\textsuperscript{14} http://youtu.be/MP2ESWaYOm8

\textsuperscript{15} https://www.youtube.com/watch?v=Tbb2LY2Xb6w
This case study describes autistic children at a school for both primary and secondary level. The aim of the school is to support students in learning to be oriented in daily lives and start using tablets. The teachers mainly use tablets in mathematics and reading courses.

The video case study\textsuperscript{16} shows an interview a special education needs teacher working with autistic children at the school and also with the mother of one of the students.

One or two more examples of good practice from the UK, even though outside the SENnet activity, are worth mentioning.

Miles Pilling in a blog post summarises some of the benefits he has observed of tablets for students with muscular dystrophy and rheumatoid arthritis (Pilling, 2014):

\begin{quote}
\textit{“The introduction of iPads and tablets in general, has changed the landscape and initial solutions pointed to its effectiveness in meeting the needs of pupils with muscular dystrophies and rheumatoid arthritis where light touch and minimal movements had a pain-free effect which laptops didn’t provide. One pupil was able to double his typing speed by having an on-screen keyboard. The key point to learn from this example is that focusing the mobile technology around the need can be most effective in meeting that specific need. In other words a blanket approach to special needs might not provide a better solution.”}
\end{quote}

For students with visual tracking problems, Pilling makes the important point that they “may prefer to have on-screen keyboards as they can keep their eyes on the one plane. A traditional laptop causes the issue of look-up, look down when the pupils is trying to follow a lesson from a board at the front.”

As others have often stated, one of the key benefits of a tablets for all classroom is that it removes the stigma of using specialized equipment:

\textsuperscript{16} http://youtu.be/SyBbSldfb3M
“I can see the sense in providing tablets for everyone as this really does help a pupil’s self-esteem. It was a big drawback to the pupils we loaned equipment to as they could be “bullied” and have their special need amplified to the class by being the only one with technology in the classroom. Everyone having an individual ICT tool means that stigma goes away.”

Also in the UK, Anthony Rhys, a teacher at Trinity Fields School and Resource Centre, Wales17, offers three inspiring examples:

“A teenage boy with Angelman syndrome (working at P4 level) normally engages with objects for very short periods and is usually more interested in the switch than the response it is creating. One of his favourite objects is a mirror, which he uses to look at himself and others. We put a tablet in a protective cover and used the camera on it to serve as a mirror to engage him. This idea was then quickly expanded so that when he put the “mirror” to his face it would produce sounds and visual effects on the screen, right in front of his eyes. We also used the depth-camera sound-making program so that he started to move his face away from the device and notice the changing sound responses that he was creating. He is now learning to interact in different ways with his “mirror” as it has, to all intents and purposes, started to interact with him.

An older teenage pupil with ASD has serious sensory processing issues; he requires and gives a lot of deep pressure, is often agitated and on the move and will hit and crush equipment. Switches and touchscreens only interest him for very short periods of time. With a tablet, though, he can take it with him, hit at the screen as much as he likes (in its protective cover) and engage with it where and when he wants, whether sitting, standing or lying down. He has now shown that he can choose the app he wants and will interact with it using the touch screen for longer periods. He also has the opportunity to self-regulate the sensory input he is getting; for example, he can move it closer to his ears if he wants more audio feedback.

Another boy has severe cerebral palsy and can use a switch mounted by his head or elbows to engage simple cause and effect experiences, like playing music tracks or a recording of his mother singing to him. Now, a tablet can also be mounted by his head and he can use the small range of movement that he has to move his head over the surface of the screen in different directions. Instead of just having a “play” option, his movements now create different effects each time he interacts with musical programs. In a recent occupational therapy session, he refused to interact with the tablet screen at all until his favourite app was put on for him, then he spent ten minutes creating lovely Chinese zither sounds.”

17 www.trinityfieldsschoolandresourcecentre.com
ADDITIONAL EQUIPMENT AND APPS

The protective cover mentioned above is a flexible frame that fits around a tablet to protect it from bumps and being dropped. An example is the Big Grips Frame and Stand for iPad.

![Protective cover for iPad](image)

This carry case with stand allows the iPad to be better protected and held more easily by individuals with physical disabilities. It can be seen in use in this video clip: [http://www.youtube.com/watch?v=ykzR5Aley3Y](http://www.youtube.com/watch?v=ykzR5Aley3Y).

The ability to secure a device, computer, tablet, switch or other hardware, so that they do not move when used, is crucial for some learners. For example a wheelchair user may require their communication device or computer to be secured so it is available at all times, while other learners may need a tablet to be attached to a table top to prevent it being accidentally damaged.

![Mounting system](image)

This mounting system allows an iPad to be securely mounted to a table or wheelchair tray. The cradle securely holds the iPad steady while it’s in use and still provides access to all controls and jacks. The suction mount easily attaches to almost any smooth surface and works with all editions of the iPad.

Miles Pilling also maintains a useful UK directory of apps for special needs, organized by SEN category, type of tablet, etc. ([http://aas123.org/resources/online-resources/](http://aas123.org/resources/online-resources/)). Others:

- Teach with tablets: [http://www.teachwithtablets.co.uk/bett-2013-part-4-tablet-use-for-sen/](http://www.teachwithtablets.co.uk/bett-2013-part-4-tablet-use-for-sen/)
- AAC Apps for Android: [http://appsforaac.net/content/aac-apps-android-0](http://appsforaac.net/content/aac-apps-android-0)

Other apps are mentioned in the SENnet case studies themselves in the following section.
THE CASE STUDIES IN DETAIL

The following case studies were produced by SENnet partners to show how tablets are used by students in a range of settings. They follow a standard format, with information provided under the same headings (see Annex 2).

AUSTRIA

TABLETS IN SPECIAL NEEDS EDUCATION

CASE STUDY VIDEO

http://youtu.be/TpbUhFC63U0

The case study video does not cover the above case study but shows some more ways of using technologies such as an iPad in SEN education:

Augmentative and Alternative Communication

We visited the Martin-Boos-Schule, a special school for children with severe disabilities, in Gallneukirchen (Upper Austria) to gain some insight into using digital media for augmentative and alternative communication (AAC). There are many ways to do so, including technologies such as eye-tracking or devices such as the iPad. Julian, Marcel, Vanessa and Felix showed us some of the possibilities.

BRIEF OUTLINE OF THE PRACTICE

In this case study, the influence of the use of tablets in an Upper Austrian special school with integration classes was analysed. Information about the students who are working with tablets, on the apps which are being used and on the assessment of the tablet use was collected.

WHO CONDUCTED THE CASE STUDY

The case study was conducted by LIFEtool employees DI (FH) Claudia Pointner und Mag. Thomas Burger. The contact person in the school was a committed teacher who could convince the class teachers to use iPads. The class teachers were asked about their experiences when preparing the case study.

CASE STUDY METHODOLOGY: CASE-STUDY, DOCUMENTATION ANALYSIS, OBSERVATION, DISCUSSION, INTERVIEWS WITH TEACHERS, HEADTEACHER, PARENTS AND PUPILS

The children were trained in using the iPad at school – the extent of the training depended on the needs of the child. Some of them have been using the iPad for three years, some of them started using it just a few months ago. When doing the observations, the child, the LIFEtool employees and the class teacher were present. Each observation took about 45 minutes, they were done in a quiet room of the school.

INSTITUTION WHERE THE PRACTICE WAS CONDUCTED
The practice was mainly conducted in the Johann-Eisterer-Landesschule, St. Pius 10, 4722 Peuerbach (http://schulen.eduhi.at/eistererlandesschule/). The school is situated in a rural area between Linz and Passau. However, this case study also includes the experiences which were made in other schools working with tablets.

DATE (BEGINNING AND END OF THE PRACTICE)

In the Johann-Eisterer-Landesschule, children have been working with iPads since 2012.

PERIOD OF OBSERVATION (BEGINNING AND END)

The case study was recorded on May 15, 2014 between 8am and 4pm.

TYPE OF DEVICE USED

- **Tablet** - The school and the parents agreed to use iPads only – there are 4 iPads which are owned by the school and 4 which are owned by the pupils.
- **Mobile phone** - Currently not used.
- **Other** - The school owns some outdated windows computers which are used every once in a while.

USE OF TABLET/MOBILE IN CLASSROOM

At the moment, iPads are mainly used by SEN pupils. The other children work with the desktop computers – some of them also use family iPads at home.

The choice of apps is different for every child – generally, both the pupil and the teacher prefer small and easy-to-use apps.

As the use of iPads proves to have a very positive effect, the school plans to buy more iPads in the next academic year.

OWNERSHIP OF THE TABLET(S)/MOBILE

- **BYOD** - 4 iPads
- **borrowed by the school** - 4 iPads

WIFI CONNECTION IN THE SCHOOL

- **no**

USE OF TOOLS SPECIFICALLY CONNECTED WITH THE TABLET/MOBILE

Many AAC apps and apps for learning to read, to write or for basic mathematics are used, including the ones on the following list. The links in the left column lead to the version which is actually being used (German version on the iTunes store).
Buchstaben Spielplatz ([http://bit.ly/1m0nJZf](http://bit.ly/1m0nJZf))

*Learning letters*

The app “Buchstaben Spielplatz” (3,59 €) supports children who are learning to write. There are six types of exercises – for example the learners have to match initial sounds with words or have to write words. The pupils can write themselves or can work with alphabet cards.


*Learning to write*

The app “Wortzauberer” (2,69 €) allows the users to form words by using a talking movable alphabet. Users can work with the free placement words or can write given words which are organised in word lists. It’s also possible to create custom word lists easily.


*Reading whole words*

The app, Special Words“ (12,99 €) was developed for children with Down’s Syndrome. It supports them in learning to read whole words. The users have to match pictures to words – some are included but it is also possible to use own content.


Multidingsda ([http://bit.ly/1nW0gOI](http://bit.ly/1nW0gOI))

*Learning words*

The app “Multidingsda” (free, in-app purchases) supports users in learning and consolidating basic vocabulary. It offers various levels. First the users learn words which have to be found in a picture. In following levels, these words have to be read and written. In total 40 topics are available, 2 of them can also be accessed for free.


*Picture-Text-Sound Exercises*

The app “Bitsboard PRO” (4,49 €) offers 10 exercises (3 of them are also included in the basic version - [https://itunes.apple.com/at/app/bitsboard-education-games/id516842210?mt=8](https://itunes.apple.com/at/app/bitsboard-education-games/id516842210?mt=8)) which consist of the combination of picture, text and sound. For example, the user can look at all the pictures and listen to the matching words. There is also the possibility to match texts to pictures or to write the expressions.

In the exercises, custom pictures and sound recordings can be used. In addition, there is an online database with a lot of content.

Erstes Zählen, erstes Rechnen ([http://bit.ly/1k8UE2u](http://bit.ly/1k8UE2u))
Number tracing

In the app, Erstes Zählen, erstes Rechnen" (1,79 €) the learners are asked to trace numbers with their fingers. There are also some more exercises – for example they have to match numbers and sets or have to do some mathematics themselves.

Counting and calculating with fingers

The app “Fingerzahlen – Fingermengen" (0,99 €) requires the learners to use their fingers to work with sets or to do some basic mathematics. They have to touch the display with the right number of fingers. There are four games for different learning levels: “Numbers“, “Sets of points“, ”Different Representations“ and “Calculations“.

Mathe, 3-5 Jahre (http://bit.ly/1nW23Di)  
Calculating with fingers

The app „Mathe, 3-5 Jahre“ (free, in-app purchases) comes with simple exercises which help children to get to know some basic mathematics. There are two different levels covering topics such as counting, getting to know sets, matching exercises,…

(Log Android version: http://bit.ly/1k91K7e)

Logik Spielplatz (http://bit.ly/1ACfMTY)  
Funny games – for example to learn the numbers

This app (3,59 €) includes 6 games – one of them supports children in getting to know the numbers. There are three mini games available: matching numbers to dice faces, counting sea stars and practise writing numbers.

(Android version: http://bit.ly/1oQ2XjW)

Create your own quizzes

The app “Quizmaker” (3,59 €) supports the creation of custom multiple choice quizzes. In each question, a picture (optionally with sound) is used and there are three possible answers. The app comes with some sample questions which can be used as an inspiration for your own work.

LÜK (http://bit.ly/1qrkME3)  
Mini LÜK on the iPad

In this app (free, in-app purchases), the pupils are asked to solve some exercises – they have to place six tiles on the squares showing the right solutions. If they do it right, a control pattern is formed on the back of these tiles. The app comes with six sample exercises, more are available for purchase.
Konzentration – der Aufmerksamkeits-trainer HD  
(https://bit.ly/1m0uFpe)
Concentration exercises for children
This app (2.69 €) offers many exercises for children to train their concentration. The games include tasks such as “Look Closely” or “Ear training”. In other exercises, the users are asked to memorise sequences. There are various levels of difficulty available.

SpeechCare für Kinder mit Lese-Rechtschreib-Schwäche  
(https://bit.ly/1odEccy)
Exercises for children with dyslexia
This app (49.99 €) supports children in acquiring written language skills. For example, they can practise orthography and literacy. Various types of exercises are available to meet the pupil’s needs.
(Assertion version: https://bit.ly/1oQ4fLY)

Lexico Verstehen (D)  
Promoting language acquisition
This app (free, in-app purchases) aims to train the speech comprehension, vocabulary, the retentiveness as well as auditory training. The exercises consist of sets of questions which have to be answered. There are six levels with five exercises each: Combining, Correlations, Actions, Attributes, Positions and Opposites.
(English version: https://bit.ly/1ACyUBa)

SonoFlex DE  
(https://bit.ly/1n6fWZL)
Communication interface using SymbolStix symbols
This app (159.99 €) turns symbols into clear speech and comes with more than 11,000 symbols. Users can change them or add custom expressions. The app is mainly intended for children but can also be used by adult learners. The users just have to be able to swipe the screen to switch between pages.
(English version: https://bit.ly/1txvCxp;  

MetaTalk DE  
Communication interface using METACOM symbols
This app (159,99 €) uses METACOM symbols and can be operated by buttons. It is mainly intended for children. It is possible to add custom content or new pages.
GoTalk Now (http://bit.ly/1kob07P)

GoTalk for iPad

This app (69,99 €, in-app purchases) supports the creation of custom communication pages. It is possible to link them with each other – thus complex interfaces can be built. In addition, own Visual Scene Displays can be built. Extra sets of symbols (SymbolStix, METACOM or Widgit) are available for in-app purchase. In addition, users can add and their own pictures.

AutisMate (http://bit.ly/1m0xQxa)

Communication app for autistic people

This app (129,99 €, a free version - https://itunes.apple.com/at/app/autismate-lite/id654826365?mt=8 - with less features is available as well) can be used in many ways: Visual Scene Displays can be created and linked; routines can be visualised and custom communication charts can be created. It is possible to use custom pictures or videos; the full version of the app comes with 12.000 SymbolStix symbols.

Assistive Express German (http://bit.ly/1kobD1c)

Text-to-Speech App

This app (21,99 €) converts written into spoken text – some voices are already included. The app uses the iPad/iPhone keyboard and features word prediction to minimize the number of required keystrokes. Written texts can be bookmarked – it is also possible to access previously spoken sentences quickly by browsing the recent list.


Predictable Deutsch (http://bit.ly/1qMWCZC)

Comprehensive text-to-speech app

This app (139,99 €) converts written text into synthetic speech. The integrated word prediction engine “learns” new words and contexts together with the user. Phrases and expressions which are used often can be saved as “Favourites” – there is also a history view with access to the last used phrases. In addition, it is possible to store sentences in category folders.

(English version: http://bit.ly/1u3dEjC)

Abilipad (http://bit.ly/1u31i1c)

Text-to-Speech using own keyboards

Basically, this app (17,99 €) is also a text-to-speech app but it offers many more opportunities. Like the apps mentioned above, it comes with word prediction and a spellchecker and also offers the chance to create custom keyboards. Keys can feature letters, words, sentences or pictures. It is also possible to use own content

The above apps can also be found on http://www.lifetool.at/beratung/rat-tat/app-tipp/aktuell.html?no_cache=1. This page is updated on a regular basis.
The pupils are between 6 and 14 years old.

The Johann-Eisterer-Landesschule was founded as a pure special school in 1932. In 1999, integration classes were introduced.

Currently, about 100 pupils attend this school – about half of them are taught using the Austrian curriculum for primary schools.

Close to the school, there is also the St. Pius home for people with disabilities. In addition, the Caritas offers some other services concerning the assistance, care and activities of people with disabilities. More information (in German) can be found on http://www.caritas-linz.at/hilfe-einrichtungen/menschen-mit-behinderungen/standorte/st-pius/

Basically, the children who are not taught using the curriculum for primary schools are mentally disabled. Some of them have multiple or very complex disabilities such as Down’s syndrome or autism spectrum disorders. There are also children who can hardly speak or are not able to speak at all.

This excerpt of the strategy for the support and integration of challenged learners at the Johann-Eisterer-Landesschule is relevant for the case study:

- Every human being is unique and valuable. We treat each other with mutual respect.
- For us, the diversity of humans is totally natural and enriches our lives.
- We, the teachers, aim to provide individual assistance to every child. We want to find out about their strengths and weaknesses to make sure they are not asked for too much or too little. Thus, the children retain their natural curiosity and stay interested in learning.
- The children take as much responsibility as possible for their own actions. Its extent is changeable and is different for every child.
- Being independent is the most important goal for all our pupils. For some children, this means being able to eat on their own or learning a new way to communicate. For others, it means mastering cultural skills such as reading, writing or using new media such as computers and the Internet.
- In our so-called S-classes, a focus is put on the social relationships between the pupils and on the formation of heterogeneous groups.
• Every child with special needs has his or her individual support plan. In addition, individual curriculum goals are set for children with severe disabilities. All the children are supported as well as possible considering their individual developmental stages.

• In some cases, teachers accompany the children and their parents to the doctor or therapist (LIFEtool, Institute for Neurology of Senses and Language, ...).

The entire strategy (in German) can be found on http://schulen.eduhi.at/eistererlandesschule/Foerderkonzept.htm.

Currently, there is no special strategy concerning the use of computer and new media for the support and integration of challenged learners. Nevertheless, special learning games on conventional Windows computers have been used for years. About three years ago, tablets were introduced.

### TEACHING OBJECTIVES (GENERAL AND SPECIFIC OBJECTIVES)

Depending on the curriculum used, the learning targets of the children vary – for children who work with the conventional curriculum the respective learning objectives apply.

The school’s strategy states the following: “Every child with special needs has his or her individual support plan. In addition, individual curriculum goals are set for children with severe disabilities. All the children are supported as well as possible considering their individual developmental stages. The talents of every single pupil are fostered. Children who work with the curricula of primary schools or special schools are educated individually as well.”

### TEACHING METHODOLOGY (PERSONALIZED TEACHING-LEARNING METHODS, TEACHERS’ APPROACH I.E. FOR THE SAE OBJECTIVES? FOR DIFFERENT ONES?)

The school’s strategy states:

“Teachers know the life stories and the living environments of each pupil – the things which are being taught are relevant to their daily lives.”

This principle is applied as well as possible in all areas of teaching and learning – also when using iPads. It is especially important when working with SEN pupils. However, factors such as holidays or focus weeks of the school have great influence on the teaching methodology.

### TEACHING TOOLS/MATERIALS (BOTH ONLINE AND OFFLINE)

The following iPad-apps are used at the moment – the ones marked with “*” are described in more detail below:

• GoTalk Now*: This AAC app supports the creation of communication pages as well as of communication books, quizzes, …

• MetaTalk DE*: This iPad app is based on METACOM symbols and allows users without or with limited voice capabilities to communicate.

• TouchMe Pairs: A memory game which allows users to use custom pictures.

• TouchMe PuzzleKlick: A simple cause and effect programme – pictures are uncovered little by little and the players have to guess…
• Apps for learning to read or to write, for example “Wortzauberer*” or “Special Words*”
• Apps for basic arithmetic, for example “Fingerzahlen – Fingermengen*” or “Mathe, 3-5 Jahre*”
• Apps for early learning such as “Finger Paint with Sounds”, “Big Bang Pictures” or “TouchMe HokusPokus”
• Discovery Books

CHANGES AS A RESULT OF THE ACTIVITY (PROGRESS IN STUDENTS’ ATTITUDES, KNOWLEDGE, SKILLS AND UNDERSTANDING; REACTION OF TEACHERS, STUDENTS, PARENTS...)

☐ Direct control: As the use of a computer mouse is not necessary anymore, working with the device is easier in most cases.
☐ Intuitive use: Controls are usually big and clearly arranged.
☐ Mobility/Portability: Tablets can easily be used everywhere. However, there are also some downsides to this – they can be lost or stolen relatively easily.
☐ Interactivity: Tablets foster the communication between the pupils.
☐ Direct feedback (visually and auditory)
☐ High level of motivation: A reason for this is the “cool design”.

Pros
• Huge choice of apps
• Apps are not overloaded
• Accessibility features make sense
• Closed system

Cons
• Many unsuitable apps
• Rather short activities
• There aren’t apps for all the subject areas included in the curriculum

ASSessment (Adaptations for Pupils with SEN)

Example:

Comparison of different tools in mathematics

Paper/pencil – abacus – iPad (using the app “Rechnen mit Wendi”)

If a child solves the same number of arithmetic problems with these three learning materials, it becomes evident they are less likely to make mistakes when using the iPad. In addition, they need less time for their tasks.
Some children manage to complete their exercises only if they work with the iPad – if they use pencil and paper or the abacus, they lose their focus very quickly and cannot manage to achieve a result.

Conclusion:

- Tablets don’t replace teachers
- Tablets add to the tools which have been used before
- iPads are easy to use and therefore user-friendly

**BUT**

- Information and training are important
- Concepts for the use are required

These observations which were previously made by Igor Krstoski (Lassbergschule, - Stiftung KBZO, Sigmaringen) can also be confirmed by our case study. However, neither a concept nor teacher training can be found yet – currently, the use of tablets greatly depends on the commitment of some pioneer teachers.

In the Johann-Eisterer-Landesschule, the following changes and improvements can be confirmed so far by our own observations and by information given by the class teacher:

- Higher level of concentration among SEN pupils
- Longer attention span when using iPads compared to working with other materials
- Higher level of motivation and therefore more repetitions of the exercises
- Improved communication by working with communication apps

**THEORETICAL REFERENCES AND IN-SERVICE TEACHER TRAINING (IF RELEVANT)**

- Blog about iPads and AAC: [http://uk-app-blog.blogspot.co.at/](http://uk-app-blog.blogspot.co.at/)
- Unterstützte Kommunikation, isaacs Zeitung 4/2012: UK und iPad?!
- iPads in school: [http://schule-ipad.de](http://schule-ipad.de)

**CONTINUOUS PROFESSIONAL DEVELOPMENT (DESCRIBE ANY TRAINING UNDERTAKEN BY TEACHERS TO SUPPORT THIS INITIATIVE)**

As mentioned above, there is no continuous professional development concerning the use of tablets in the Johann-Eisterer-Landesschule at the moment. The same is the case in most other schools – so it's time for pioneers!

Institutions/organisations offering training opportunities in Austria include

- LIFEtoll: [http://www.lifetool.at/startseite.html](http://www.lifetool.at/startseite.html)
- Education Group GmbH: [http://www.edugroup.at/](http://www.edugroup.at/)
- atempo Steiermark: [http://www.atempo.at/](http://www.atempo.at/)
EXTERNAL COLLABORATIONS (WHEN THEY EXIST)

In some cases, teachers accompany the children and their parents to the doctor, therapist or to institutions such as:
  
  - LIFEmoll Consulting Centre in Linz
  - Institute for Neurology of Senses and Language (http://www.barmherzige-brueder.at/site/linz/medizinpflege/abteilungeninstitute/sinnesundsprachneurologie)

LINKS ABOUT THE CASE STUDY (WEBSITE, VIDEOS, SLIDESHARE, MATERIALS, ETC.)

(Additional) links to apps which were not listed above:

  - Mathe, 4-6 Jahre (iTunes http://bit.ly/1zyGf3s)

Some pictures of a child working with an iPad (© LIFEmoll GmbH):
USE OF THE TABLET BY A VISUAL IMPAIRED PUPIL

CASE STUDY VIDEO

https://www.youtube.com/watch?feature=player_embedded&v=kA8c4qGA2fo

BRIEF OUTLINE OF THE PRACTICE

The pupil, 12 years old, uses the tablet for typing in ADIBooks (digital version of the schoolbooks) and as a board-camera. He attends the lessons in a regular school but is supported by a GON-expert of a special school for the blind and visually impaired.

WHO CONDUCTED THE CASE STUDY

Ingrid Vandenbempt (GON)

CASE STUDY METHODOLOGY: CASE-STUDY, DOCUMENTATION ANALYSIS, OBSERVATION, DISCUSSION, INTERVIEWS WITH TEACHERS, HEADTEACHER, PARENTS AND PUPILS

Observation

INSTITUTION WHERE THE PRACTICE WAS CONDUCTED

Molenholleke, a primary catholic school in Heusden-Zolder. Once a week he gets support from Ganspoel, a school for the blind and visually impaired.

DATE (BEGINNING AND END OF THE PRACTICE)


PERIOD OF OBSERVATION (BEGINNING AND END)


TYPE OF DEVICE USED

- Tablet

USE OF TABLET/MOBILE IN CLASSROOM

- use of tablets by pupil(s) with SEN (in case only one or a few pupils have access to mobile technology

OWNERSHIP OF THE TABLET(S)/MOBILE

- BYOD
WIFI CONNECTION IN THE SCHOOL

✓ yes

USE OF TOOLS SPECIFICALLY CONNECTED WITH THE TABLET/MOBILE

✓ app (please specify if the app are free, produced by the school, commercial, bought by the school etc)
  - Type on PDf free (free): he needs this to work in the ADIBooks.
  - Magnifier with light (paid by the parents)
  - Texas Instruments calculator (60 euros). Easier to work with than a real calculator because he can enlarge it on his iPad.

✓ Cloud computing application (i.e. Google, Slideshare, Dropbox etc.)
  - Dropbox to share the files

AGE OF THE PUPIL(S) WITH SEN [IF DIFFERENT FROM THE SCHOOL LEVEL REPORTED BELOW]

12 years.

CONTEXT - BRIEF SUMMARY OF SCHOOL, SOCIAL-GEOGRAPHIC CHARACTERIZATION, DIMENSION, NO. PUPILS, SCHOOL LEVEL,...

The pupil attends a primary catholic school in his municipality. He is 12 years old and attends the sixth grade. It is a class with 24 pupils. He follows the curriculum like the other pupils.

Once a week he gets support from an expert based at Ganspoel, a school for blind and visually impaired.

PUPIL(S) CHARACTERIZATION – ICF (INTERNATIONAL CLASSIFICATION OF FUNCTIONALITY) - CONDITION OF FUNCTIONALITY AND PARTICIPATION, IEP (INDIVIDUAL EDUCATIONAL PROGRAMME), CURRICULA ADAPTATIONS

Amorisis of Leber.

His functionality is limited without his compensatory tools. When there is not enough light, such as in the hallway, he cannot see anything and has to use his tactile senses to find his way.

He uses a television reading glass, an iPad, a computer, ADIBooks (adjusted digital versions of the schoolbooks) and a lamp.

TEACHING OBJECTIVES (GENERAL AND SPECIFIC OBJECTIVES)

He has to learn to use his tablet (mobile solution) very flexible. It is important that he can operate it independently and quickly so he doesn’t lose too much time on the other pupils in the class.
TEACHING METHODOLOGY (PERSONALIZED TEACHING-LEARNING METHODS, TEACHERS’ APPROACH I.E. FOR THE SAE OBJECTIVES? FOR DIFFERENT ONES?)

The teaching methodology is the same as for the other pupils in the class.

The GON-experts searches for (mainly) free apps that support him in the classroom.

TEACHING TOOLS/MATERIALS (BOTH ONLINE AND OFFLINE)

- iPad with a foot to place it on when its acts as a board camera.
- Separate keyboard for the iPad.
- Apps: Magnifier with light, dropbox, type on PDF free.

CHANGES AS A RESULT OF THE ACTIVITY (PROGRESS IN STUDENTS’ ATTITUDES, KNOWLEDGE, SKILLS AND UNDERSTANDING; REACTION OF TEACHERS, STUDENTS, PARENTS...)

- Better integration in the group;
- He is more prepared to try new things in the future;
- His digital knowledge has grown;
- He is better able to follow the lessons;
- Better scores on tests and exams.

ASSESSMENT (ADAPTATIONS FOR PUPILS WITH SEN)

Twice a year there is an evaluation of the pupil. The teacher, the parents, the expert and the CLB are present at such a meeting.

The progression of the pupil is discussed and adaptations are made where necessary. In this case every one saw the positive effects of the use of the tablet in the classroom. Not only socially but also in the cognitive progression the pupil made.

CONTINUOUS PROFESSIONAL DEVELOPMENT (DESCRIBE ANY TRAINING UNDERTAKEN BY TEACHERS TO SUPPORT THIS INITIATIVE)

- Self-study
- The teacher bought her own iPad to search and try out new apps.

EXTERNAL COLLABORATIONS (WHEN THEY EXIST)

Expert in special needs support.
DENMARK

WRITE TO READ AT SPECIALSKOLEN TEJBJERG

CASE STUDY VIDEO

http://media.videotool.dk/?vn=25_2014072122302737195016414765

WHO CONDUCTED THE CASE STUDY

Teacher Jimmy Davidsen, assistant pedagogue Morten Krogh, pedagogue Susanne Hoogendoorn and special teacher Marianne Juul Glud.

CASE STUDY METHODOLOGY - CASE-STUDY /DOCUMENTATION ANALYSIS / OBSERVATION /
DISCUSSION - INTERVIEWS WITH TEACHERS/HEADTEACHER/PARENTS/PUPILS

Evaluation of students’ portfolio and class activities

INSTITUTION WHERE THE PRACTICE WAS CONDUCTED

Special school Tejbjerg, Municipality of Kalundborg

DATE (BEGINNING AND END OF THE PRACTICE)

Autumn 2013

PERIOD OF OBSERVATION (BEGINNING AND END)

Autumn 2013

TYPE OF DEVICE USED

✓ Tablet
□ Mobile phone
□ Other

USE OF TABLET/MOBILE IN CLASSROOM

✓ use of tablets by pupil(s) with SEN (in case only one or a few pupils have access to mobile technology)

OWNERSHIP OF THE TABLET(S)/MOBILE

✓ borrowed by the school

WIFI CONNECTION IN THE SCHOOL

✓ yes
Tejbjerg is a special school at the municipality of Kalundborg.

Average social-geographic characterization (houses, apartments etc.) with pupils from Kalundborg, a municipality with a population of 48,358 citizens, on the west coast of the island of Zealand.

The school has a capacity of 40 pupils and their families, grades 1-8.

By 2014/15 the school is about to merge with two other special schools at the municipality.

Six students in a SEN class

The students used the app "Write to read" to increase their motivation and skills to work with the written language.

The specific learning objectives were to 1) learn the shape of the letters, 2) learn the sound a letter, 3) learn reading from left to right, 4) learn that a text is composed of letters, words and sentences, 5) to copy words, 6) to write small words yourself.

Differentiation to meet individual student’s need

The app “Write to read” / WriteReader (http://writereader.com/gb/app/writereader/)

Write to Read is a book creator app in which children from the age of three easily can make or participate in making their own books and at the same time learn how to write and read. The app is developed in cooperation with leading literacy and computer based researchers, teachers, parents and children.
The student products showed a big difference in students' benefits of using the app. The reason may be the written language prerequisites of the individual student or/and the individual student's motivation to work with the written language.

However, for all the students concerned there is evidence that in working with the app they are motivated to write, and they write complete sentences, unlike in the past, where they mainly wrote single letters or words.

When students' progress in terms of increased motivation and production is compared to established formal writing goals (see Teaching objectives 1-6), one may consider "giving up" on Phonics tradition in favour of a Whole-language tradition in relation to the future didactic considerations. (Frost, 1998).

Students' progress is partly due to teaching and learning being organized from a principle of functionality, and therefore the specific objectives of teaching the written language must continue to be consistent with this principle, so students do not lose motivation and thus the basis of progress in writing with respect to both formal and functional skills.

The project team at the Specialskolen Tejbjerg recommends that the app "Write to Read" is introduced in both classes with SEN students and in lower primary classes, where the principle of differentiation is given high priority.

The app "Write to read" meets with its easy access, its supporting visual and auditory possibilities and the quickly produced results the expectations, which teachers and educators have a to a successful app in written language teaching. The app can therefore create opportunities to build a framework for students' motivation for learning of the written language.

ASSESSMENT (ADAPTATIONS FOR PUPILS WITH SEN)

Students' products/portfolios were evaluated by the teachers and pedagogues.

THEORETICAL REFERENCES AND IN-SERVICE TEACHER TRAINING


Glud, M.J., Thorsted, J.(2013): Hvorfor og hvordan kan Ipads fremme motivationen for at lære at læse og skrive, når eleverne har særlige behov? (Eng: Why and how can IPads increase motivation for learning to read and write when students have SEN). Landsforeningen af Læsepædagoger


Labuz, N., Bundsgaard, J., Kjertmann, K., Jensen, A.S.(2012): Rapport fra projektet "At skrive sig til læsning" (Eng: Report from the project "To write to read"). Institut for Uddannelse og Pædagogik, Aarhus Universitet

EXTERNAL COLLABORATIONS (WHEN THEY EXIST)

The project was evaluated by lecturer Helga Borgbjerg Hansen, University College Zealand
DEVELOPMENT AND TESTING OF IPAD-BASED MATERIAL TO SUPPORT READING

Research by Mads Poulsen and Stine Torup Jensen, Center for Reading Research, University of Copenhagen m.poulsen@hum.ku.dk.

Introduction

The purpose of the project was to develop and test an iPad-based teaching material that could supplement ordinary teaching in the Danish Grade 0, the first year of preparatory reading instruction. The project was carried out in Denmark by Centre for Reading Research, University of Copenhagen. The project was funded by the Danish Ministry of Education.

Description of practice

The developed teaching material consisted of a Danish app for iPad and a companion website for the teachers. The app contained both activities where the pupils learned new skills and practiced the mastery of these skills. The pupils’ activities in the app were synced to a server, and they were summarized in a web-based dashboard, where the teachers could monitor the continuous progress of their students.

The idea behind the development was to create an app that included self-contained instructions and training in sub-skills that are necessary for reading short regular words, i.e. letter knowledge, letter-sound knowledge and phonemic awareness. The digital materials supported the classroom instruction by giving the students the opportunity to hear instructions at their own pace, and to allow repeated training with the materials in a game-based format. Another important development goal was that the students should receive immediate and constructive oral feedback to correct responses and errors in particular. The app was developed with the goal that the students at the end could try to read short regular words (e.g. Danish bi ‘bee’). It therefore consisted of five games, where the students practiced different sub-components of reading these words. Thus for example there were exercises for recognizing the letters b and i, learning the sound of the letters, learning to identify the letter sounds in spoken words, and reading the word bi. These exercises were presented to the students in a mostly fixed order so that one exercise built on the previous.

Method of assessment

The app was evaluated in a quasi-experimental field study investigating whether the students using the developed iPad-based material would show faster progress on reading sub-skills than a group of pupils with high quality, phonics-based supplemental paper materials. 356
students from 17 Grade 0 classrooms in six schools in the Copenhagen area participated in the project. The students participated in pre-testing in September 2013 and post-testing in January of 2014. Half of the participating schools used the iPad-based supplemental material. The other half used high quality, phonics-based supplemental paper materials. The teachers included the iPad activities in the classrooms. Each student had their own individual iPad, provided by the schools. The schools were responsible for hardware logistics. The teachers were asked to use the app as an activity for 15 minutes three times a week from October to December. However, actual numbers were lower since consistent classroom implementation was made difficult by hardware difficulties and incidents of large-scale theft of the iPads.

Pre- and post-testing consisted of a battery of tests of letter knowledge, phoneme awareness and reading, supplemented with control measures of vocabulary and number knowledge.

**Results**

Preliminary results suggest that training in general helped. The students that completed more iPad training rounds, showed larger relative gains in reading skills. But the iPad group did neither better nor worse than the paper-based control group on average. The results indicate that it is important to practice repeatedly with skill-appropriate materials, but that possible benefits of the digital format do not on average provide strong benefits in reading skills compared to paper materials. Only cautious conclusions can be made from the group comparisons, however. The study's nonrandomized experimental design could both under- or overestimate the effect.

Preliminary analyses indicated that the students' performance in the app showed quite strong correlations with post-test performance on reading measures. This opens the possibility of teachers using student app-performance information to monitor student progress, instead of or as a supplement to traditional individual testing. This is an area that needs further research.

**Conclusion**

The preliminary results indicated that fairly intensive training with the app improved reading skills: Students who trained more with the app, showed larger gains in reading skills. But we found no evidence that the app-based materials were more effective than phonics-based paper materials in a realistic classroom setting. The experimental design and logistic difficulties reduce our faith in the comparison between the iPad and the "paper" schools. But our impression is that the digital materials did not influence learning dramatically either positively or negatively. It is possible that larger effects will be found as schools get more proficient in dealing with the logistics, and we also identified areas where the app could be further developed to be more engaging and to better support difficult to learn subskills, such as phoneme awareness. Finally, the results suggested that student app performance can be used to monitor the real reading skills of individual students. This is an area where digital materials provide a feature that truly novel compared to traditional paper-based materials.
USING TABLETS IN TEACHING: THE CASE OF KÄO BASIC SCHOOL.

CASE STUDY VIDEO

http://youtu.be/STBs3dBykDE

BRIEF OUTLINE OF THE PRACTICE

Käo Basic School is a school where pupils with severe and profound intellectual and multiple disability study. Most of the students are mute. The school decided to start using tablets in order to establish and develop communication with mute and inarticulate children. The school received the devices in 2012 and they were funded with support by the Tiigrihüpe foundation.

WHO CONDUCTED THE CASE STUDY

• Merje Pors, HITSA, communication specialist
• Pille Tina-Kuušik, Aruküla kindergarten Rukkilill, speech therapist and special educational needs teacher.

CASE STUDY METHODOLOGY - CASE-STUDY/DOCUMENTATION ANALYSIS/OBSERVATION/DISCUSSION-INTERVIEWS WITH TEACHERS/HEADTEACHER/PARENTS/PUPILS

• Interviews with the school staff (principal Liina Pihol, special educational needs teacher Kati Kiiver and teacher Jaanika Aas).
• Observation of classes.
• School’s website: http://www.kaokool.ee/

INSTITUTION WHERE THE PRACTICE WAS CONDUCTED

Käo Basic School

DATE (BEGINNING AND END OF THE PRACTICE)

Tablets have been used in learning since school year 2012/2013.

TYPE OF DEVICE USED

✓ Tablet

OWNERSHIP OF THE TABLET(S)/MOBILE

✓ borrowed by the school

WIFI CONNECTION IN THE SCHOOL
The apps used:

Generally, Käo Basic School uses free apps, but there are also apps it has to buy. Examples of apps used in lessons:

- GoTalk: a paid for application that is meant for creating communication fields and supporting communication. The GoTalk app is an advanced version of speech communicators for tablets.
  

- My Piano: a free app that vibrates when the keys are touched. Also good for students with visual impairment:
  

- Piikea Street Xylophone: an app free of charge with which to play the xylophone.
  
  http://www.piikeastreet.com/apps/xylophone/

- Real Fireworks: a free fireworks app to practise the connection between cause and effect and movement of the hand: https://itunes.apple.com/ee/app/real-fireworks-artwork-visualizer/id489733828?mt=8

- Joy Drums: a free app that enables pupils to play drums.
  

- Camera: both filming and photographing functions are used. Also sound recording is used and it is especially useful for children who are able to make a sound and hear and watch themselves afterwards.

Also the following apps are used:

- Cine Vox: a free app which is useful for speech treatment as it encourages pupils to make sounds.
  
  http://www.sensoryapphouse.com/Cinevox.html

- Talking Tom: a free app that repeats what is said to it.
  

- Candle Free: a free app that is good for practising the connection between cause and effect – the student puts out a candle.
  

- Chalk Walk: a paid for app that is used to develop motor skills and practise the tweezer manoeuvre.
  

AGE OF THE PUPIL(S)

7-16 years

CONTEXT - BRIEF SUMMARY OF SCHOOL, SOCIAL-GEOGRAPHIC CHARACTERIZATION, DIMENSION, NO. PUPILS, SCHOOL LEVEL,...
Käo Basic School is a private school with no study fees. The founder of the school is a non-profit organisation, "Inimeselt inimesele". It is a young school that has operated since 2011. The school accepts pupils who are registered as citizens of Tallinn. If there are vacancies, pupils who live in other municipalities and have reached compulsory schooling age are also accepted. 36 students study in the school, of whom 34 follow a “care” curriculum.

**PUPIL(S) CHARACTERIZATION – ICF (INTERNATIONAL CLASSIFICATION OF FUNCTIONALITY) - CONDITION OF FUNCTIONALITY AND PARTICIPATION, IEP (INDIVIDUAL EDUCATIONAL PROGRAMME), CURRICULA ADAPTATIONS**

Coping classes are for students whose special educational needs are connected with moderate intellectual disability. The Advisory Committee has recommended for them an adapted study programme based on a simplified national curriculum. Care classes are for students whose special educational needs are caused by severe or profound intellectual disability. The Advisory Committee has recommended for them a care study programme based on a simplified national curriculum.

The following fields of action have been set out in the care curriculum: communication, social skills, motor skills, and cognitive skills. Supporting every pupil according to his/her abilities is based on a complex and objective evaluation of the student’s developmental potential, the structure of the disability and consideration of the special features of the individual student’s abilities. By taking into account every student’s individual education needs, the teachers, in cooperation with parents as well as study assistants and rehabilitation experts, compose an individual study plan which is based on the school curriculum (http://www.kaokool.ee/ul/OPPEKAVA_2014.pdf – page 6).

**PEDAGOGICAL CONTEXT OF THE PRACTICE OBSERVED (EDUCATIONAL SETTING)**

In order to perform the learning activities, the students are divided into study groups based on their abilities and skills.

All the students who took part in the Estonian language lesson were in wheelchairs and sat in the classroom around the table.

The music lesson was held in the assembly hall, where the students sat on chairs in a semicircle.

**TEACHING OBJECTIVES (GENERAL AND SPECIFIC OBJECTIVES)**

**General objectives**

The aim of the school is to create an environment which is modern, open, based on humanistic values and cooperates closely with social partners in order to support every student’s development. The priority of Käo Basic School is to ensure that every student has equal opportunities to learn and obtain basic education according to their abilities. “Studying is a part of every person’s whole development and a natural need and a basic right. The preconditions of studying are humane, tolerant attitudes and democratic collaborative relationships at school. A pupil who has followed the school curriculum acquires skills to engage in social and family life as independently as possible. In order to achieve a complex development of a basic school student, attention is paid to coordinated studying and study assistance, social care support services, rehabilitation services and parental support.”

(Source: school’s webpage)
The objectives of the observed classes

We visited two classes, an Estonian language and a music class. The aim of the music class was to practise making choices through music and to improve hand and eye coordination. The Estonian lesson’s aim was to fix the concepts of “no” and “yes”, develop the skills of visual fixation as well as eye and hand coordination and practise the ability to make choices.

Teacher Kaidi Lepik shows pictures and shares what is going to be done in the Estonian lesson: the pupils are going to communicate with a friend, use a tablet etc. Photo: Merje Pors.

TEACHING METHODOLOGY (PERSONALIZED TEACHING-LEARNING METHODS, TEACHERS’ APPROACH I.E. FOR THE SAME OBJECTIVES? FOR DIFFERENT ONES?)

In the Estonian lesson, there were four pupils with multiple disability. They were all in wheelchairs and the movement of their hands was limited. Apart from the teacher, three more people were assisting the students. The lesson started with a song and saying hello. A little bell and a PCS picture depicting the Estonian lesson were going round in class. When the teacher said the students’ names, they had to press “hello” or “goodbye” on the speech communicator. After that, the teacher introduced the programme of the lesson by using PCS pictures. At the end of the lesson, the students could choose which tablet application they wished to use. Each student had their own device. The students could also choose how they wished to communicate with their companions: whether to play the ball or pat a friend. The lesson ended with a summary and the students could press “goodbye” on the communicator. Every student had a tutor who helped with the execution of the exercises.

In the music lesson there were five students and two teachers. The teacher used two iPads in the lesson in order to help students make choices – what day is it today, do you want to sing, dance, listen to music or play an instrument, etc. The choices became more specific – what kind of dance do you want to dance, what kind of instrument do you want to play? Every student could choose a preferred activity with the help of the iPad, and the whole class took part in it.
The teachers used the principles of universal design in learning (UDL): at first a mood for the lesson was created and planned activities were introduced. The lessons were practical and the students had the opportunity to choose a suitable activity; it was also possible not to make a choice. All of the students were included. The teachers spoke slowly and clearly, used short sentences and multiple repetitions and it all contributed to a better understanding. A calm attitude, commenting on pupils’ actions, positive feedback, variety of activities – all this helped to make the most of the study process.

Mihkel is playing the drum in the Estonian lesson with the help of teacher Jaanika Aasa. Photo: Merje Pors.

**TEACHING TOOLS/MATERIALS (BOTH ONLINE AND OFFLINE)**

Four tablets are actively used in the study process, three of which are iPads and one Samsung. In addition to tablets, also communicators, communication boards and communication books with pictures, a blackboard, PCs and Smartboards are actively used.

Finding suitable applications for the tablets is a long process due to the wide selection. The applications used in the lessons are introduced below.

**CHANGES AS A RESULT OF THE ACTIVITY (PROGRESS IN STUDENTS’ ATTITUDES, KNOWLEDGE, SKILLS AND UNDERSTANDING; REACTION OF TEACHERS, STUDENTS, PARENTS...)**

The school staff find that using tablets in working with pupils with special educational needs in order to fulfil different study objectives has justified itself. Tablets give pupils with special needs an opportunity to express themselves better. Using tablets is motivating for pupils as it strengthens their will to communicate, makes the studying situation more playful and creates the feeling of success.
The introduction of tablets in Käo Basic School has diversified everyday augmentative and alternative communication (AAC) and has thus improved the conditions and possibilities of supporting the development of pupils’ communicative, cognitive and social skills. The school also considers it very important that using tablets gives pupils with special needs a chance to feel **equal among others**. If other children are using tablets then children with special needs should also have this opportunity. (Source: school’s website [http://www.kaokool.ee/client/default.asp?wa_object_id=2&wa_id=20&id_key=1ae08fdcc9dd8b4c939d56ac01d8f951](http://www.kaokool.ee/client/default.asp?wa_object_id=2&wa_id=20&id_key=1ae08fdcc9dd8b4c939d56ac01d8f951)).

A tablet can be a real discovery for some families where a child with special needs is growing up. For example, one parent of Käo Basic School was happy to find that tablet was a great tool for motivating her child. “The mother feels joy that something has been found to motivate her child to act. The parents have been starting to ask more and more how we are using the tablets at school, and want to use them in a similar way at home,” explained **Jaanika Aas**.

The topic of the music lesson was making choices: the children could choose whether they wanted to dance or listen to music, for example. Photo: Merje Pors.

**ASSESSMENT**

The school’s principal **Liina Pihol** has experienced that several students are motivated especially by the tablet. Also the school’s special educational needs teacher **Kati Kiiver** says that the motivation to act increases considerably when tablets are involved. The screen, sound and light are so exciting – more exciting than regular pictures… “To our children it is
relevant to teach the connection between cause and effect: you press and then something changes,” she added.

The teachers used the following adaptations:

• the teachers choose a suitable material for every student: a feasible game and level;
• help is offered at the closest development level;

Additional equipment (a frame, tripod) was used on tablets when needed.

[CONTINUOUS PROFESSIONAL DEVELOPMENT (DESCRIBE ANY TRAINING UNDERTAKEN BY TEACHERS TO SUPPORT THIS INITIATIVE)]

At first, when the school received the tablets, none of the staff had previously had much experience with using them. The school’s principal Liina Pihol encouraged teachers to take the devices home with them and get to know them at their own pace – so self-learning was used. Today, most of the teachers can use them. “It is not obligatory to use the tablets at our school – it is optional,” explained Liina Pihol.

“The most important thing is not to be afraid to use the device and there is no point in forcing. I’d rather let them explore by themselves and take the device home,” added teacher Jaanika Aas, to whom the other teachers turn when they have questions about the tablets. Aasa says that by now, many have smart devices at home and so the working principles are clear.

The teachers have taken a course on Smartboards and this has encouraged them to use IT in their work.

[LINKS ABOUT THE CASE STUDY (WEBSITE, VIDEOS, SLIDESHARE, MATERIALS, ETC.)]

SCHOOL’S WEBSITE: HTTP://WWW.KAOKOOL.EE/

ITALY

ICT AND INCLUSION. LEARNING TOGETHER WITH TABLETS

CASE STUDY VIDEO
http://youtu.be/MP2ESWaYOm8

BRIEF OUTLINE OF THE PRACTICE

The practice is about the use of iPads in Key Stage 3, in the lower secondary school of Cadeo and Pontenure, Emilia Romagna. R. decided to attend this school, even though it is quite far from his house, because here the use of iPads is advanced and he has to use the iPad to communicate because of his disability. In his previous school, R. was the only one to use iPad, but here he is just as all the other ones. Several apps are used and an example of collaborative activity is given to illustrate how the class is working in an inclusive way.

WHO CONDUCTED THE CASE STUDY

Silvia Panzavolta, researcher at INDIRE (www.indire.it)
Patrizia Lotti, researcher at INDIRE (www.indire.it)
Giuseppe Moscato, researcher assistant at INDIRE (www.indire.it)

CASE STUDY METHODOLOGY - CASE-STUDY /DOCUMENTATION ANALYSIS
/OBSERVATION/DIscussion-INTERVIEWS WITH TEACHERS/HEADTEACHER/ParentS/PUPils

• observation
• discussion and interviews with teachers, head teacher and pupils
• documentation analysis

INSTITUTION WHERE THE PRACTICE WAS CONDUCTED

Lower secondary school “Francesco Petrarca”, Pontenure (Piacenza)

DATE (BEGINNING AND END OF THE PRACTICE)

School year 2013/14

PERIOD OF OBSERVATION (BEGINNING AND END)

May-June 2014

OWNERSHIP OF THE TABLET(S)/MOBILE

✓ borrowed by the school

WIFI CONNECTION IN THE SCHOOL

✓ yes

USE OF TOOLS SPECIFICALLY CONNECTED WITH THE TABLET/MOBILE

✓ app (please specify if the app are free, produced by the school, commercial, bought by the school etc) - Write to read (see Teaching tools)
✓ Cloud computing application (i.e. Google, Slideshare, Dropbox etc.)

R. uses a specific App for alternative communication, “TapSpeak”. The app was tested first as a trial and then purchased by R.’s family. The vocabulary provided in the app is constantly improved by an educator who can program apps.

Another fundamental app for R. is “BookCreator”, because he uses it to create small thematic units, assembling images on certain topics, and to animate them in small videos/slideshows.

Like his mates, he uses many apps (mainly free) for content learning (as the one used in the activity observed), especially for music, English language, geometry, sciences and geography.

He personally goes to the App Store to find the apps to play with and to communicate better.
Cloud computing applications (such as Dropbox) are also used to share digital material within classmates.

R. is aged 11 and he is attending Key stage 3, 1st year.

The institute is made up of primary and lower secondary schools (six buildings in total) and it is the reference school for two small towns, the Municipality of Pontenure and the Municipality of Cadeo, both with demographic growing-up trends. There are 54 classes and a total number of 1,350 students.

All the classes are heterogeneous and have been arranged on the basis of students’ competences, skills and behaviors in order to get classes with the same mixture.

The school educational principle is considering each single student - with his/her personality, interests, skills, talents and peculiarities - as the centre of the school ecosystem, where all his/her networks and human relations (family, friends, etc.) play an important role.

The institute has had formal agreements with the two Municipalities for twenty years, since school-territory relationships are considered to be very important to guarantee a sense of community, citizenship and active participation.

The mission of this school - they say - is to make it possible for students not only to learn hard skills and subject contents but also to learn soft skills, that is personal autonomy, critical thinking, creativity, communication and relational skills so that, later on in their life, they can use all their potential.

This school would like to represent an "Accessible and Inclusive School", a school of everyone and for everybody, where each one could feel to be welcomed and provided with the best tools, facilities and competences that fit his/her own specificities.

The school participates in many research activities and projects – at local, national and international level – and carries out innovative school projects on its own as well. Just to mention one, the project Libr@, started in the school year 2013/14, provided all the lower secondary students (Key stage 3, 1st year) with iPads and digital textbooks.

R. decided to attend this school, even though is far away from his house, because of this project, because he would not feel different from his mates – which used to happen in his primary school, since he was the only one using the iPad for communicating.

The school has a large library, serving the entire community and lending e-books and dvds (they have a very big collection of movies, documentaries, etc.) and it is open in summer to offer students and the community learning opportunities but also entertainment occasions.

Teaching methodologies are the core of innovation, technology comes later, as a consequence – they say. Collaborative approaches, enquire-based learning, non-graded classes, personalized teaching/learning, microteaching, these are just some of the methodologies being used by teachers, who are constantly updating themselves with professional developments courses.
To sum-up, the distinctive traits of the school are:

- inclusive community,
- school as a civic centre,
- lab approach to curriculum subjects,
- non-graded system,
- device 1:1,
- open and innovative learning environments (#anchelospazioinsegna),
- just-in-time professional development,
- school-family deep relations,
- school open in summer,
- research projects on the use of the iPad with learning difficulties (dyslexia etc.),
- research projects on the use of the iPad with autistic students,
- e-learning and e-teaching.

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**PUPIL(S) CHARACTERIZATION – ICF (INTERNATIONAL CLASSIFICATION OF FUNCTIONALITY) - CONDITION OF FUNCTIONALITY AND PARTICIPATION, IEP (INDIVIDUAL EDUCATIONAL PROGRAMME), CURRICULA ADAPTATIONS**

ICD 10 – code G82.4.

R. is suffering from a spastic tetraplegia and can use his head and arms in a very limited way. He uses a wheel-chair.

R. has serious difficulties in chewing and swallowing, his food has to be minced and chopped up before eating and it is important to pay attention during snack times and lunches.

He also suffers from low-vision and strabismus.

He cannot communicate verbally, a part from the word “mum” and some conventional sounds to indicate whole words. He therefore communicates by using a specific app on his iPad that can manage speech synthesis and it is based on the alternative augmented communication model.

Despite these severe limitations, R. is very curious of the different aspects of life and of the people he meets. He can rely on a large family, in which other members have different health problems and where there is a mutual cooperative system of care, making him feeling understood and accepted. He is always smiling and determined, so he has a strong emotional impact on other people.

R. uses the iPad to have fun and he’s always looking for new games. He also searches for apps that can improve his communication. He uses a specific app for alternative augmentative communication, which has also been further developed by some professionals, according to R.’s cognitive and relational development.

At the moment, R. uses the following tools:

- for communicating: a professional personalization of the app TapSpeak, with emoticons for faster linguistic exchanges with his friends; Skype, with the help of one of his family, to communicate with mates and teachers during the out-of-school time;
- for expressing his emotions: digital collections of photographs and songs (he loves classical and pop music and he listens to music during car trips);
• for playing: the videogame FIFA 14 (because he is a football fan) and an app for managing the football market.

As for the motivation to study, R. is a smart guy even though he is interested in learning only if somebody he trusts asks him to do so. He spontaneously would play all the time.

PEDAGOGICAL CONTEXT OF THE PRACTICE OBSERVED (EDUCATIONAL SETTING)

R. is supported by various professionals, inside and outside the school:

• the SEN teacher, O. C., at school;
• one educator, M. B., who knows R. since the primary school he used to attend in Piacenza. She visits him twice a week;
• one educator provided by the Municipality;
• the physiotherapist;
• the speech therapist;
• the Research Institute “E. Medea” and the Association “La nostra famiglia” of Bosisio Parini (http://www.emedea.it/index.php), located in Lecco, where doctors do a general check-up once a year and give suggestions on cognitive challenges to be faced by the boy.

All these professionals meet regularly via Skype and keep in touch via mail on a weekly basis.

TEACHING OBJECTIVES (GENERAL AND SPECIFIC OBJECTIVES)

R. follows an individualized educational plan (IEP) even though teachers (curriculum teachers and the SEN teacher) include him in almost all group and class activities. The strategies to include him are also discussed in class with R. and his mates. R. is very open about his disability and it is not a problem to speak about it. The SEN teacher is not the only person taking care of him in class. Spontaneously, his mates sit next to him and help him expressing his will and emotions or communicating his thoughts. It is interesting to notice that the most problematic pupils, when taking care of R., become calm and collaborative.

Roberto follows partly a personalized curriculum and partly the class curriculum, but the use of technology ensures him an inclusive environment. His IEP is based on his communication ability and on his cognitive competences (such as generalization, memorization etc.). His motivation depends on the relationship R. is having with the teacher and it is only partly predictable.

One example of individualized activity presented by his teachers is about Medieval history. The class was studying the Middle Age and R. together with his SEN teacher searched images related to that historical period on the web (i.e. castles, knights, abbeys etc.) and created a video while the others could also write detailed compositions.

In grammar, things are more complicated and he follows a specific program with individualized objectives because the Italian grammar is very complicated for him. At the time of the SENnet observation he was studying the structure of the sentence rather than simple
linguistic units and their functions, as his mates were doing, in order to improve his linguistic competences, as suggested by the external professionals that are following him.

**TEACHING METHODOLOGY (PERSONALIZED TEACHING-LEARNING METHODS, TEACHERS’ APPROACH I.E. FOR THE SAME OBJECTIVES? FOR DIFFERENT ONES?)**

The teaching methodology is based on microteaching and on interdisciplinary small units so that R. can work with images, videos, pictures and short sentences. This helps him understanding and memorizing, minimizing efforts and maximizing outcomes.

R. uses alternative augmentative communication systems, especially by using an app on the the iPad called TapSpeak, which is free for trial.

![Picture of TapSpeak app](image)

When the INDIRE researchers went to R.’s class to carry out the SENnet observation, an example of inclusive activity using the iPad was shown.

The activity was about the task of writing a descriptive text. The classroom setting was arranged in "islands" (group of 4 desks) where students worked in group. There were 4 groups and R. was in one of those, together with his SEN teacher.

In this activity, within each of the 4 groups, the students had different roles (namely the Observer, the Surfer, the Coordinator and the Critical Friend). The groups composed in this way work for one month and then the students are mixed-up again to form new combinations.

The teachers explained that students like very much this education setting and that are using it quite often.

Each group has to describe one of their mates by using the app “Note”. The teacher gave 20 minutes to produce a collaborative description and they had to speak quieter in order not to be heard by the other groups, since later on there would be a game where the 4 teams would try to guess who’s who and would compete to win. Then two students for each group went in a silent place (i.e. library) and used an app called “Tellagami” to give a voice to their classroom characters (this tasks lasted 10 minutes). The other members of the group remained in the classroom and added some more details to their description, by using the app “Pic Collage”.

As for the latter task, or adding further details to the character, this was quite difficult for R. thus he used an English app to learn the names of the parts of the human body.

After all the students had returned from the voice recording session, the competition started. The 4 teams moved to the library. There was a student annotating the teams scores (1 point for a right guess and -1/2 for a wrong guess) and R. had the task to tell everybody the teams’
guess, by using his speech synthesis app. Every group was showing the video obtained by using "Tellagami" and it was a very funny moment (R. was very happy and made jokes of the wrong guess).

TEACHING TOOLS/MATERIALS (BOTH ONLINE AND OFFLINE)

R. uses two tablets, one for alternative augmentative communication – that he uses at home as well - and one for running specific apps for content learning. Sometimes he also uses paper-based sheets and material, but digital contents and the iPads are used for the majority of his school time.

R.’s class uses the iPad for about 60% of their school time. Certain curriculum subjects are taught using only the iPad and digital contents (history of art, music, geography, history) since teachers produce their own textbooks. For other curriculum subjects (maths, Italian language and science), a mix of both digital and paper-based content is used.

The digital content that R. uses is partly designed by a team of professional of the Association "La nostra famiglia" of Lecco. They also give advice on what content R. should work on.

CHANGES AS A RESULT OF THE ACTIVITY (PROGRESS IN STUDENTS’ ATTITUDES, KNOWLEDGE, SKILLS AND UNDERSTANDING; REACTION OF TEACHERS, STUDENTS, PARENTS...)

R. is progressing together with his mates, and participating in classroom activities and group work.

His curriculum of history is almost completely the same as the classroom one, just a little bit simplified. Geography and science are taught as a joint curriculum subject and a selection of topics has been made by the SEN teacher in relation with possible experiences, to make his learning easier.

For learning English, he uses the app Fun English, with words categories (colors, numbers, fruits, animals etc). At the beginning of the school year, teachers thought that R. would had liked to learn the informatics terminology but later on they found out that R. likes to learn other terms, so they decided to implement other thematic terms. R.’s IEP does not include a second foreign language. For mathematics he uses various apps, some with demonstrations and some with games. During art lessons, he makes handmade works, by using tools he can hold or apps that the class tests with him. He also likes anecdotal biographies of artists. R. loves his music teacher and when it is possible he is the percussionist of the class (with various apps).

R.’s priorities concerns two main learning objectives: the extension of life skills for his personal autonomy and the improvement of his communication skills. As for the latter areas, his educational path is the same as his mates. The teaching strategy that is most effective for him is the learning unit, tuning its schedule with his interests and needs.

In order to improve his communication skills, the Research Institute "E. Medea" and the Association "La nostra famiglia" have been studying a personalised educational programme since 2007.

Teachers say that all the professionals working with him are networked and exchange information, meet regularly on Skype and study ways to guarantee the best opportunities for R. to improve his social, cognitive and emotional potential.
ASSESSMENT

As for the assessment, since R. cannot speak (the only word he can say is “mum”), the tests are often multiple choice tests and maps. Assessment sheets can be digital or paper-based.

R. does not have a natural interest for the topics that are far from his everyday life. However, he trusts his teachers, who understand and help him, and he’s motivated to learn the new topics they propose him because of this deep relationship. Therefore, when a teacher he trusts assigns him a task, he does it. He studies if he is scaffolded and if well structured tasks are given to him. Assessment is based, as for history, geography and sciences, on multiple-choice tests since he can only give yes-no answers.

The teacher reads the questions and he selects the one he thinks it is correct. Together with his SEN teacher and the extra-school educator, R. studies the questionnaire items and tries out if they work.

One of the biggest satisfaction for R. is to review the topics he remembers better with his mates and to compete with them.

THEORETICAL REFERENCES AND IN-SERVICE TEACHER TRAINING

Canevaro Andrea (a cura di), L'integrazione scolastica degli alunni con disabilità. Trento, Erickson, 2007

Janes Dario, Bisogni Educativi Speciali e inclusione. Valutare le reali necessità e attivare tutte le risorse. Trento, Erickson, 2006

Nocera Salvatore “Il diritto all’integrazione nella scuola dell’autonomia – gli alunni in situazione di handicap nella normativa scolastica italiana”, Trento, Erickson, 2001

Pavone Marisa, Personalizzare l’integrazione. Brescia, La Scuola, 2004

CONTINUOUS PROFESSIONAL DEVELOPMENT (DESCRIBE ANY TRAINING UNDERTAKEN BY TEACHERS TO SUPPORT THIS INITIATIVE)

The school where the case study was conducted is also one of the Local Support Centres for ICT in SEN education for the Provinces of Parma and Piacenza, in the Region of Emilia Romagna (Central Italy). It promotes continuous professional development initiatives to teachers from the school and outside the school and offers consultancy on assistive technologies for all kind of disabilities and lending services.

In the school year 2012-13, 30 professional development courses were given, based on a just-in-time model. The school is also part of the Ministry of Education network of innovative schools and it is collaborating with INDIRE in many research and innovation projects.

The main areas of research, innovation and training are the following ones:

- innovative use of learning environments (physical and virtual);
- inclusive teaching;
- curriculum development;
- inquired-based learning and lab approaches;
• innovative teaching/learning methodologies, also with the use of ICTs.

Training courses are offered on the basis of real needs and skills of teachers and aim at mastering specific competences, problem-solving oriented, in specific learning/teaching contexts and situations.

One of the recent areas of interests of teachers is about the use and programming of apps for educational purposes.

The school is also participating in some European projects coordinated by EUN, where INDIRE is a Consortium member, namely the Creative Classrooms Lab project and the Living Schools Lab project.

**EXTERNAL COLLABORATIONS (WHEN THEY EXIST)**

• the Municipality

• the Research Institute “E. Medea” by the Association “La nostra famiglia” of Bosisio Parini, in Lecco

**LINKS ABOUT THE CASE STUDY (WEBSITE, VIDEOS, SLIDESHARE, MATERIALS, ETC.)**

• News on the school observation visit conducted in 2013 within the LSL project by the University of Wolverhampton, [http://tinyurl.com/kaougw6](http://tinyurl.com/kaougw6)

• Video presented during the LSL summer school in Dublin, 16-18 May 2014, on inclusion with ICTs and tablets, [http://www.youtube.com/user/IstComprensivoCadeo?feature=watch](http://www.youtube.com/user/IstComprensivoCadeo?feature=watch)

• Video documenting lessons with iPad in several curriculum subjects, [http://www.youtube.com/watch?v=BP8Biuo7yrk](http://www.youtube.com/watch?v=BP8Biuo7yrk)
TABLET USE IN AN EDUCATIONAL CONTEXT BY A STUDENT WITH SPECIAL NEEDS

CASE STUDY VIDEO

https://www.youtube.com/watch?v=Tbb2LY2Xb6w

Case Study Prezi:

http://prezi.com/__hvgevm10lj/?utm_campaign=share&utm_medium=copy&rc=ex0share

BRIEF OUTLINE OF THE PRACTICE

Observation and analysis of the school situation of a student with special educational needs in the 1st year of primary school regarding the use of a tablet: need, implementation and results

WHO CONDUCTED THE CASE STUDY

The team that conducted the study was made up of teachers working with CRTIC Porto, Fernanda Cerqueira and Manuela Torres, both specialists in the area of Mental/Motor disability.

CASE STUDY METHODOLOGY - CASE-STUDY /DOCUMENTATION ANALYSIS /OBSERVATION/DISCUSSION-INTERVIEWS WITH TEACHERS/HEADTEACHER/PARENTS/PUPILS

We approached the study through the case study method using the following: documentary analysis; observations (direct/indirect in a natural environment); capturing images (photo and video), meetings (with those responsible for the pupil's education and the therapists that provide him with external support); interviews with the Special Education, Class and Support teachers.

INSTITUTION WHERE THE PRACTICE WAS CONDUCTED

Santa Cristina Primary School - Levante da Maia School Cluster.

DATE (BEGINNING AND END OF THE PRACTICE)

January-June 2014

PERIOD OF OBSERVATION (BEGINNING AND END)

March-June 2014

OWNERSHIP OF THE TABLET(S)/MOBILE

✓ other: own equipment provided by MEC
WIFI CONNECTION IN THE SCHOOL

✓ yes

USE OF TOOLS SPECIFICALLY CONNECTED WITH THE TABLET/MOBILE

✓ app (please specify if the app are free, produced by the school, commercial, bought by the school etc)

Due to the student profile, we chose to provide a limited number of apps, so he would not lose concentration while using them. Apps were sought that were attractive and that featured sounds, images and movement to capture his attention.

Another criterion was that the apps had to be free.

Free Microsoft apps:

• for mathematics: Kids Play and Learn and Kid’s Animal - connectable dots;
• for Portuguese: Discover ABC (lite); attention and memory: Angry Birds (memory game with 3 levels of difficulty).

✓ Other: PowerPoint

Several PowerPoint presentations related to skills acquisition were produced or adapted by the Special Education teacher in collaboration with CRTIC Porto: sequences, opposites, drawing numbers, choosing the correct word, 28 words method, geometric shapes, counting, colours.

AGE OF THE PUPIL(S)

Luís is 7, the age corresponding to the 1st grade of primary schooling.

CONTEXT - BRIEF SUMMARY OF SCHOOL, SOCIAL-GEOGRAPHIC CHARACTERIZATION, DIMENSION, NO. PUPILS, SCHOOL LEVEL,…

The Levante da Maia School Cluster, located in the suburbs of the city of Porto in the municipality of Maia, includes schools in the parishes of Folgosa, Milheirós, Nogueira, Silva Escura and São Pedro de Fins. Demographically, the populations of these parishes are multi-centred, with the highest population density in the oldest centres in the vicinity of their respective parish churches. In terms of demographic change over the last decade, the resident population has increased significantly, albeit below the average for Maia. This trend applies to all demographic indicators except household composition, where the average family size in Levante da Maia is higher than the mean in the municipality. This indicates a population structure of the peri-urban type, where the marks of recent urbanism blend with the area's rural past.

• Levante da Maia School Cluster
• Total number of pupils: 1511
• Pre-school (ISCED 0): 278; Primary (ISCED 1): 546; Elementary (ISCED 2): 236; Lower Secondary/CEFPP (ISCED 2) and vocational courses: 365; Upper Secondary (ISCED 3): 86
The Santa Cristina Primary School is located in Folgosa, a parish that lies 8 km to the east of the centre of the municipality of Maia in the district of Porto. The parish has a population of around 3300 inhabitants.

The Santa Cristina Primary School has 7 rooms (4 classrooms for the 1st cycle, 2 for Kindergarten and 1 for resources), is well lit and ventilated, and has 4 toilets for the 1st cycle and 3 for Kindergarten, as well as a small canteen. The school also has a playground and a small covered area in which the pupils can take shelter on rainy days.

The school has IT facilities (e.g. interactive whiteboards) with a fixed Internet connection in classrooms and other audiovisual resources on which teachers and pupils can carry out certain activities.

Total: 111 pupils (2 Kindergarten classes and 4 Primary School classes).

<table>
<thead>
<tr>
<th>PUPIL(S) CHARACTERIZATION – ICF (INTERNATIONAL CLASSIFICATION OF FUNCTIONALITY) - CONDITION OF FUNCTIONALITY AND PARTICIPATION, IEP (INDIVIDUAL EDUCATIONAL PROGRAMME), CURRICULA ADAPTATIONS</th>
</tr>
</thead>
</table>

The student presents comprehensive global delayed psychomotor development with characteristics of Pervasive Developmental Disorder (PPD-NOS).

The findings of an assessment of the pupil with reference to ICF (International Classification of Functioning, Disability and Health) are listed below.

**Body functions:**

**Muscle power functions** (b730.8) (GDQ59) - Luís is clumsy, with poor motor coordination and impaired balance.

**Temperament and personality functions** (b126.8) – In the personal/social area (GDQ66) he has difficulty in feeding himself adequately; difficulty using two items of cutlery simultaneously; unbuttons but cannot button his clothes; has difficulty undressing/dressing himself, even with simple items of clothing; does not know his date of birth or where he lives. His weak fine coordination does not contribute to the optimal development of these skills.

**Mental functions of language** (b167.8) – The area of hearing and language (GDQ81) is progressing well. He presents a low-average level of verbal expression, but fails on items that assess verbal comprehension and has great difficulty constructing answers to questions.

**Control of voluntary movement functions** (b760.8) – He has marked difficulty in the area of hand-eye coordination (GDQ56): he cannot thread 6 beads on a string; he has difficulty handling scissors and folding paper; he copies only a cross and a circle; and he represents the human figure in a very rudimentary, immature way. He is a little better in the area of making (GDQ69): he puts things together in relatively good time, reproducing certain patterns with cubes, while his bridge construction is rudimentary, making a train pass under the bridge, with uncoordinated movements. He can put cubes in their respective boxes.

**Orientation functions** (b114.8) – In the area of practical reasoning (GDQ68) the results are reasonable, reflecting the targeted stimulation he has received: he has an idea of big and small, and largest and the tallest, but not yet high and low, longest or the heaviest, or the concept of faster. He can count four cubes, associating the number with the quantity, and repeats 2 and 3 digits; he understands morning and afternoon.
**Activity and Participation:**

He presents a satisfactory level of independence for his age, but still needs to be supervised by an adult for many basic tasks, particularly in the areas of dressing (d540.1), eating (d550.1) and hygiene, where he presents some errors in the use of the bathroom and in hand-washing (d510.2, d530.2), but he is improving in this area.

He presents difficulties in motor skills and fine motor skills (d440.3), in the perception and comprehension of oral messages and in the preparation and organisation of oral messages with meaning (d310.2). He has some difficulty establishing dialogue and organising ideas, and his oral expression with respect to semantic and symbolic meaning is poor (d315.2). He has difficulty paying attention for a long period of time. He has difficulty maintaining his attention and concentration on a particular task (d160.3), and is unable to complete complex tasks independently, as he needs the guidance of adults. However, we are seeing improvements, with the pupil performing his work alone in certain situations. This is related to his powers of concentration and ability to pay attention to the activity he is engaged in, as well the importance of silence in the classroom, because noise causes him serious disruption and makes him more agitated and nervous.

The student has not had much difficulty adapting to new situations that have previously been well explained to him so that he already knows what he will do, when and how (d2409.2). However when asked to report situations that have occurred, or relate short stories, he is unable to do so coherently (d330.3). He recognises vowels and some letters, especially those forming his name. (d140.3) He can write the vowels and his first name, but needs guidance (d145.3). He has difficulty working with numbers and performing simple arithmetic, such as using mathematical symbols for addition and subtraction and applying the correct mathematical operation to a problem (d150.3)

**Educational measures defined in the Individual Education Plan (IEP):**

**Personalised educational support** (article 17)

a) Reinforcing the group or class strategies used in terms of organisation, space and activities.

   The pupil must sit close to the teacher so that he can be supported in the activities he undertakes.

b) Encouraging and strengthening of the competences and skills involved in learning.

c) Anticipating and reinforcing content learning taught within the class or group.

d) Strengthening and developing specific skills.

Personalized educational support should be provided by the class teacher and the Special Education teacher to strengthen and develop strategies aimed at developing specific skills in the areas in which the pupil has more difficulty, as indicated in his Functionality Profile. The Special Education teacher will also work on anticipation and/or the reinforcement of content learning.

The Special Education teacher, in partnership with the class teacher, adapts different strategies and methodologies that best contribute to the pupil's educational, personal and social success.

**Individual Curricular Adaptations** (article 18) (attach adjustments)
b) Introduction of intermediate objectives and content, according to the target skills for the year or course, and the characteristics and specific learning difficulties of the pupils.

In the curriculum for Year 1, certain recommendations must be taken into account, such as:

- Reducing visual and auditory distractions, because the student is distracted and does not focus on the task at hand;
- Allowing the pupil time to answer questions;
- Promoting attention, autonomy and motivation for school activities;
- Increasing his autonomy in carrying out individual tasks through a progressive reduction in the aid provided by the adult;
- Alternating between more active and more passive tasks, and between complex and less demanding activities;
- Use of extended visual supports, if necessary, to facilitate the learning of more abstract concepts;
- Investing in strategies to facilitate the pupil's learning success;
- Use of positive reinforcement whenever the pupil successfully performs the proposed activities or shows particular commitment or effort to achieve them;
- Checking with the pupil if he has understood the instructions given to the class.

Adjustment of the evaluation process (article 20)

a) Changing the type of test.

b) Adaptation of assessment and certification tools.

c) Adaptation of assessment conditions (ways and means of communication, frequency, duration and location).

These changes should always take into account the individual curricular adjustments, one of the educational measures for pupils with SEN in national legislation. Objective and short-answer tests should be used, and the pupil should be given more time to do them; activities should be divided into small tasks; direct, unconnected questions should be used with multiple choice answers (T or F); pictures should be used to reinforce content acquisition.

Technological support (article 22)

Tablet - Bearing in mind the development of skills, whether at the level of visuomotor coordination or in terms of academic learning (reading, writing, and arithmetic), the use of the tablet is suggested as a useful and motivational tool, not only through word processing, but also through the use of specific educational software, which the CRTIC (ICT Resource Centre for Special Needs) may propose in the future.

PEDAGOGICAL CONTEXT OF THE PRACTICE OBSERVED (EDUCATIONAL SETTING)

Brief analysis of the Year 1 group.
The class comprises 17 pupils (8 boys and 9 girls), all at the beginning of compulsory schooling.

There is 1 pupil, Luís, with SEN. The class works in one classroom, using other educational spaces when necessary. Luís attends class full time.

The class has a regular class teacher, an educational support teacher and a special education teacher (3.5 hours per week of Special Education support provided by a specialist teacher and 1.5 hours of educational support provided by a Primary School teacher).

They have extracurricular activities after school hours on the school premises: Physical Education - twice a week; English - once a week; and Playful and Expressive Project Work - twice a week.

During the case study, we observed the student working individually with a special education teacher, during the 1st phase of implementation of the tablet as a learning resource.

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**TEACHING OBJECTIVES (GENERAL AND SPECIFIC OBJECTIVES)**

**General objectives**

- **Language/communication**
  - Oral communication with progressive autonomy and clarity;
  - Development of language and communication skills.

- **Reasoning**
  - Progressive discovery of numbers

- **Autonomy**
  - Progressive discovery of the body

- **Socialisation**
  - Know and apply rules
  - Mobilise and enhance cognitive abilities

**Specific objectives**

- **Language/communication:**
  - Express yourself on your own initiative;
  - Describe drawings, pictures, paintings;
  - Understand simple oral stories;
  - Associate words with pictures;
  - Recognise the vowels;
  - Make artwork;
  - Write your name in cursive script;
  - Play writing games (with letters and words);
  - Transmit simple oral messages;
• Reasoning
  o Associate numbers with quantity (up to 10);
  o Quantify groupings and gradually discover numbers;
  o Make additions using objects and pictures;
  o Make subtractions using objects and pictures;
  o Count using objects and pictures;
  o Complete figures;
  o Establish the relationship of size between numbers using the >, < and = symbols

• Autonomy
  o Talk with the pupil about his name, age and sex;
  o Draw his body;
  o Talk about his tastes and preferences;
  o Draw his close family;
  o Recognise pleasant and unpleasant situations.

• Socialisation
  o Know the classroom rules;
  o Respect other pupils and adults;
  o Develop attention span through games;
  o Reduce the frequency of interruption or attempts to give up the task;
  o Develop an interest in the outcome of the tasks;
  o Decrease stereotyped behaviour;
  o Stabilise his behaviour;
  o Use expressions of courtesy (good morning, thank you, excuse me, etc.)

The curriculum followed by the pupil includes all areas of the curriculum that apply to the other pupils in his class.

Support from a special education teacher is coordinated with the main class teacher, and can be undertaken in the classroom or in other contexts for individual support.

For the introduction of the tablet as a support technology, individual work periods were adopted in a specific space, where the main task was to strengthen and develop basic skills in the use of the tablet, and a programme to promote skills in the use of this equipment was
developed (equipment operation, use of different environments, recognition of the equipment as a working tool), encouraging its use for future application in everyday classroom contexts.

Luís was closely and systematically monitored by the class teacher and also by the educational support and special education teachers.

Use of motivational factors for the student.

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**TEACHING TOOLS/MATERIALS (BOTH ONLINE AND OFFLINE)**

Use of the tablet in a controlled educational environment with supervision, and with judicious and suitable use of digital media in an educational environment in conjunction with other media.

The tablet has features that influenced the choice of this tool, such as the fact that it allows access to USB resources (external connections).

Offline: production of worksheets and educational resources in Powerpoint, Paint and Word to work on the tablet or using the tablet as a complementary resource for conducting academic activities in other formats (graphics, oral interpretation, etc.). The use of free apps was also intentional.

Online: The school's fixed network is accessible only in the classrooms. In the context observed there was no Wi-Fi network, nor was there the possibility to use one.

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**CHANGES AS A RESULT OF THE ACTIVITY (PROGRESS IN STUDENTS’ ATTITUDES, KNOWLEDGE, SKILLS AND UNDERSTANDING; REACTION OF TEACHERS, STUDENTS, PARENTS...)**

At this point the pupil knows how to use the tablet functionally. Progress has been made with regards to attention span and the fine motor skills necessary to use the equipment. In academic results, there is a gap in relation to the class and in terms of what is expected at this level in Portuguese and Maths, but the objectives in the area of Environmental Studies have been achieved.

The school, the pupil and the family recognise the tablet as a useful tool that facilitates access to the curriculum.

Luís will continue to use this resource in the coming school year, during which time one of the aims will be to implement its use in the classroom, possibly combined with other existing technological resources (e.g. interactive whiteboard).

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**ASSESSMENT**

The evaluation of this implementation phase was measured through a joint discussion with the teaching team to analyse the pupil's progress. The following observations were made about the tablet:

- It is an easy and intuitive resource given the pupil's limitations. He likes to use it and it can be used in different contexts.
- It provides portability and mobility to different spaces, customisation, and enables access to educational materials that are not dependent on the Internet network.
• The tasks have proven to be relevant learning experiences, and are both a teaching and learning resource, enabling training in basic skills.
• It is a potential teaching and learning tool thanks to the ease of building worksheets and other resources.
• Receiver of information and content (allowing the use of digital content through USB).
• It is a stimulus to learning.
• It allows tasks and activities to be planned.

THEORETICAL REFERENCES AND IN-SERVICE TEACHER TRAINING

http://acessibilidade.pbworks.com/w/page/1308503/NEE - Accessibility: SEN
http://www.educare.pt/noticias/noticia/ver/?id=24524&langid=1 – Complementarity between All Teaching Resources Is the Key to Educational Success
https://www.google.pt/?gws_rd=ssl#q=Contributo+do+iPad%C2%AE+para+o+desenvolvimento+de+crian%C3%A7as+com+Necessidades+Educativas+Especiais, Contribution of the iPad® to the Development of Children with Special Educational Needs

CONTINUOUS PROFESSIONAL DEVELOPMENT (DESCRIBE ANY TRAINING UNDERTAKEN BY TEACHERS TO SUPPORT THIS INITIATIVE)

The teacher was trained in the area of support products. The monitoring process was supported by CRTIC Porto.

EXTERNAL COLLABORATIONS (WHEN THEY EXIST)
http://creative.eun.org/ - How Can Tablets Support New Ways of Teaching and Learning in Schools?


TABLET APPLICATION IN SEN

CASE STUDY VIDEO

http://youtu.be/SYBbSLdfb3M

Parent’s view: https://www.youtube.com/watch?feature=player_embedded&v=a6JlZnpDrsq

WHO CONDUCTED THE CASE STUDY

Observation and application by SEN teacher Berat ÇELİK, Mehmet ULUCAN SEN School for autistic children, Ankara. The interviews and video studies have been realized by Ministry of Education, Innovation and Education Technologies Directorate

CASE STUDY METHODOLOGY - CASE-STUDY /DOCUMENTATION ANALYSIS
/OBSERVATION/DISCUSSION-INTERVIEWS WITH TEACHERS/HEADTEACHER/PARENTS/PUPILS

Interview with the teacher, interview with a parent, research on internet

INSTITUTION WHERE THE PRACTICE WAS CONDUCTED

Mehmet ULUCAN SEN School for autistic children, Ankara

DATE (BEGINNING AND END OF THE PRACTICE)

4 years of period by the teacher

PERIOD OF OBSERVATION (BEGINNING AND END)

Video study on 29 September 2014

OWNERSHIP OF THE TABLET(S)/MOBILE

✓ BYOD (by APPLE)

WIFI CONNECTION IN THE SCHOOL

✓ no

USE OF TOOLS SPECIFICALLY CONNECTED WITH THE TABLET/MOBILE

✓ app
✓ National/international repositories of digital resources: http://www.eba.gov.tr/

AGE OF THE PUPIL(S)

8-10 years old (4 students). The school has students from first grade to eighth grade
Elementary and secondary SEN together at school. This e SEN school giving education for autistic children at elementary and secondary education level. The aim of the school is to gain students to be oriented in their daily lives and start using educational technologies with the support of private institutions to get tablets or computers.

There are 4 students in every classroom. The transport and the lunch of the children are provided by municipality.

The students usually attend from another parts of the city. They are the children of middle or low class citizens. But the location where the school has been a part of the city where all rich people of ANKARA live. There is a contradiction. There are all villas and luxury houses all around the school.

The students have autism problem. 2 of them epilepsy problem. Every four student is supported by one government and one volunteer teacher. They even have their lunches with their teachers and go to the toilet with them.

They are carried to the school by the municipality freely. The lunch comes from the municipality freely. The national curriculum for SEN is adapted for them.

Tablets are being mostly used in Mathematics and Reading courses by the students by our teacher Berat ÇELİK. The educational contents uploaded in the tablets are being used by the teacher. Before tablets ordinary materials jigsaws or puzzles were being used in the courses. After using tablets they were more interested in tablets and successful in puzzles and in these ordinary materials. Because they learned how to make them in tablets and applied it these devices.

As you will see in the video, time, reading , expressing themselves are tried to be taught in the classroom.

Students were able to read and learn the objects which have been used in our daily lives. The main objective had been to orient them into social life and then make them read and understand the things they read. They were able to learn the numbers and in the later process make simple mathematical procedures. They learned the professions and the vehicles. They learned time telling.
The teacher firstly introduced them basic concepts and showed them on the tablet, after learning these concepts on the tablets in a long process they were also able to use them in their daily lives.

As the students had different psychologies there had to be different approaches for some students.

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**TEACHING TOOLS/MATERIALS (BOTH ONLINE AND OFFLINE)**

The technology and software had been provided by Apple and all the contents were uploaded from Apple Store. They are all shown in the video whose link is given.

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**ASSESSMENT**

Assessment has usually been made with the parents and you will see an interview made by a parent about tablet education. The link as mentioned below: [http://youtu.be/a6JlZnpDrsg](http://youtu.be/a6JlZnpDrsg)

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**THEORETICAL REFERENCES AND IN-SERVICE TEACHER TRAINING**

Our teacher gave many in-service teacher trainings on this subject, e.g.:

- Manisa Celal Bayar University Communication Platform
- Ministry of Family and Social Affairs-Good examples in autism
- Autism Foundation-Technology Usage
- National SEN Congress.
CONCLUDING REMARKS

The anecdotal evidence collected with the SENnet case studies appears to support some of the findings already highlighted in existing research. The case studies give anecdotal evidence on the wide range of students with SEN that can benefit from using tablets, e.g. visually impaired students (case study Belgium Flanders), autistic students (case studies Austria and Turkey) and students with a pervasive development disorder (case study Portugal).

The case studies emphasize many potential benefits of tablet use for students with SEN. They confirm the advantages of the tablet being a portable and intuitive tool. As already highlighted by others, one of the most appealing aspects of tablet for students with SEN is their ability to bring them closer to their classmates (Nazzal, June 2014). This observation can be confirmed e.g. by the examples of the visually impaired student portrayed in the Belgian case study and the student with SEN who cannot move his arms or legs nor speak portrayed in the Italian case study who are both better integrated in their class thanks to tablets. One tablet supported action leading to better integration is improved communication possibilities, as highlighted in the case studies from Austria, Estonia and Italy. In particular, the Austrian video case study emphasizes how a tablet can enable some non-verbal students to express themselves and gain autonomy, as the tablet enables them to express decisions and emotions. Moreover, the tablet offers a differentiation in the level of difficulty of tasks that allows e.g. the Italian student to complete the same tasks as his classmates in some subjects. The case studies give several examples of how tablets support personalized instruction, which has been highlighted as a main benefit of tablets by earlier research (Dwight, 2013). In addition, a better attention span is highlighted e.g. in the case studies from Austria, Portugal and Turkey. Autistic students portrayed in the Turkish case study were able to read and learn the objects useful to their daily lives, e.g. to tell the time. Several case studies emphasize that tablets enhance the students’ motivation to learn. Finally, the Portuguese case study highlights in particular how a tablet can support progress with fine motor skills.

The case studies, however, also draw the attention to some difficulties related to the use of tablets with students with SEN. As McMahon/Walker had already emphasized, two reasons that often hinder successful implementation are a lack of training on how to use the device and the lack of a pedagogical framework on how to include the device to meet the needs of diverse learners (McMahon/Walker, 2014). For instance, the Austrian SENnet case study confirms this view. It identifies in particular a lack of a consistent strategy and opportunities for professional development as challenges. It highlights that currently a lot that happens in the field of tablet experimentations with students with SEN is dependent on the commitment of some pioneer teachers. All case studies are an illustration of how tablets as an integrative tool are particularly successful, if the student with SEN is supported by a team of teachers, SEN teachers, specialists and parents.

One of the conclusions drawn from the Austrian case study is that tablets do not substitute teachers, they add to existing tools. The visually impaired student from Belgium using a television reading glass, an iPad, a computer, ADIBooks and a lamp illustrates how the tablet can supplement existing tools. As already stated by Newton/ Dell, for tablets to offer solutions to problems students with SEN face, providing them with a tablet (or any other
technology) needs to be combined with adequate training (of students, parents, and professionals) parents, careful assessment and decision-making, detailed implementation plans, and persistence in follow-up if we are to see gains in student learning (Newton/Dell, 2011). Further, more large-scale research will be necessary to provide evidence-based guidance to teachers, specialists and parents.
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ANNEX: CASE STUDY TEMPLATE

Each case study report follows the same headings:

- Title
- Case study video
- Brief outline of the practice
- Who conducted the case study
- Case study methodology: case-study, documentation analysis, observation, discussion, interviews with teachers, headteacher, parents and pupils
- Institution where the practice was conducted
- Date (beginning and end of the practice)
- Period of observation (beginning and end)
- Type of device used
  - Tablet
  - Mobile phone
  - Other
- Use of tablet/mobile in classroom
  - By all pupils (in case the whole classroom is provided with mobile technology)
  - By pupil(s) with SEN (in case only one or a few pupils have access to mobile technology)
- Ownership of the tablet(s)/mobile
  - BYOD
  - Borrowed by the school
  - Other
- Wifi connection in the school
  - Yes
  - No
- Use of tools specifically connected with the tablet/mobile
  - App (please specify if the app are free, produced by the school, commercial, bought by the school etc)
  - Online learning environment (i.e. Moodle, Edmodo etc.)
  - Cloud computing application (i.e. Google, slideshare, dropbox etc)
  - National/international repositories of digital resources (please specify)
  - Other
- Age of the pupil(s) with SEN (if different from the school level reported below)
• Context – brief summary of school, social geographic characterization, dimension, no. pupils, school level, …

• Pupil(s) characterization – ICF (International Classification of Functionality) - condition of functionality and participation, IEP (individual educational programme), curricula adaptations

• Pedagogical context of the practice observed (educational setting)

• Teaching objectives (general and specific objectives)

• Teaching methodology (personalized teaching-learning methods, teachers’ approach i.e. for the same objectives? For different ones?)

• Teaching tools/materials (both online and offline)

• Changes as a result of the activity (progress in students’ attitudes, knowledge, skills and understanding; reaction of teachers, students, parents…)

• Assessment (adaptations for pupils with SEN)

• Theoretical references and in-service teacher training (if relevant)

• Continuous professional development (describe any training undertaken by teachers to support this initiative)

• External collaborations (when they exist)

• Links about the case study (website, videos, slideshare, materials, etc.).