

# **Influence of the Snappet educational platform on the teaching and learning environment in the Netherlands and testing the applicability of the platform in Bulgaria**

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# 1. Summary

Snappet is an educational platform, involving one-to-one tablet usage, which is implemented in primary schools across the Netherlands and internationally. The educational content is on the tablets and students do tasks on them. It is an adaptive learning platform, meaning it provides additional tasks for students performing at a faster pace than others and gives real time feedback for teachers to track each student's progress.

The general question in this master thesis is how does an e-learning platform such as Snappet influence the teaching and learning environment? The specific research questions are: does the Snappet platform lead to improvement of students' results, whether and how does it improve cooperation and communication between students and students and teachers and does the tablet device divert their attention from the teacher. The research goal is to find out whether Snappet brings added value to the learning and teaching process and under what conditions this technology is transportable to teaching and learning in other educational contexts such as the educational system in Bulgaria. This goal is achieved using both quantitative and qualitative methods – a combination of teacher surveys, student surveys and observations in classrooms.

Theory shows that a number of research projects have highlighted both benefits and limitations of the use of Tablets. These include constant access to information and communication, increased collaboration among both students and students and teachers. This could improve student results. However, according to teachers surveyed, having a personal device constantly available made the temptation to chat to friends or play games too much to resist for some students, which teachers felt was affecting their academic performance.

The findings of this research are that Snappet influences the teaching and learning environment in a meaningful way and can bring changes to it. It involves interaction between students and teachers, similar to those in a regular lesson, but it does not improve student-student communication, since work on tablets is exclusively individual. Snappet might increase student results in an indirect way, by increasing student motivation. However, it could also have a negative effect on student outcomes, since children are not very focused

when using the platform. This is due to Snappet and the way teachers use it. Ultimately, Snappet brings added value to the teaching and learning process. If an attempt is made to implement it in another country such as Bulgaria, contextual and educational differences in the systems should be taken into account.

Based on the findings above are formulated policy recommendations. At least one group task or some other form of group work should be included per lesson on Snappet. A recommendation toward teachers working with Snappet is that focus levels could be enhanced by providing all students with tasks, either group work or individual tasks on the tablets, so that they will not lose focus in the lesson. According to teachers' views using tablets leads to writing less on paper, which could have a negative effect, especially regarding grammar skills. Therefore, the recommendation is that usage of Snappet could be limited to half a lesson, followed by a task on paper.

## 2. Introduction

Education is an essential field in every modern society, which has to be developed and effective, in order to contribute to the creation of young leaders, who would strive to achieve ambitious goals and would successfully enter the labor market. The educational system is a fruitful area for sociological analysis of all kinds, since this subject has contextual, (national, local, historical, cultural) specifics, and it changes and transforms itself over time. The competencies, acquired at school, are one of the main resources for social mobility in some societies, in which education and economics are closely connected and interdependent public spheres. The interests of many social actors influence at the same time the development of education: political state institutions, private entities, students and their parents, teachers, principals, etc. In the past years, the fast development of technology has turned it into a big sphere of influence and it is changing, among other fields, the educational system.

Schools now recognize the influence wireless and mobile technologies are having on their students as well as how it is shaping new ways of thinking and teaching. More colleges and universities are starting to get on board with utilizing newer learning methods for higher education that are targeted to how students want to learn and what is most effective for them to succeed not only in the classroom but after they graduate. In order to modernize their

campuses for today's digital-native students, many schools are continuing to increase investments in technology related to learning. In fact, funding for educational technology jumped 55% in 2014 and will only increase year-over-year, according to CB Insights (Perez, 2017). Technology has the potential to change the way of learning and the way of teaching in the coming years and centuries and a number of different e-learning platforms and devices have already been implemented in many classrooms around the world in order to utilize the new tools, available to people. This research will focus on Bulgaria and the Netherlands as specific examples of the ways ICT influences education.

In recent years ICT has been introduced up to some degree in education in Bulgaria. This process has been influenced by the following factors, among others: participation of educational and research institutions in a lot of international projects; government policy; initiatives by universities, well-qualified experts in information and communication technologies. Unfortunately, there are problems, such as lack of sufficient e-Learning content; insufficient preparation and readiness of university lecturers and school teachers to use e-Learning technologies; insufficient didactical readiness of teachers to use e-Learning technologies; lack of a regulatory system in schools and in some universities to stimulate school and university teachers to develop and use e-Learning content (Tuparova, Tuparov, 2011).

According to Eurydice's Key Data on Learning and Innovation through ICT at school in Europe, in the Netherlands there are national strategies covering training measures for ICT in schools, e-inclusion, digital/media literacy and e-skills development, and research projects for ICT in schools and e-learning. In primary and secondary schools ICT is taught as a general tool for other subjects/or as a tool for specific tasks in other subjects. Public-private partnerships for promoting the use of ICT are encouraged<sup>1</sup>.

One of the ways technology has influenced education in the last years is by using tablets in the classroom. Tablets appeared on the market in 2002 (El-Gayar et al., 2011), and reached the number of 14 million sales all over the world in 2009, (Ozok et al., 2008). iPad and Google Android- based tablets have helped increase their popularity on the worldwide market. This

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<sup>1</sup> [http://ec.europa.eu/information\\_society/newsroom/image/document/2018-3/netherlands\\_country\\_profile\\_2FE28D05-0DDC-4AEB-3400625E40C86921\\_49448.pdf](http://ec.europa.eu/information_society/newsroom/image/document/2018-3/netherlands_country_profile_2FE28D05-0DDC-4AEB-3400625E40C86921_49448.pdf)

popularity has led to interest in applications in education, particularly in schools (Haßler, Major, Hennessy, 2016). Like other types of technological innovations, implemented in secondary schools, the use of tablets has the potential to help acquire knowledge faster and more efficiently, contribute to motivational levels, etc. According to Johnson et al., there is great potential to research the use of tablets in schools, particularly as the technology becomes more accessible and capable (as cited in Haßler et al., 2016).

One of the platforms, involving tablet use, which is widely utilised in the Netherlands, is called Snappet. More than 2,800 primary schools in the country now work daily in the classroom with a tablet for each student, and almost all of them have opted for Snappet. Snappet is the largest digital education platform in the Netherlands and also active in several other countries. In addition to primary education, Snappet also offers its platform for secondary education for mathematics. The main goals of Snappet are: time saving for students and teachers; insight & overview for pupils and teachers; proven higher learning outcomes for students of all levels.<sup>2</sup> With Snappet every child has access to teaching and training materials on its own tablet at the appropriate individual level. Students can monitor their progress and learn to work with their own learning goals. Learning progress at classroom level and at individual level is visible for teachers at any time. Tablet Learning creates more time for instruction, lesson preparation and remediation through a direct check and error analysis. Snappet provides tablets on a deposit basis; schools pay a fee per student, per school year.<sup>3</sup>

### 3. Relevance

The relevance of this study is based on several of its components. It is important and relevant in the practical sense for society and policy recommendations to find out whether Snappet has added value for the learning and teaching process and the degree of its effectiveness, since the educational system is at the centre of any modern society, striving to be successful.

The development of technology has proven to be of big importance and affecting all public spheres, so it is valuable to research its introduction in education. A notable channel of influence of technology on education is the use of one-to-one tablets in the classroom.

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<sup>2</sup> <https://nl.snappet.org/informatie/over-snappet/>

<sup>3</sup> <https://www.linkedin.com/company/snappetnl/>

Increased affordability and functionality have been highlighted as partly explaining the popularity of mobile devices in education. Looking at tablets specifically, these can be argued to have greater functionality compared to, for example, smartphones and e-readers (Clarke & Svanaes, 2014). Sharples et al. report that since the early 1980s schools, colleges and universities have experimented with technology for learning (as cited in Haßler et al., 2016). McFarlane et al. argue that as the adoption of mobile technologies in education becomes more widespread, research is starting to demonstrate the value of incorporating such devices in teaching (as cited in Haßler et al., 2016). Ozdamli states that cost, adaptability and scalability are among motivations often cited for using mobile technologies to support learning (as cited in Haßler et al., 2016). Owing to the rapid advance and popularity of wireless communication and mobile technologies, mobile and ubiquitous learning has become more and more important (Hwang & Tsai, 2011). Specialized handheld devices such as data loggers, phones and smartphones, low-power computers such as the Raspberry Pi1 and tablets have been used educationally (Haßler et al., 2016). In recent years, mobile technologies such as tablet devices have become more powerful and popular. The tablet devices are usually smaller than laptops but larger than smartphones. The laptop interface is controlled by a mouse, whereas the primary means of input on the tablet is the touch-screen. Because tablets are also portable and lightweight, they are easy to use anywhere and anytime. Moreover, tablets allow flexible access to information on the Internet, an ease of use, and flexibility that is highly attractive to many users. These devices have made significant inroads into the educational context.

Despite the huge popularity of tablets, few studies have addressed their impact on teaching and learning (Rikala, Vesisenaho, & Mylläri, 2013). Tablets can viably support children in completing a variety of learning tasks (across a range of contexts and academic subjects), but the fragmented nature of the current knowledge base, and the scarcity of rigorous studies, makes it difficult to draw firm conclusions (Haßler et al., 2016). As Tablets become cheaper, and more manufacturers produce high quality and portable devices that can be used by pupils at school and at home, it is believed that it is important to monitor their use in school and find out the effects of that use (Clarke, Svanaes, & Zimmermann, 2013).

This research will focus on the digital platform Snappet, implemented in the Netherlands, to show what kind of effects it has on the teaching and learning environment and student results.



There have been two studies conducted on the Snappet usage in the Netherlands so far – in 2014-2015 by Radboud University and in 2016 by University of Twente. Their methodologies and results will be taken into account. Both of those research projects focus on the use of Snappet in primary education.

#### **4. Research question (s)**

The general research question I will be posing in this master thesis project is how does an e-learning platform such as Snappet influence the teaching and learning environment? There are different elements of the school environment I will be looking at, which leads me to several specific research sub questions. Does the Snappet platform lead to improvement of students' results? Whether and how does it improve cooperation and communication between students and students and teachers? Does the tablet device divert their attention from the teacher?

In connection with my descriptive and explanatory research questions, I am formulating my policy advice questions, related to my overall research goal. Does an educational platform, such as Snappet, involving tablet use in classrooms, have added value for the learning and teaching process? Is it effective in terms of improving student results? I would like to find out under what conditions this technology is transportable to teaching and learning in other educational contexts such as the educational system in Bulgaria.

#### **5. Research goal**

The goal of my research is to find out whether and how technology could change the teaching and learning environment, regarding several educational elements. More specifically, I will be conducting research on an educational platform called Snappet that is being implemented in schools across the Netherlands and other countries. In order to find out what changes occur, I will be looking at student results, the process of cooperation between students and students and teachers and student engagement in class. The final goal is to determine whether and how an educational platform such as Snappet could bring added value to the teaching and learning process. If there is room for improvement, what is it, according to the stakeholders, involved in the process? Based on these research and policy advice goals, I will make an

attempt to see if and how the Snappet platform could be implemented in a different context and educational system such as the Bulgarian one.

The data collection methods that I intend to use to answer my research questions are mixed. I will gather and use data about student outcomes in a quantitative survey, in order to be able to subsequently connect the results from it to their attitudes, level of cooperation, etc., and make observations in classrooms to see how it happens in practice.

## 6. Research outline

This master's thesis contains chapters, following the steps undertaken in a research project. It starts with an introduction to the topic, relevance, research questions and research goal, including planned methods of data collection to reach that goal. After that, there is a literature review and framework on the chosen topic, including what has been done in previous research, review of the educational systems in the Netherlands and Bulgaria and what is the influence of technology on them. The theoretical part leads to formulation of hypotheses, outline of data collection instruments and methodology for analysis, which will be used to test them. Then comes the analytical part, based on the data collected. That part is followed by results and conclusion. The thesis ends with a discussion, recommendations for policy makers, strength and limitations of the research project and future research suggestions.

## 7. Theoretical framework

### 7.1. *The field of technology and its impact on education*

The Net Generation (N-Gen) is defined as the population of about 90 million young people who have grown up or are growing up in constant contact with digital media (Tapscott, 1998). Today's Net Gen college students have grown up with technology. Exposure to IT begins at very young ages. Children aged six or younger spend an average of two hours each day using screen media (TV, videos, computers, video games), which nearly equals the amount of time they spend playing outside (Oblinger & Oblinger, 2005). The statement that the computer is "part of my brain" should resonate with everyone involved in education today. Computers and the attendant technology can no longer be considered desirable adjuncts to education. Instead, they have to be regarded as essential (Philip, 2007). Since ICTs are so intimately

intertwined with students' everyday lives, the question arises regarding how to apply the informal learning opportunities of these technologies to formal education. The challenges of information technology (IT) for education have been studied for about 40 years. Due to rapid technological developments, the field is continuously changing in intriguing ways (Voogt & Knezek, 2008). According to Voogt & Knezek, who investigated the impact of information technology in primary and secondary education, a lot of research has been done on IT in these educational levels of the system, looking at the international perspective, but most of it is scattered and a synthesis from a broad point of view has not been achieved yet. However, attempts to provide an overview of major directions of research done in the field, such as their book could be found in literature. Voogt & Knezek discuss that computers were first introduced in education in 1960s and since then many policy-makers and researchers have recognised their potential to be used in primary and secondary education. At the beginning, computer technologies were used for processing information, but when a communication function was added, this increased their potential for use in education. However, in Lai's view it is generally accepted that IT as such does not support learning. Only when IT is well integrated into a learning environment does the full potential of IT for learning become realized (as cited in Voogt & Knezek, 2008).

The term computer-assisted instruction (CAI) was adopted, indicating either a type of software programme for education or a type of instructional process. Steinberg, for example, emphasized CAI as computer-presented instruction that is individualized, interactive and guided (as cited in Voogt & Knezek, 2008). CAI was conceptualized as an assistant for teachers by taking over some of their tasks. CAI software has the capacity to provide feedback to the learners and to keep track of their performance. A major benefit of software for education in this category is that it became possible to individualize instruction (Voogt & Knezek, 2008). Keeping in mind these characteristics of CAI, we can categorise the Snappet educational platform as a computer-assisted instruction (CAI) type of educational technology, since it provides immediate feedback, has an individualized function of tailoring tasks according to each student's understanding, interests and work pace, and assists teachers' work.

## 7.2. *Educational contexts*

For the purposes of the analysis of an educational tool, used in the Netherlands, that also could be implemented in Bulgaria, it is necessary to compare and describe the two educational systems and the ways, in which technology has influenced them. In Bulgaria, it is obligatory to go to school between the age of 7 and 16. Primary education is seven or eight years long. The secondary educational stage is four to five years long. The language of instruction in the schools in the country is Bulgarian, but in specialised bilingual secondary schools, some subjects are taught in a foreign language. If you pass a certain grade/level, you can always go up in the system, irrespective of what school you finished before that (in the Netherlands it is a little bit different). The grading scale officially consists of six points, but it actually has five – the mark one is not included in measuring student results (Blagoev, Haralampiev 2013). The Ministry of Education makes the State educational requirements, including the main school subjects in the study plans of the schools, the quality standards and main goals of the educational policy and is responsible for administering the educational system. It can also be a separate subject in an approved by the minister program (Stoyanov, 2011)<sup>4</sup>.

In Bulgarian education, there have been attempts to introduce ICT up to a certain degree. Educational and research institutions participate in international projects, the government and, more specifically, the Ministry of education in Bulgaria has carried out initiatives, such as a pilot project, involving 40 Bulgarian schools in 2015. It was part of the National program 'Information and communication technologies in schools (ICT)'. It involved providing a budget to schools for laptops and tablets and providing them with one projector and one minicomputer. Unfortunately, there is no sufficient information published about the effect of this pilot project. Among problems with integrating ICT in education in Bulgaria are a lack of sufficient content for e-learning, insufficient preparation of teachers to use technology in educational settings or lack of a system to stimulate that usage (Tuparova, Tuparov, 2011).

In the Netherlands, similarly to Bulgaria, children between 5 and 16 years old are obliged by the law to go to school. It is obligatory for children to start school at the age of five in the Netherlands, but nevertheless they can – and it is a common practice – to start school at the

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<sup>4</sup> <http://www.uni-vt.bg/pages/6189/uplft/d2.pdf>

age of four as well. This age is the youngest in Europe and unique for all European educational systems (Stoyanov, 2011). Teachers' salaries are record high, which also distinguishes the country. Between the age of four and twelve children go to primary schools. The first four years are first level and the following four are a higher level. In the obligations of the Ministry of education and science are included: financing public and private schools, determining the general goals in education and the main school subjects in the study plans of the schools<sup>5</sup>. A main characteristic of the Dutch educational system is the freedom of education. This includes freedom to found schools, in which teaching is organised and baseline principles are determined. Schools, providing education, based on religious or ideological beliefs can be found. As a result public and private schools function in the Netherlands. Mainstream schools are opened for all children, irrespective of their religion and views. Unlike the Bulgarian educational system, the Dutch one is far more segmented, regarding the types of educational preparation in secondary education. Another main difference is that the students in one class are at a similar age, but are divided into classes based more on their abilities and interests, not by their age as the only criteria. This difference is very important, because the different type of grouping suggests a different way to achieve results at school and the way to measure them. On the other hand, the grading scale is bigger and has the potential to differentiate students more than the Bulgarian one – grades vary from 1 to 10. Before entering secondary schools, the Dutch students take an exam, called CITO (National Institute for educational evaluation), which tests their knowledge in language, math and reading and is not obligatory. The primary schools advise parents about the type of secondary school (VMBO, HAVO or VWO), based on the CITO scores and educational work, interests and motivation of the child (Stoyanov, 2011).

In the Netherlands there are national strategies covering training measures for ICT in schools, research projects for ICT in schools and e-learning.<sup>6</sup> In addition, Kennisnet is a public organization for Education & ICT. They provide a national ICT-infrastructure, advise the sector councils and share their knowledge with the primary education, secondary education and vocational education and training. Together with the sector counsels, they enable the

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<sup>5</sup> [http://www.azbuki.bg/editions/azbuki/archive/archive2011/doc\\_view/1512-vutsova-minova012014](http://www.azbuki.bg/editions/azbuki/archive/archive2011/doc_view/1512-vutsova-minova012014)

<sup>6</sup> [http://ec.europa.eu/information\\_society/newsroom/image/document/2018-3/netherlands\\_country\\_profile\\_2FE28D05-0DDC-4AEB-3400625E40C86921\\_49448.pdf](http://ec.europa.eu/information_society/newsroom/image/document/2018-3/netherlands_country_profile_2FE28D05-0DDC-4AEB-3400625E40C86921_49448.pdf)

educational sector to realize their ambitions with ICT. The organisation provides a national ICT basic infrastructure and advises the sector councils. The Ministry of Education, Culture and Science (OCW) finance Kennisnet.<sup>7</sup> There is a widespread positive attitude towards the use of ICT for educational and administrative purposes. The basic technical facilities of teacher training institutes include access to computers, internet connection and electronic learning environments for teachers and students. Access, maintenance and technical support are well organised. The pedagogical use of ICT is promoted. Actual use of ICT is optional for most teacher trainers and in many cases optional for student teachers during their internship. There is hardly any regulation or mandatory standards that guarantee a certain level in the preparation of all student teachers in the use of ICT by well-prepared teacher trainers.<sup>8</sup> Focusing on primary education more specifically, the Primary Education Council and the Ministry of Education have made agreements in the Primary Education Sector's School Board Agreement. In the coming years, schools would like to use more digital educational resources in their lessons; they also want to recognize talented pupils sooner and stimulate them more.<sup>9</sup>

Regarding the influence of ICT usage in the educational sphere, it could be seen that it is more developed in the Netherlands, although similar attempts on the part of the government are also made in Bulgaria. However, there is no sufficient information about the effects they have and the results from them in the Bulgarian context. This means an attempt to test the Snappet platform in Bulgaria, based on the results from the research on the Dutch usage is fruitful. However, it is important to note that there are significant differences between the two described systems above, at a structural level, as well as in the types of schools, grading scales, public educational institutions, etc. There are also similarities and a common framework could be made, but differences are what should be kept in mind: the younger age in which children enter school in the Netherlands, the grading scale that enables more differentiation than in Bulgaria, the grouping in levels by ability and interests, not just age that characterises the Dutch context. Dutch children start school at the age of 4-5, so they get used to the learning and teaching environment by the age of 7-8, when they usually begin using Snappet. In Bulgaria at the age of 7-8 is the first grade of primary school, so it might be too early for

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<sup>7</sup> <https://www.kennisnet.nl/about-us/>

<sup>8</sup> <http://www.oecd.org/education/ceri/45063786.pdf>

<sup>9</sup> [https://www.kennisnet.nl/fileadmin/kennisnet/corporate/algemeen/Let\\_ict\\_work\\_for\\_education\\_Kennisnet\\_strategic\\_plan\\_2015\\_-\\_2018.pdf](https://www.kennisnet.nl/fileadmin/kennisnet/corporate/algemeen/Let_ict_work_for_education_Kennisnet_strategic_plan_2015_-_2018.pdf)

children to start using an e-learning platform such as Snappet. This is an important thing to be taken into account, in connection to the implementation of Snappet in the Bulgarian educational system. The grading scale would allow for less differentiation in the Bulgarian context. It might not be suitable for measuring the results of students on the Snappet tablets, because the platform has adaptive tasks for students performing better or faster than others, therefore it is intended to grasp the detailed differences between their outcomes. Perhaps another form of measurement of results, integrated into Snappet, should be used. The type of grouping is also connected to this. In Bulgaria, every child enters next grade based solely on their age, so children in one class might have bigger differences in skills and interests than in the Dutch system. It might be necessary to group them in a different way when using Snappet (an internal grouping in one class as it is, but in smaller groups), to overcome too many discrepancies. All these differences need to be accounted for and are relevant for answering the research question how does the Snappet platform influence the teaching and learning environment, in particular student results, levels of distraction and communication and collaboration. For instance, the age of students using Snappet and how long they have been at school has an influence on their levels of focus and outcomes, which also largely depend on the measurement system. The way they are grouped in different grades at school also has an impact on the mentioned aspects of the learning process, as well as on how much and in what way children would communicate and collaborate. Ultimately, these factors should be taken into account when implementing the e-platform in the Bulgarian context, since they could influence the effectiveness and change the added value of the tablets for the teaching and learning process, which are the essential policy questions in this research.

### *7.3. Theoretical analysis*

#### *7.3.1. Overview of the aspects of the influence of IT on education*

After having reviewed the two educational systems and the impact technological development has on them, it is time to focus on important aspects in that influence. The ease of use and increased functionality of Tablets compared to previous technologies, including other mobile technologies, means that these devices are able to support teaching and learning in a variety of ways. According to Bjerede and Bondi, Burden, Hopkins et al., the cost of Tablets compared to other devices such as laptops has made equipping all students with a

personal device achievable, and one-to-one access has been argued to be a crucial factor in increasing student motivation and independence (as cited in Clarke & Svanaes, 2014). One-to-one Tablet use has also been argued to allow students to personalise their own learning experience, supporting the development of learner autonomy and metacognitive skills. The portable nature of Tablets and the ability to be connected at all times is argued to facilitate seamless learning. Pedagogical benefits identified across academic research include increased or improved communication and collaboration, increased independence, engagement and motivation among pupils, and the ability to customise learning and benefits for children with special educational needs (Clarke & Svanaes, 2014). Device and software qualities that appear to support pedagogical benefits are size and weight, which facilitate portability, instant access to information and communication, access to apps and recording facilities, battery life, and ease of use. In addition to the pedagogical benefits and challenges highlighted in the literature, teachers' and pupils' previous experience with using technology, as well as the existence of a pedagogical and administrative plan for the use of Tablets, are factors that will influence Tablet adoption in a school. From this a culture of use is created, which will develop over time, influenced by factors such as technical, administrative and pedagogical support, opportunities for professional development, and the involvement of pupils themselves (Clarke & Svanaes, 2014).

### *7.3.2. Communication, collaboration and learning outcomes*

The mentioned important aspect of the influence of ICT and, more specifically, tablet usage in schools, is the process of collaboration and teamwork between students and students and teachers, which will be one of the focuses in this research. In literature can be found various evidence of the importance of communication and collaboration for the educational process, as well as of the influence technology and more specifically mobile devices such as tablets, have on communication processes. Collaboration is defined as the ability to engage in discussions about learning, which are supported by technology, as well as the ability to transfer and collaborate on content. This degree of collaboration is facilitated by a personalised approach to learning where all students have access to mobile technology (Clarke & Svanaes, 2014). Collaboration with others has long been a central form of human activity. Now it is being capitalized on more explicitly in school and work settings, a situation that calls for a deeper scientific understanding. New organizational structures in the 21st



century workplace rely on team-based projects. In schools, learning occurs through interaction with peers. It is hoped that new learning arrangements will lead to deeper engagement in subject matter and facilitate a sense of agency through the tangible accomplishments that can result from collaborative work on interesting problems (Barron, 2000).

As Dabbagh describes, Constructivist theories of learning assume that meaning is imposed by the individual rather than existing in the world independently. People construct new knowledge and understandings based on what they already know and believe, which is shaped by their developmental level, their prior experiences, and their sociocultural background and context. Knowledge is embedded in the setting in which it is used; learning involves mastering authentic tasks in meaningful, realistic situations. Learners build personal interpretations of reality based on experiences and interactions with others, creating novel and situation-specific understandings (Voogt & Knezek, 2008).

According to Anderson, owing to the enormous impact of technologies, our society is in transition towards an information or knowledge society (as cited in Voogt & Knezek, 2008). The twenty-first century reports consistently emphasize the educational outcomes for students in the areas of *communication and collaboration*, among others, and workers of the twenty-first century will have expanded needs for skills in these areas. *Communication* entails the ability to construct logical arguments, reason from diverse evidence and be sensitive to audiences to the outcomes of most projects. Using ICT tools when effective is critical in this domain. *Collaboration* involves teamwork as well as coordination in knowledge-intensive organisations. Networks and network-based tools have become prerequisites to cooperative work (Voogt & Knezek, 2008). According to Snell and Snell-Siddle, enhanced mobile communication and feedback can lead to greater student motivation and greater understanding of the learning process. West similarly argues that ongoing digital assessment can give students opportunities to reflect on their learning progress and therefore support greater student autonomy (as cited in Clarke & Svanaes, 2014). Collaboration is highlighted by Kearney, Schuck et al. as the third main benefit of mobile learning in addition to personalisation and authenticity (as cited in Clarke & Svanaes, 2014). According to van't Hooft, mobile devices support collaborative learning thanks to their high mobility (i.e. they are small enough to be carried in one hand) and their small form factor (in other words, they are

unobtrusive and do not interfere with face-to-face interaction). Van't Hooft further points to the accessibility of mobile devices (ease of use and ability to turn on instantly), the ability to create, access and display information in multiple modalities (text, video, audio, graphics) and the ability to communicate and share information; these are cited as other facilities of mobile technology that support collaboration between students and between students and teachers (as cited in Clarke & Svanaes, 2014). Dhir, Gahwaji et al. carried out a literature review on the subject of the iPad's role in education and found a number of frequently perceived benefits, which included ease of use, suitability for 'anytime and anywhere learning', use for both classroom demonstrations and small group teaching activities, a wide range of educational apps, the ability to support interactive and collaborative learning, and increased communication between pupils and teachers (as cited in Clarke & Svanaes, 2014). A survey of over 6,000 primary and secondary school students in Quebec, Canada, conducted by Karsenti and Fievez in 2013, highlighted both benefits and limitations of the use of Tablets in the province. Karsenti and Fievez argued that while the iPad programme had not yet reached its full potential, because it was not yet sufficiently integrated into teaching and learning, a number of benefits to students were visible. These included constant access to information and communication and increased collaboration among both students and students and teachers (as cited in Clarke & Svanaes, 2014). Ferrer et al. report that both boys and girls indicate they participated more in learning tasks when tablets were used (as cited in Haßler et al., 2016). According to Heinrich, this could lead to evident enhanced levels of collaborative working (as cited in Haßler et al., 2016).

On the other hand, it has been suggested by Sheppard, partly because of technical considerations (synchronizing content and recharging batteries), that tablets may be best suited for individual rather than collaborative use (as cited in Haßler et al., 2016). Culén & Gasparini state that some students are reluctant to share 'their' tablet with fellow learners (as cited in Haßler et al., 2016). In another study by Word et al., students working in groups of two to three all respond that they feel that they are able to spend enough time using the tablet, although a proportion of students in groups of four responds that they would like more time to use the device (as cited in Haßler et al., 2016). Importantly, an analysis of student performance, conducted by Lin et al., following the use of tablets showed that both one-to-one and many-to-one settings can improve it. In the one-to-one setting, there is no

competition for tablets among students, and in the studies reviewed, there was consistently high group participation, improved communication and interaction. However, the many-to-one groups generated superior artefacts as all the notes were well discussed among the group members. Because of the high connectivity and the capability of co-construction supported by tablet technology, student roles, participation and contributions within a group were found to be more equal in the tablet class when compared with the pattern of collaboration found in a non-tablet class (as cited in Haßler et al., 2016). It can be seen that different researchers highlight the importance of looking at the process of communication and collaboration both between students and students and teachers, so it is crucial as a focus of this research.

### *7.3.3. Distraction*

Another aspect, important for ICT usage in class, especially relevant for tablets, is the potential for distraction. Culén & Gasparini report distraction as tablets can add additional layers of complexity (due to technical problems with tablet and applications used) compared with traditional means of completing similar tasks (as cited in Haßler et al., 2016). According to Iserbyt et al., the addition of entertaining features to increase the interest of a lesson may ultimately distract learners and lead to poorer learning (as cited in Haßler et al., 2016). In Sheppard's view, issues concerning tablets distracting students and negatively affecting the quality of work produced, as Culén & Gasparini state, are areas that warrant further investigation (as cited in Haßler et al., 2016). The possibility for technology to be a source of distraction has been noted in research on technology in schools, in the survey of teachers and students using one-to-one Tablets in Quebec of Karsenti and Fievez (as cited in Clarke & Svanaes, 2014). According to the teachers surveyed, having a personal device constantly available made the temptation to chat to friends or play games too much to resist for some students, which teachers felt was affecting the academic performance of these students (Clarke & Svanaes, 2014). Research in both primary schools by Henderson and Yeow and universities by Kinash, Brand et al., as well as McCoy has also highlighted the use of technology for non-educational purposes during lessons (as cited in Clarke & Svanaes, 2014).

### *7.3.4. Studies on Snappet*

Apart from overall studies and literature reviews on tablet usage in class, there have been two bigger research projects, conducted specifically on the Snappet platform – by the university

of Twente and Radboud University. The Radboud study took place during the 2014-2015 school year and included 12 primary schools, working with tablets with the adaptive education technology Snappet. Four control schools, which had not used Snappet, were also included. The main research questions were: is there an impact of using the adaptive education technology Snappet on developing spelling skills; are there differential effects of the adaptive education technology for students in different level groups; how is the use of adaptive education technology related to student characteristics (such as socioeconomic status, skill level, gender). The following data was collected: Snappet user data (the number of classroom and adaptive assignments per subject and the number of correct and incorrect answers) and skill development of students as measured by the CITO progress tests. The results, relevant for this research, show that most of the class time is devoted to individual processing (50%) and teacher-led activity (44%), the least time is spent on collaborative learning (6%). It was also found that students with low SES do more tasks in class than students with average SES (Molenaar, Knoop-van Campen, C. A. N., & van Gorp, 2016).

79 primary schools in the province of Overijssel took part in the study, conducted by the University of Twente. In 40 of these schools were students and teachers using Snappet for six months, other schools were used as control groups. The assignment of the schools to the experimental and control group was random. The experimental schools used Snappet in the field of mathematics or the subjects mathematics and spelling. The main research questions were what is the effect of Snappet on learning outcomes, what is the effect of Snappet on students' motivation, what is the relationship between the frequency of the differentiation activities by Snappet teachers and the impact on learning outcomes, what is the relationship between the intensity of Snappet use by students and the effects on motivation and learning outcomes? The results show that all students benefit from Snappet, but the 20% highest scoring students benefit most. One possible explanation for the latter is that pupils using Snappet are able to work more independently at their own level, and this is particularly advantageous for this group of students (Faber, Luyten & Visscher, 2017).

### *7.3.5. Hypotheses*

After having described literature and studies on the topic, conducted so far, comes the most significant part of the literature review - the hypotheses, specific for the questions in this

research. The following hypotheses and sub-hypotheses are formulated on the basis of the theoretical framework, described above, and will be tested by the data collected at the following stage of the research process:

- 1. The ability to communicate and share information through mobile devices such as tablets is related to collaboration:**
  - a) Between students**
  - b) Between students and teachers**
- 2. Collaboration is related to greater self-reported and teacher-reported student results.**
- 3. Self-reported and teacher-reported student outcomes are higher when using Snappet tablet devices.**
- 4. Using tablets leads to higher levels of distraction that has a negative impact on student outcomes.**

## **8. Ethical considerations**

The ethical considerations are an essential part of this research, since the field of study is education and primary schools in particular. Therefore, I had to approach students aged 7-10, and carefully consider whom and how to ask for consent. I adhered to the British Sociological Association's (BSA) Statement of Ethical Practice (2017) and looked at the guidelines, specific for my goals: 'As far as possible participation in sociological research should be based on the freely given informed consent of those studied. This implies a responsibility on the sociologist to explain in appropriate detail, and in terms meaningful to participants, what the research is about, who is undertaking and financing it, why it is being undertaken, and how it is to be distributed and used. Research involving children requires particular care. The consent of the child should be sought in addition to that of the parent. Researchers should use their skills to provide information that could be understood by the child, and their judgement to decide on the child's capacity to understand what is being proposed' (BSA, 2017). I made sure to obtain informed consent from the parents, teachers and students before entering the field to conduct research. The parents were informed via the teachers, who previously knew details about my research, and I was told they had given consent before entering schools. I received written and signed consent forms by the parents in one of the schools; the other was not on

paper. The consent forms for students and teachers can be seen in the relevant appendices in the beginning of the surveys, as well as a written and signed consent form by a parent (in Dutch).

## 9. Data and methods

### 9.1. *Data collection*

The data collection process was very important and not easy, more specifically regarding approaching respondents. In order to be able to research an e-learning platform, it was necessary to get into the schools using Snappet to see how things happens in practice. At first, I had a meeting with Snappet to present them the research project and, if possible, use their help to approach schools. However, the schools they got in contact with declined, so I had to start reaching out to others myself. I wrote emails to schools and used whatever connections I have in the Netherlands. At first, I wrote only in English and got very few responses (12% response rate) and then I figured out that emails I sent out had to be in Dutch and then have an English version. I approached 94 schools in total and got a little bit higher response rate of 14%, out of which six of the responses were positive. Out of these six, in the end I arranged going to two schools to collect data and in each of those I could enter only one class. The two schools I went to are private Catholic schools. In the Netherlands there are 68% private primary schools (the rest 32% are public) and 43% out of these are Catholic schools. It is important to note that private schools are categorised in this way, because they can be freely founded by anyone, but they are still publicly funded. 30% of all primary schools are catholic (Centraal Bureau voor de Statistiek, 2016-2017)<sup>10</sup>. As most private schools, their visions and missions are determined by the different umbrella organisations they are part of, but do not differ significantly. As an illustration, here are extracts of the vision and mission statements of each school:

*'We want to ensure that every child develops their skills and knowledge through continuous learning in order to become an independent, social and critical thinking person in a multicultural society. We assume that children who master this can cope in a rapidly changing society.'*

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<sup>10</sup> <https://opendata.cbs.nl/statline/#/CBS/en/dataset/03753eng/table?ts=1525169197513>

*‘Our children grow up in a rapidly changing society. That is why we think it is important that they get acquainted with the world and culture at a young age and learn to deal with it in a responsible manner. We want to help our children develop into young people who contribute with their passions and talents to a humane society.’*

## **9.2. Research methodology**

### **9.2.1. Methods for data collection**

The methodology is specific for the research questions and goals, as well as for the field that is under study. The mixed methods approach was chosen and there is evidence in literature as to why it is the most appropriate when looking at the influence of technology on education: ‘To study the impact of IT on student learning is not an easy job. Experimental (or quasi-experimental) research designs are appropriate for studying the potential of specific IT applications under controlled conditions. However, it is not easy to transfer findings from experimental research designs to the reality of the classroom. Other research designs and methodologies are needed to take into account the complexity of the classroom, such as mixed methods approaches and design research. In addition, studies researching the impact of IT on student learning also require a careful specification of the IT application involved. In many large-scale studies, IT is used as a container concept, which in reality consists of many different IT applications’ (Voogt & Knezek, 2008, p.36). Since it is necessary to consider the specific IT application, which is being researched here, when choosing the methodology, a number of studies on the specific impact of tablets in school environments were reviewed. Some of the studies were based on qualitative and some on quantitative data, proving both types are appropriate. In order to be able to use different evidence from distinct types of data collection, I chose to combine the quantitative method of surveys and the qualitative method of observations. The main operationalisations of concepts, deriving from literature and used to answer the research questions and create the hypotheses are self-reported student outcomes, levels of communication and collaboration, and distraction. All of these are suitable for both qualitative and quantitative methods, with emphasis on surveys for student outcomes and communication environment as a suitable factor for observations. The observations complement the quantitative data from the surveys by going more in-depth into the communication process between students and students and teachers – not just whether

there is communication, but what types of interactions occur between them and how frequently they are repeated. Also, the general atmosphere in the room as well as the level of focus of the students is observed – not simply whether or not they are focused when using tablets, but in what ways they express themselves and up to what degree they are concentrated (do they make noise, walk around the room, get distracted by doing other stuff than the tasks on the tablets, talk to each other about things not related to school, playing, etc.). The time spent using tablets in comparison with the time spent on other types of school activities and the proportion between the two in one lesson is observed too. In addition, observations that the teacher makes on the students' performance could contribute to testing the influence on teacher-reported student outcomes. All of this helps in answering the research questions whether and how does Snappet improve cooperation and communication between students and students and teachers, does the tablet device divert their attention from the teacher and does the Snappet platform lead to improvement of students' results. The observations will help test the first, third and fourth hypotheses.

Research on Tablet use ranges from nurseries to universities, and it should be highlighted that the educational focus and context of Tablet use of course varies depending on the stage of education, which again affects research methodologies. Research on Tablet use in primary schools often focuses more on teachers' use of the devices, as they inevitably will hold more control of the technology (Clarke & Svanaes, 2014). In this research, both students and teachers are involved as respondents in the study, since the research questions are about communication between both parties and students only, as well as level of focus and outcomes of the students, so looking only at the teacher's point of view most likely would not be enough.

### *9.2.2. Instruments for data collection*

The instruments for data collection are surveys for teachers, surveys for students and observation protocols. The surveys for teachers are created online and translated in Dutch by a native speaker, prior to distribution among respondents. The surveys for students are on paper, also translated in Dutch by the same person prior to distribution. There is a slight difference in the surveys for the two schools, both in the teacher and the parent version, due to the fact that in one of them Snappet was used in math and grammar lessons and in the



other – only in math. The observation protocol is in English, since it is used only by the researcher, and it is the same for the two schools. One lesson in math was observed in each of them. All the instruments can be found in the relevant appendices. Some of the questions from the teacher surveys were found in Rikala, Vesisenaho, & Mylläri (2013), who did a research on tablet usage, in schools (not on the Snappet platform, but on general usage of tablets). They were adapted for the purposes of this study and used to be able to replicate some parts of a research on a similar topic and increase the level of reliability of the instruments. There are relevant notes in the appendices as to which questions these are exactly. The rest of the questions in the teacher surveys, all of the student surveys and the protocol for observation were designed entirely by me, focusing on my research questions and hypotheses.

### *9.2.3. Methods for data analysis*

The methods, which will be used for analysis of the surveys, are quantitative, since the type of data collected is quantitative in nature. The statistical analysis used to test the hypotheses will be frequency distribution according to one and more factors. These will be used due to the fact that there are questions in the survey addressing specific hypotheses, e.g. hypothesis 4: Using tablets leads to higher levels of distraction that has a negative impact on perceived student outcomes – question from the survey: What is the level of focus of the students when they are using Snappet tablets compared to when they are not? Bivariate analysis will be used to test the influence of the control variables – age, gender, work experience, period and frequency of Snappet usage, among others. Chi square will also be looked at in some cases, since variables are categorical. The data is not representative. Teachers from 25 Dutch schools filled out the teacher survey, so there is a wide range of schools included, details about which will be commented in the beginning of the data analysis chapter.

The observations will be analysed via a qualitative approach, but will not be coded, since the number of observations is two. For the same reason they will not be analysed using SPSS and used in a quantitative way, but rather compared (since both of the observations are of a math lesson on Snappet and a comparison is feasible) and analysed, emphasising on the main findings that will add to and support the data from the surveys.

## 10. Data analysis

Before moving on to the data analysis, here are some general characteristics of the target group and respondents. The number of respondents in the student survey is 44, which are two classes. 54% are male and 47% are female. There is one missing. Students are between 6 and 10 years old – 2% are aged 6 and 10, 29% are 7 years old, the majority, 43%, are 8 years old and 24% are 9 years old. There are 2 system missings. They study in two schools and are almost equally divided – 48% study in the first school and 53% study in the second school.

The number of respondents in the teacher survey is 43. They work at a total number of 25 schools, including the two schools at which students were surveyed. 75% of schools are Catholic and Roman Catholic and 25% are public. The highest number of respondents from one school is 5 (there is one such case) and the lowest is 1, which is the mode, meaning the most common case is one teacher from a school filled out the survey. In two schools, there were 4 teachers who filled out the survey and in one school there were 3. In four schools, there were 2 teachers respondents. All of them teach all of the subjects at primary school and a range from group 3 to group 8 (specific percentages can't be commented, since there are many respondents that teach two or three groups at the same time). In descending order, 33% have worked as teachers for 11-20 years, 26% for 6-10 years, 19% for less than 5 years and the same amount for over 20 years and 5% for less than one year, so the majority is rather experienced. There are 30% male respondents and 70% female and 3 system missings. In descending order, 33% are between 36 and 45 years old, 25% are between 31 and 35 years old, 23% are 30 or less years old, 15% are more than 55 and 5% are 46-55. There are 3 system missings in this question as well.

The following data analysis will be divided into sections, corresponding to the different research questions and topics and the relevant hypotheses will be tested in each section.

### *10.1. Communication and collaboration and their influence on self-reported and teacher-reported student outcomes*

Central to the thesis project and to the first two hypotheses is the factor of communication and collaboration. The concept of communication and collaboration entails group work to achieve common goals, interactions and coordination. The first hypothesis contains two

aspects of communication – between students and between students and teachers. In the analysis part, each of the two will be viewed separately.

The first sub hypothesis is that the ability to communicate and share information through tablets is related to communication between students. In order to test this hypothesis first a question from the student survey will be used. This question is whether students work more often on their own or together when using Snappet and it reflects the level of group work involved when using the platform. In addition, four questions from the teacher survey are used to test the first sub hypothesis. The first three are: what is the level of agreement with the statement that tablet use increases collaboration between students; how are tablets used in school – in private or in shared use by students; what is the level of agreement with the statement that tablets should be used for students to work in a collaborative way. The first two show whether teachers think the platform *is currently used* in a collaborative way and the second whether teachers think this *should be a purpose* of the platform. The fourth question is how often students work together when using tablets in class, which measures the level of group work between students when using Snappet, such as the question in the student survey, but this time reported by teachers. In addition, the observations will add value to the findings.

10.1.1. Student survey data – first sub hypothesis

In figure 1 it is shown that 80%, the majority of the students, think they work more on their own when using tablets, followed by working equally with others and on their own and working more together (both with 9%).

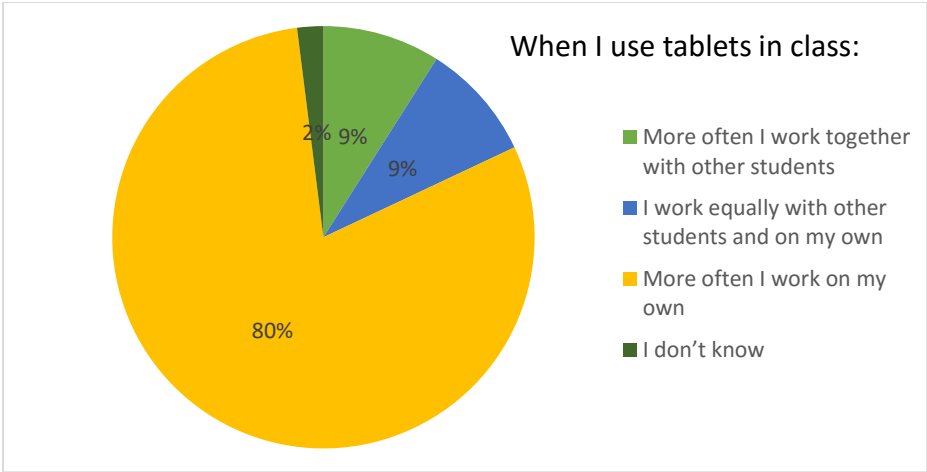


Figure 1

Two students answered they do not know or did not answer at all. This shows that for most of them tablet usage is an individual activity.

The control factors, used to test the influence on the results from each question in the student survey, are gender, age and years of using Snappet at school and in some cases, whenever it is relevant, which of the two schools students study at. They are tested using a cross table analysis and chi square tests in some cases.

**10.1.2. Teacher survey data – first sub hypothesis**

The teacher survey shows similar results. Most of the teachers neither agree, nor disagree with the statement ‘Tablet use increases collaboration between students’ (50%), while 28% rather disagree. Only 9% strongly agree and 12% rather agree with it. There are 5% strong disagreements. Regarding the question how often do students work together when using tablets in class, 31% of teachers responded occasionally, 33% rarely, 19% very rarely and 2% not at all and the rest 15% answered that students work together very often and always when using tablets. The question whether tablets should be used for students to work in a collaborative way provokes divided answers, which are reflected in figures 2 and 3 below.

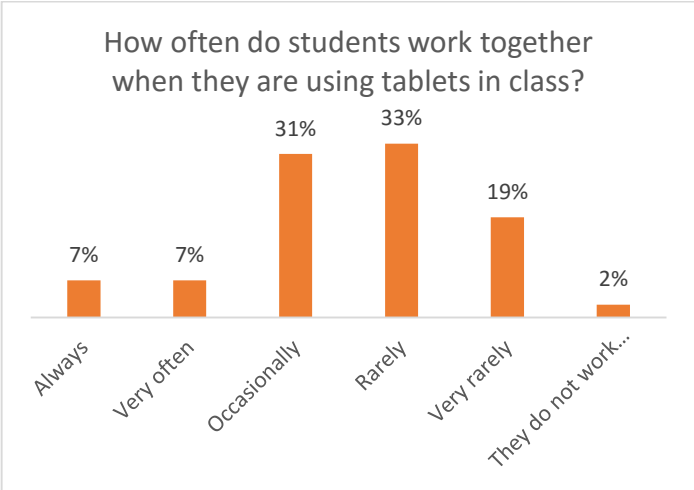


Figure 2

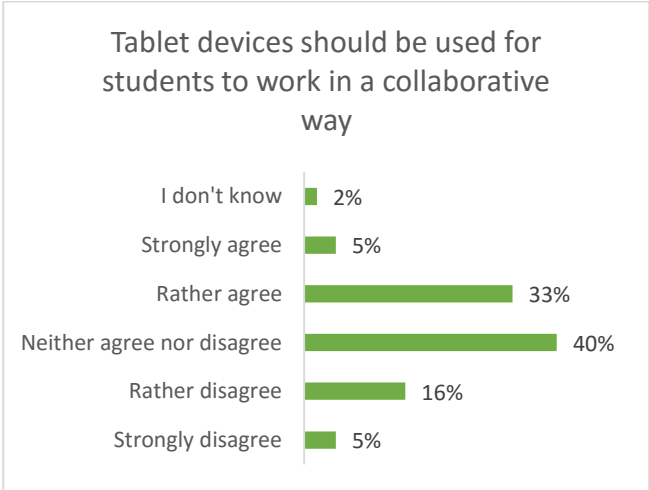


Figure 3

40% of teachers neither agree, nor disagree, 21% agree and 37% disagree (including rather disagree and strongly disagree, as well as rather agree and strongly agree). Here it could be observed that some teachers think tablets should be used in group tasks, while others are unsure, but at the same time, they mostly agree on the fact that tablets are currently not used in such a way. This is also confirmed by the responses to the question how are tablets used in

the school, to which everyone answered that students use them privately. These results could be summarised in this way – respondents are neutral to whether tablet use increases collaboration between students or tend to disagree with it and they say students rarely or almost never have group tasks on Snappet, but some believe they should have such tasks.

The control factors, which will be used to test questions in the teacher survey, are age, years of teaching experience and years of tablet usage. They will be tested via crosstabs and chi square values in some cases, since variables are categorical. Frequency of tablet usage will not be used since almost everyone, except for one person, responded they use tablets every day or almost every day (that other teacher chose the option at least once a week). Gender also will not be used, because the majority of the respondents are female and no relevant comparisons can be made with too few male respondents.

### *10.1.3. Observation data – first sub hypothesis*

The two observations that were conducted on the usage of Snappet in math school lessons in two Dutch primary schools also show that in general students work on their own when using the tablets. In the first case a 48 minute-lesson was observed, in which 40 min students worked on their own, using tablets, and 7 minutes they worked in groups, which did not involve tablets (so 85% of the time they worked on Snappet and the rest 25% were devoted to other type of work). They spent 1 or 2 minutes working on the board on tasks that were also on their tablets, but this could hardly qualify as group work on Snappet. The second case was a 35 minutes math lesson, out of which 25 minutes were spent on working individually on tablets and 8 minutes working individually in their notebooks (therefore 75% of the time they worked on tablets vs 25% in their notebooks). In the rest 2 minutes, they discussed an assignment on Snappet, which again is not group work, but activity involving communication. The differences between the two cases is that Snappet lessons are accompanied by group work in the first school and by individual work in the second and a bigger proportion of time was spent working on Snappet in the first school, but also the whole lesson observed was shorter in the second one and then the students went outside in the yard with the teacher. However, as mentioned above, an important factor when making observations is not just the lack/presence or number of repetitions of an interaction, but also the type of interactions that occur. Regarding the types of interactions between students, in both cases they sometimes

talked to each other informally and asked each other questions about Snappet, only in the first case they had a group discussion, because they had group work, unlike in the other observation.

All of this means that the first sub hypothesis is rejected. Except for some rare occasions, students work individually on Snappet tablets, therefore the ability to communicate via these devices does not increase collaboration between them.

*10.1.4. Student survey data – second sub hypothesis*

The second aspect of the first hypothesis involves communication between students and teachers. It will be tested via a question from the student survey and a question from the teacher survey, as well as information from the observations. The question in the student survey is whether students feel they work more, the same or less with the teacher when using Snappet. It is asked to measure what is the level of teacher-student interaction when using tablets compared to regular lessons. The question in the teacher survey is the same, with the difference it measures what teachers think about their interaction with students when using Snappet.

To the question whether they work more, less or the same with the teacher when using tablets in class, 65% of students answered they work more with the teacher, and equally 12% said they work less, the same or that they don't know. There is one missing. Results are presented in figure 4.

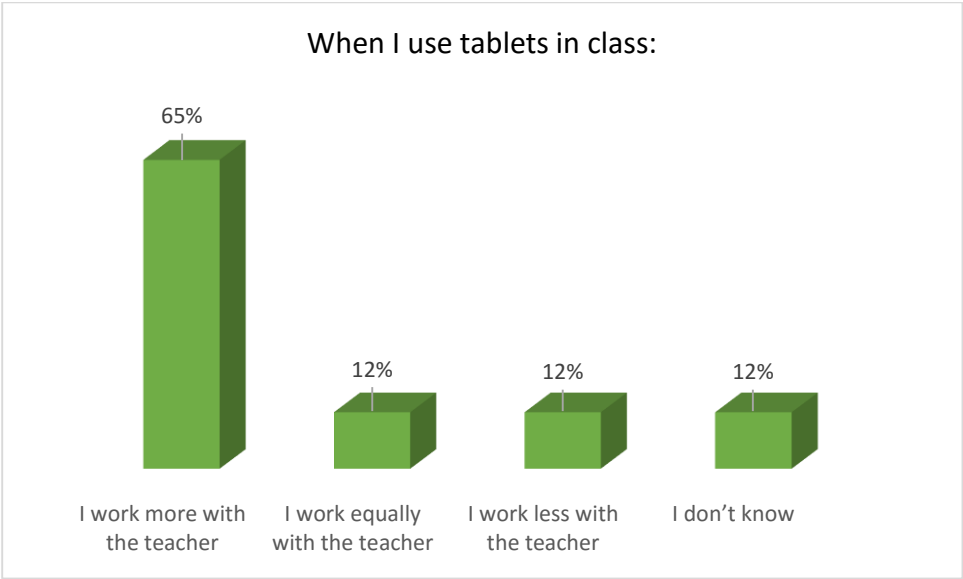


Figure 4

Unlike the question about working together with other students, most of the children have answered they work more with the teacher, so Snappet is not a platform for individual work, when it comes to teacher-student interactions.

Table 1 shows that 24% of those students who use tablets for less than a year say they work less with the teacher and 12% do not know. However, it has to be kept into account that these students are young and they have been using tablets for a short amount of time, so it might be difficult for them to judge whether they work more or less with the teacher. The rest 59% have opted for working more with the teacher and one student chose the option working equally. In the group of using tablets between one and three years 83% say they work more with the teacher and 17% indicate they work equally with the teacher when using tablets.

	Less than 1 year	Between 1 and 3 years	Between 3 and 4 years	I don't know
I work more with the teacher	59%	83%	100%	29%
I work equally with the teacher	6%	17%	0%	14%
I work less with the teacher	24%	0%	0%	14%
I don't know	12%	0%	0%	43%

Table 1

Nobody chose the options of working less or 'I don't know' among these two groups. This might be explained in a way that teachers and students who have less experience with the platform might not use all of its functions, so that teachers do not track students' progress sufficiently and work together with them enough when necessary. A chi square test of independence was not performed here, since there is a limitation in sample size and some of the cells have a count of 0.

*10.1.5. Teacher survey data – second sub hypothesis*

In the teacher survey, the majority of respondents said they work equally with students when they use Snappet and when they do not (63%), while 7% said they work more with students on Snappet and 28% said that amount is less. This is shown in figure 5:

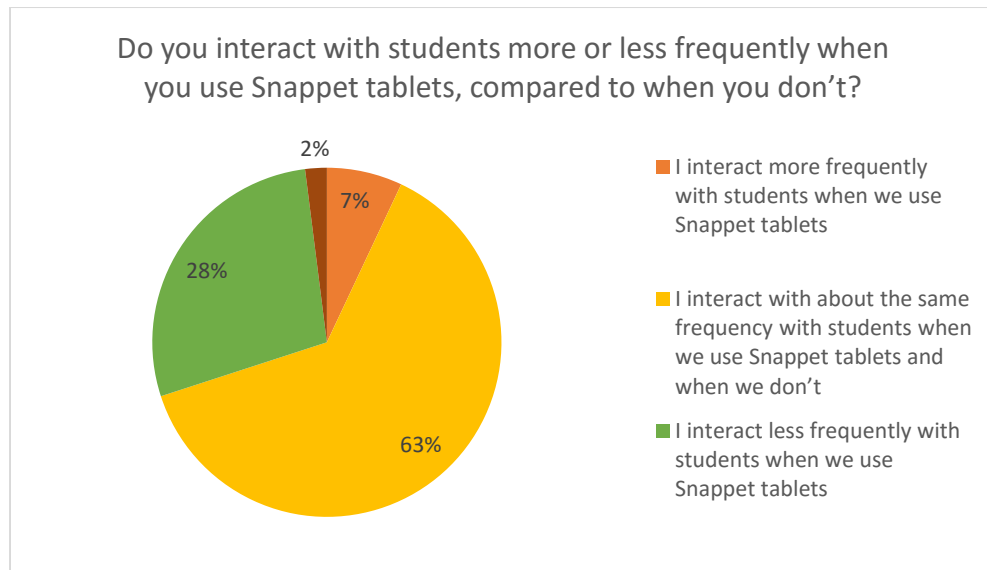


Figure 5

It appears there are more interactions involved between teachers and students when using the platform than between students. These interactions are looked into in more detail in the observations.

In order to look at communication and collaboration in general, the teacher survey has a question about the general purposes of using tablet devices and the Snappet platform. They add to the results of the first hypothesis and are reflected in figure 6:



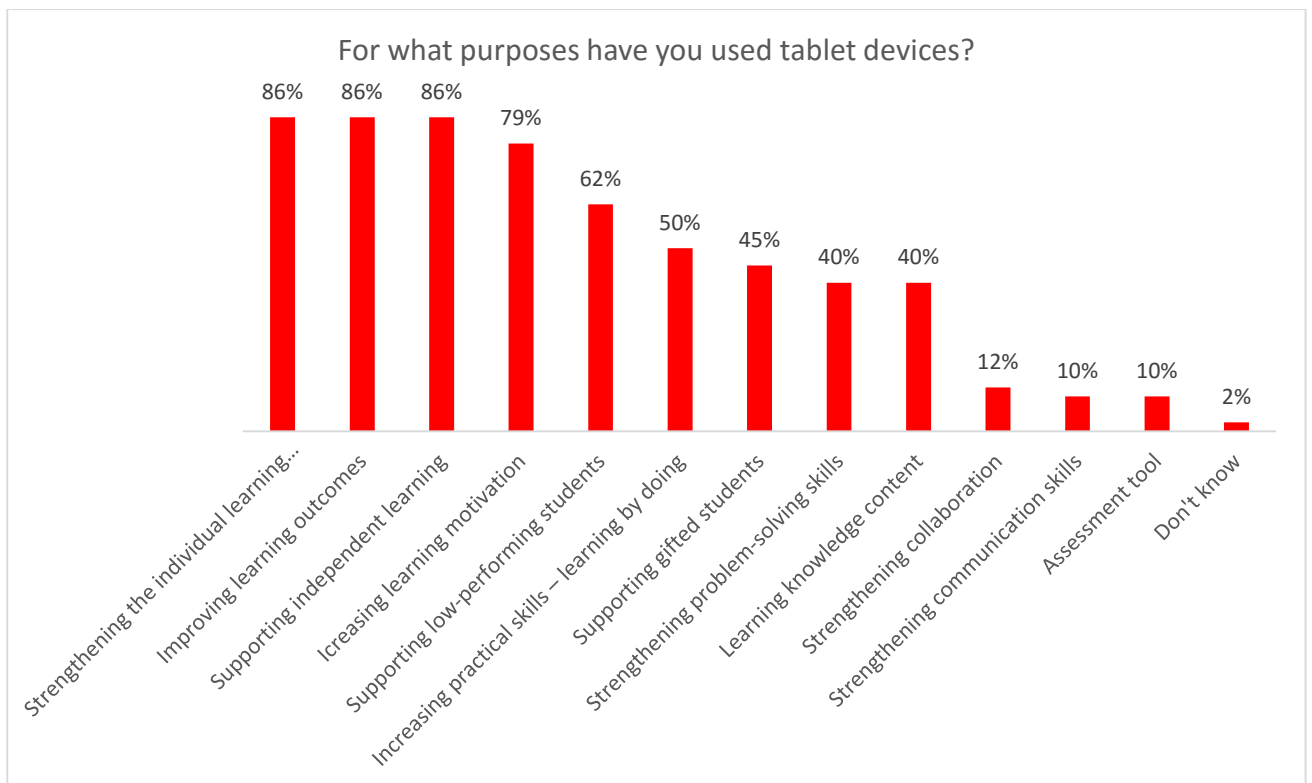


Figure 6

The two mostly indicated purposes are strengthening the individual learning experience and improving learning outcomes (both chosen by 86% of the people), while strengthening communication and collaboration skills are indicated by 10% and 12% of the teachers respectively and they are some of the least chosen out of all the other purposes. Strengthening collaboration is indicated as one of the top three purposes for using tablet devices only by one of the respondents, who has chosen the majority of the possible answers, instead of choosing three. Strengthening communication is not chosen by anyone. This means that communication and collaboration are not purposes for which Snappet is used. Since it was seen that students work individually on the tablets, the most important purposes of the platform are to support individual and independent learning, to improve outcomes and increase motivation. This paints a rather individualistic type of learning profile for Snappet and puts the emphasis on the adaptive learning, which allows grasping the differences in skill levels and working pace between each student, providing additional adaptive tasks for those, working faster than others do. It is also important to see what happens in the classroom in the observation analysis.

### *10.1.6. Observation data and results– second sub hypothesis*

The observations give additional meaningful input regarding this aspect of communication. When counting the interactions between students and teachers when working with Snappet and when not, in the first case they were 13:12 number of times they interacted, so almost equal, and in the second case 3:25, so a lot more when using tablets, since the rest of the work was individual. In the first observation the interactions between students and teachers included the teacher: asking questions to all the class, explaining tasks on the tablets and for the group assignment, going to students, when they have questions about tasks on the tablets, working closely with certain students, who experience more difficulties than others, asking students to go to the board when using Snappet (which happened the most frequently). In the second one, they said a prayer together in the beginning of the lesson, the teacher: explained tasks on the tablets and in the notebooks, asked questions to all the class (the most frequent one), went to students, when they had questions about tasks on the tablets, but also students stood up and went to the teacher to ask them questions with and without the tablets. The difference that could be seen here is that in the second school students also went up to the teacher to ask questions, while in the first school the teacher was more proactive that they were in asking them questions, inviting them to come to the board to solve a task, going up to them when they had difficulties. In addition, they said a prayer in only one of the schools, although both are Catholic, so this is one internal difference in the school habits and traditions. It seems there were a number of different types of interactions between students and teachers, and they are pretty much the same amount when working with tablets and having group tasks without tablets.

In sum, the second sub hypothesis is confirmed, since it can be seen that tablet usage is related to communication between students and teachers. However, it was seen in observations and from results in the teacher survey data that teacher-student communication is not significantly different when using Snappet and in the regular lesson. This means that using Snappet does not lead to less communication between students and teachers, but also it does not involve more – levels are about the same. Therefore, the platform does not have a strong influence on regular communication between students and teachers.

### 10.1.7. Student survey data – second hypothesis

The second hypothesis is in regards to communication and collaboration having a positive influence on self—reported and teacher-reported student outcomes. The concept of self-reported and teacher-reported student outcomes is introduced due to the fact there is no access to direct CITO scores or other type of student results, therefore they are investigated through the perceptions of students and teachers. It will be tested via two questions from the student survey and one question from the teacher survey. The questions from the student survey are whether it is easier in class, when they work together and whether it is more interesting in class, when they work together. They measure the influence of group work on student – reported outcomes through the levels of interest, enjoyment and how easy it is for students. The question in the teacher survey is for teachers to rate student performance of students when working together, compared to working individually, regarding their study results and grades. It is intended to measure group work influence on teacher-reported student outcomes.

In figures 7 and 8 below are presented results to questions from the student survey:

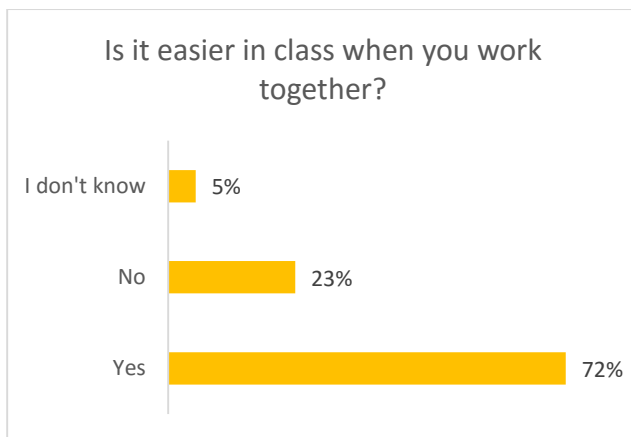


Figure 7

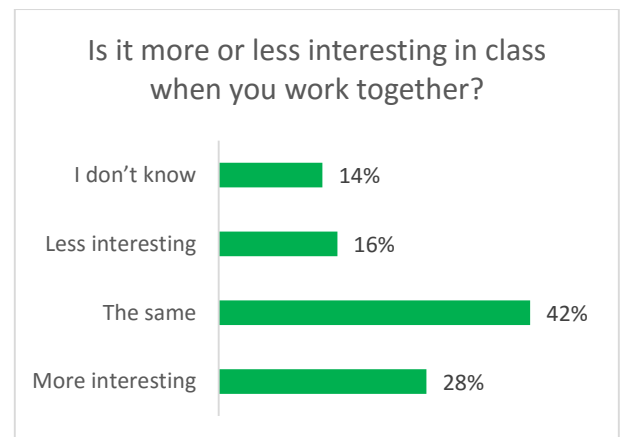


Figure 8

72% of students reported it is easier in class when they work together, for 23% it is not easier and 5% do not know. However, it is more interesting for only 28%, for 42% it is the same, for 16% it is less interesting and 14% do not know. It seems it might be easier, but not that interesting for student respondents to work together.

The control factor gender has an influence on the results to the question whether it is more interesting in class for students when they work together. A chi square test was performed

and a significant relationship was found between gender and how interesting it is in class when working together,  $X^2 (3, N = 43) = 8.74, p = .03$ . Results from crosstabs are shown in figure 9 below:

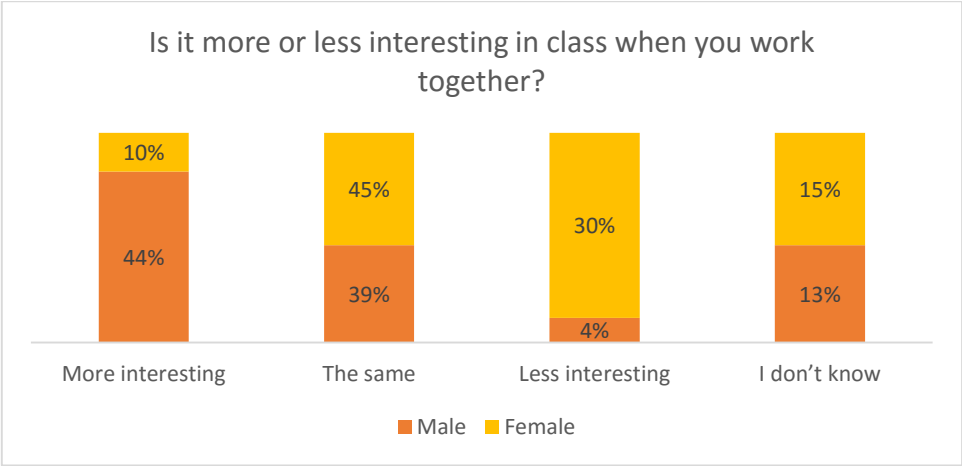


Figure 9

It can be seen that the difference is in the response that it is more interesting in class when working together. 10% of girls have chosen this option, while 44% of boys think it is more interesting. Logically, significantly more girls than boys have indicated it is less interesting for them when working together (30% of girls in comparison with 4% of boys). It appears boys prefer group work more than girls.

**10.1.8. Teacher survey data – second hypothesis**

Teachers were asked to rate the performance of students when working together in class, compared to working individually, regarding their study results and grades.

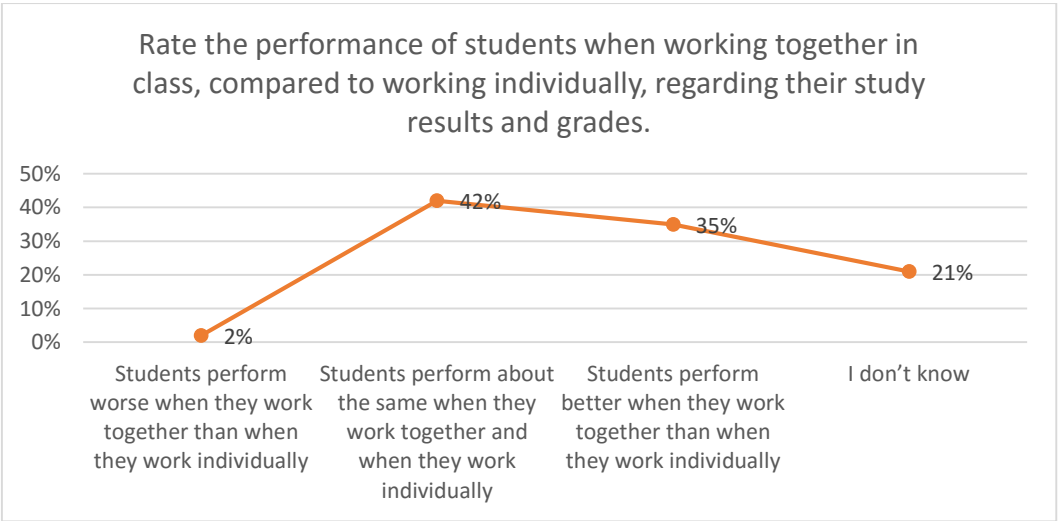


Figure 10

The results are shown on figure 10 above. 2% of respondents think students work worse together than individually, for 42% of teachers students perform about the same in both cases, 35% think they perform better and 21% do not know. It appears replies tend to go more towards a high level of performance.

Opinions are divided with a little prevalence of the option that students perform about the same, but almost the same number of teachers believe they perform better. A considerable amount also did not know the answer to that question. The majority of students think it is easier in class when they work together, while most of them have the same level of interest when working together and not. This question is influenced by students' gender as well. In summary, in both of the surveys there are different opinions, so this hypothesis can only be confirmed partially. There is no additional information from the observations, regarding the influence of communication on student results, since mainly individual work was observed and only a few minutes spent on a group task at one of the schools, in which there were no outcomes that could be accounted for.

### *10.2. Influence of the Snappet platform on self-reported and teacher-reported student outcomes*

The third hypothesis is connected to student results and whether tablet usage is related to greater self-reported and teacher-reported outcomes. It will be tested via three questions from the student survey and two questions from the teacher survey, also adding information from the observations. In order to get a grasp of student-reported outcomes, when asking 8/9 year old children, the questions in the student survey are whether it is easier studying with tablets, or studying math and grammar, since these are the subjects for which Snappet is used. The teacher survey includes the question if students finish more tasks when using Snappet tablets, which is intended to measure their performance when using tablets, as well as a question what are the purposes of using Snappet that includes supporting low-performing students, supporting gifted students and improving learning outcomes, all of which point towards a positive influence on teacher-reported outcomes.

### 10.2.1. Student survey data – third hypothesis

Opinions are divided on the first question whether it is easier studying when using tablets – 50% of students say it is easier. This is the majority, however, the rest 50% are spread out between ‘No’, ‘It is the same’ or ‘I don’t know’ answers (27% say it is not and 16% say it is the same). Results are presented in figure 11 below:

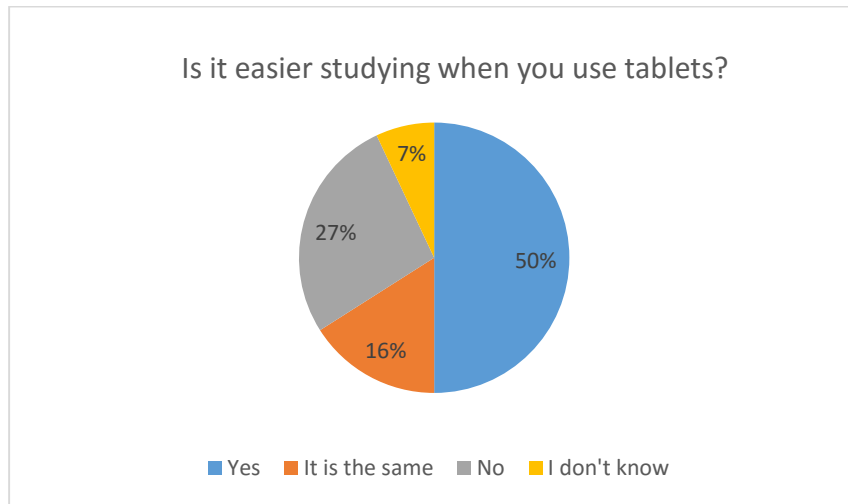


Figure 11

This shows that tablets cannot instantly account for an easier learning process and, therefore, probably higher student outcomes.

As it could be expected, the experience with using tablets has an influence on how easy it is for students. More specifically, the difference is between those who have been using Snappet for less than one year and those who have been using it between one and three years, which is shown in table 2 below:

		How long have you used tablets at school?			
		Less than 1 year	Between 1 and 3 years	Between 3 and 4 years	I don't know
Is it easier studying when you use tablets?	Yes	44%	67%	0%	50%
	It is the same	6%	17%	0%	16%
	No	50%	17%	0%	27%
	I don't know	0%	0%	100%	7%

Table 2

50% of students who use tablets for less than one year do not find it easier studying when using them and 44% find it easier, while the rest 6% think it is the same. On the contrary, 67% of those who use Snappet between one and three years believe studying with them is easier and, equally, 17% consider it the same or less easy. This is a logical influence, since more experience makes it easier to study. A chi square test was not performed, since there are cells with a 0 count due to the sample size.

The questions if it is easier studying math than other subjects, as well as grammar, are posed in order to control for the influence of Snappet tablets, since they are used only for math in one of the schools and in the other - both in grammar and math lessons. Therefore, these two questions will be looked at separately for the two schools. Since these are the only subjects the platform is used for, Snappet can be the reason for differences students might have in the perception of how easy or interesting it is to study. In addition, the control factors will be looked at as influencers. Results are reflected in figure 12:

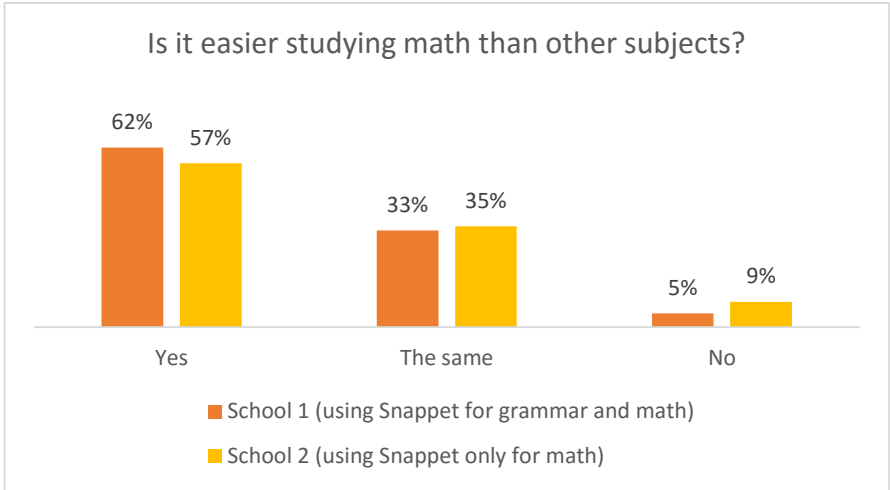


Figure 12

57% of the students that use Snappet only for math say that it is easier than other subjects, while 35% think it is the same and 9% that it is not easier. It seems the majority considers the subject easier, but since they are more divided on the previous question, it is likely that there are other factors influencing these results, some of which will be controlled for. In the second school math is considered easier by 62%, while 63% believe grammar is not easier. Since Snappet is used for both subjects, it seems there are other factors coming into place or it has a different effect on different subjects, some of which will be tested.

Gender has an influence on the answers to the question whether it is easier studying math than other subjects. A chi square test was not performed, since there are cells with a count of zero. Figure 13 below shows differences between groups:

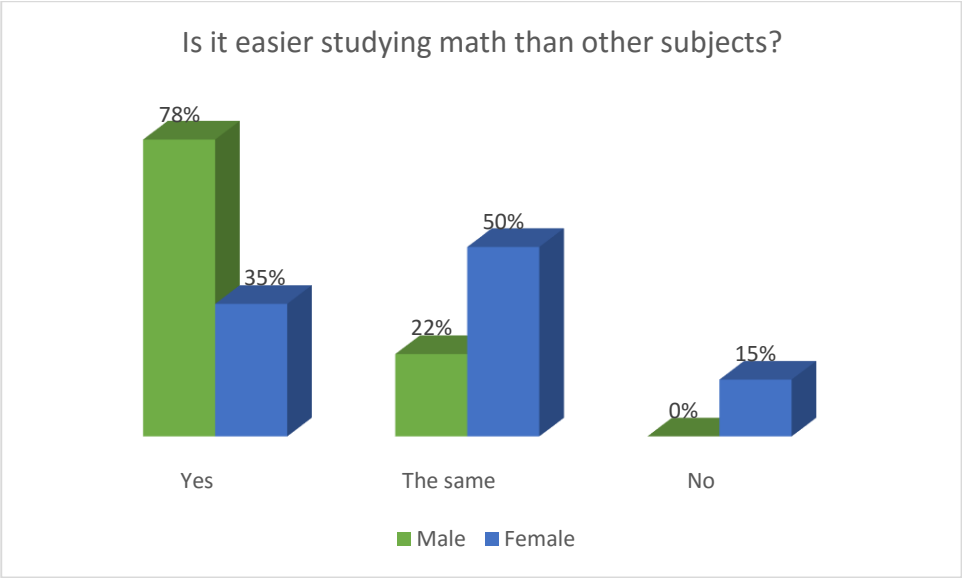


Figure 13

The exact differences between boys and girls can be seen from the graph – 78% of boys find math easier and 22% find it the same as other subjects, no boy has chosen the option that it is not easier. In contrast, only 35% of girls think it is easier, 50% think it is the same and 15% believe math is more difficult than other subjects.

**10.2.2. Teacher survey data – third hypothesis**

The teacher survey includes similar questions, in order to test whether there is influence of Snappet on teacher-reported student results. One of them is if students finish more tasks when using Snappet tablets and results from it are shown in figure 14:



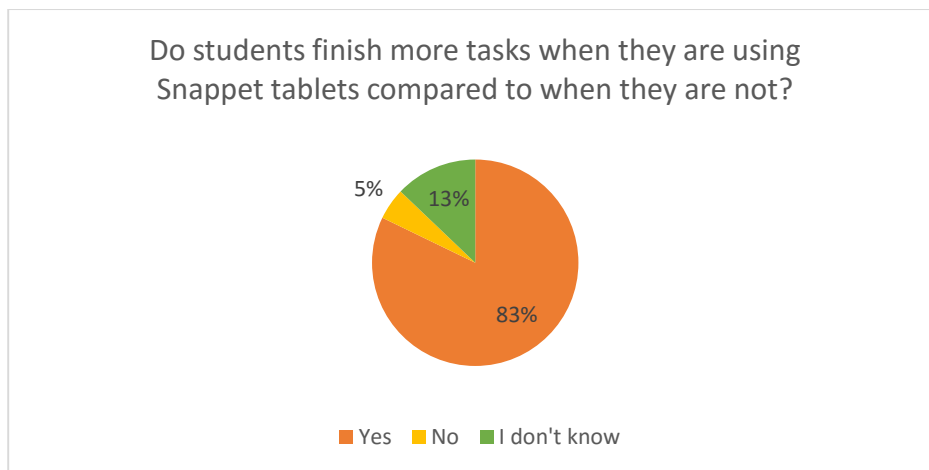


Figure 14

The majority of the teachers (83%) believe they do, 5% think they do not and 13% do not know. This points towards a prerequisite for increasing student results.

Among the purposes, for which tablets are used (which are displayed on Figure 6), are the options supporting low-performing students, supporting gifted students and improving learning outcomes, all of which are connected to the third hypothesis. 86% of teachers indicate that improving learning outcomes is one of the purposes of Snappet and 67% think that it is one of the top three purposes. Supporting low-performing students is marked by 62% as one of the purposes and by 23% as one of the top three. 45% have chosen supporting gifted students as a purpose and 12% think it is one of the top three. It appears all three purposes, mostly improving learning outcomes, are considered important by teachers, so Snappet is supposed to be a platform that improves student outcomes.

### 10.2.3. Observation data – third hypothesis

In addition, there is information from the observations that would be necessary for testing the third hypothesis. In the first observation were seen some possible indirect effects on student outcomes. The teacher said to a couple of students they are doing really good and showed their results on the board in percentage performance assessment that is integrated into the Snappet platform. This was only done for students who were significantly excelling in performance, so it could have a motivating effect on the rest of the class. The reaction of the other students was very positive, so this could mean that they are motivated to achieve higher results as well, because they would like to also be shown as a good example in front of all the class. In addition, in the first school there were adaptive tasks for 2 children, because it

seemed they were done with the rest of the regular tasks. For the last 15 minutes of the lesson a different teacher took five of the students to another classroom and I was told by the teacher (whose class I was doing observations on) that these students needed additional help in math, so they were working on more and different tasks with the other teacher and that happens on a regular basis. This shows that both high performing and struggling students have the opportunity to work at their own pace and this could also contribute to increasing the average results of the class (although no direct effect could be observed). This is due to a combination of the teaching style and educational approach within the classroom and the use of Snappet. It was also shown in the purposes of the platform, indicated by teachers (Figure 6) that important ones are supporting low-performing and gifted students, as well as improving student outcomes. The fact that some students work additionally with another teacher, because it is more difficult for them, and the way that the teacher shows the progress of the most improved students to others are part of the educational approach. But also, these assessments are an integrated part of Snappet, which allows to see who are the students that need more work, and who are the ones, performing better than the rest, and act accordingly.

Meanwhile, in the second observation there are almost no comments done on the results of the students or adaptive tasks they were doing. It seemed there were students that could have been doing adaptive tasks, (additional tasks for those students, finished faster than others with the regular ones), but they were not. This is a significant difference between the schools, in one of the cases you could account for some indirect possible effects on outcomes, while in the other this was not observed.

Neither students nor teachers can definitely say it is easier when they use tablets or whether students perform better in the subjects Snappet is used for. Still, opinions are rather divided and the majority of teachers believes that students finish more tasks when using tablets. In addition, a lot of them think that the purposes of the platform are to improve outcomes and support both gifted and low-performing students. In one of the schools, an effect on outcomes could be seen from the observation, but not in the other. Therefore, the third hypothesis shows mixed results.

### 10.3. Focus levels

The fourth hypothesis is related to focus levels and the way the Snappet platform influences them, which could thereafter have an impact on student outcomes. The concept of focus level entails a comparison between the time students spend thinking on the educational content when working on tablets and the time spent doing other activities while in class, such as moving around, singing, talking to each other about topics not related to education, etc. It will be tested via four questions from the student survey and one question from the teacher survey. The questions in the student survey test students' self-assessment of their focus level when using Snappet, how interesting it is for them to study when using the platform, since interest could lead to higher levels of focus, as well as how interesting are math and grammar, because these are the subjects Snappet is used for. The question in the student survey is again how focused students are when using the platform, but this time (perhaps more objectively) reported by teachers.

#### 10.3.1. Student survey data – fourth hypothesis

Children were asked whether they feel they are less or more focused when they use tablets in class. Opinions to this question are divided, as shown in figure 15 – notably, 27% of students do not know and the same amount - 27% think using tablets does not change their focus level.

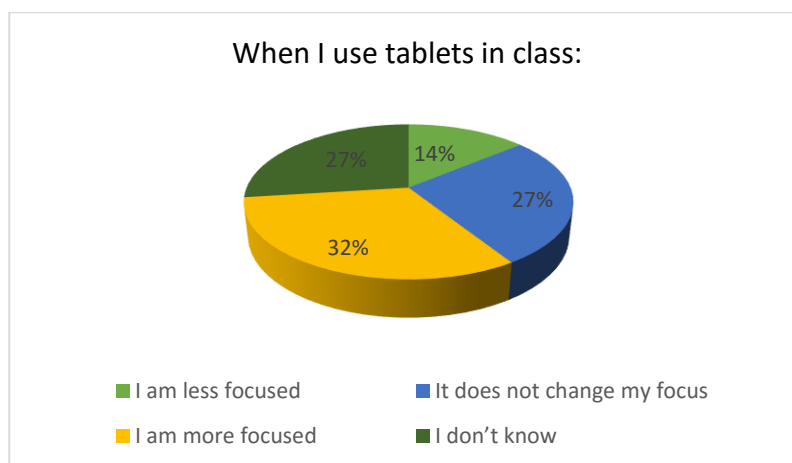


Figure 15

32% believe they are more focused when they are using tablets and 14% have indicated they are less focused. An additional question in the student survey was whether it is more interesting to study when using tablets. It reflects students' interest in studying with tablet usage with the presumption that more interest should lead to more focus. In comparison, the

question whether it is easier studying when using tablets is used to grasp student-reported outcomes. 39% of students think it is the same, 34% find using tablets less interesting and equally 14% have chosen the options 'More interesting' and 'I don't know'.

Students were also asked whether they think math and grammar are more interesting than other subjects (again to look at the influence of tablet usage, since only the school that uses tablets exclusively for math was asked whether math was more interesting and the school that uses tablets for both math and grammar was asked about both subjects). Results in Figure 16 for math reflect the answers of students in both schools – 43 in total (1 missing). Results for grammar are from the school that uses Snappet for both subjects – 20 in total. Therefore, only percentages are compared.

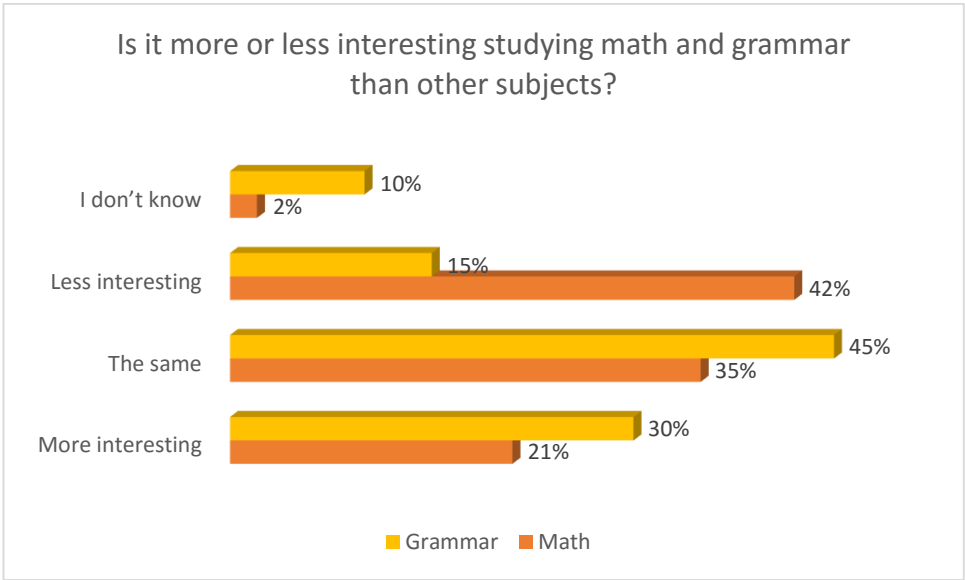


Figure 16

42% find math less interesting, 35% think it is the same and 21% consider it more interesting. 2% do not know. Regarding the question about grammar, 45% think it is the same as other subjects, 30% think it is more interesting and 15% think it is less interesting. 10% do not know.

Looking at results separately for two schools, it seems that tablets do not have such an influence on considering these subjects more or less interesting and there could be other factors involved in the results, some of which will be accounted for. Overall, math is considered more interesting than grammar or they are the same as other subjects.

It can be seen that most students think they are more focused when using Snappet and a considerable amount do not know or believe it is the same. However, they do not think it is more interesting to study when using tablets or find it the same in general.

The control factor gender has a slight influence on results to the question whether students feel they are more or less focused when using tablets in class. The cross table shows a difference in results – 40% of girls think they are more focused and the rest of the answers have equally been chosen by 20% - less focused, the same and 'I don't know'. Results are displayed in figure 17:

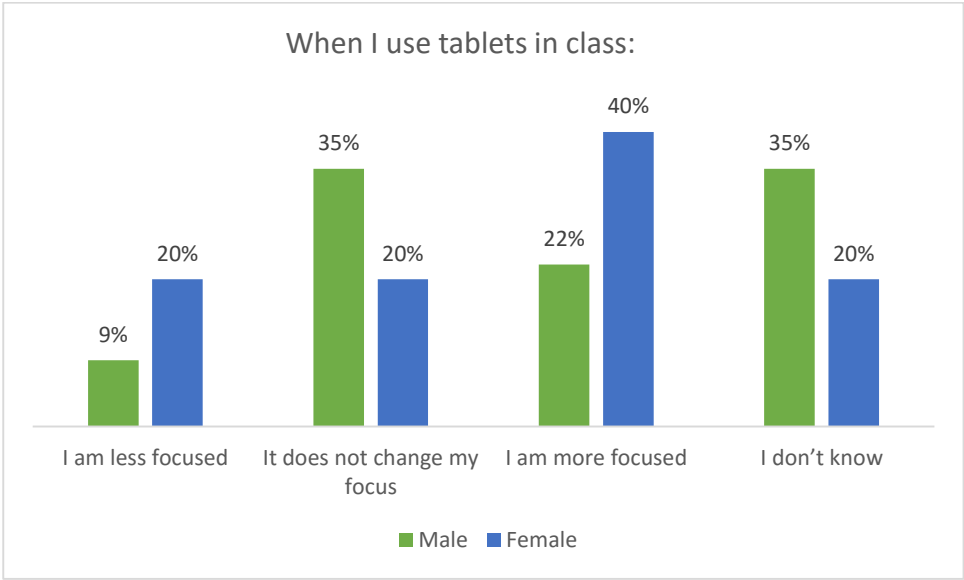


Figure 17

35% of boys have opted for options 'The same' and 'I don't know', while 22% think they are more focused and 9% believe they are less focused. Overall, this would mean girls feel they are more focused when using tablets than boys. This could also be confirmed by the observations, since the majority of those who appeared less focused and moved around the classroom, were boys. In both schools, boys were less concentrated than girls were and this is proven by their action of making noise and moving around.

Regarding the question whether it is more interesting studying when using tablets, experience with using tablets shows an influence. A chi square test of independence was not performed, due to the limited sample size and the presence of cells with a zero count. 28% of those students who have been using tablets for less than one year think it is more interesting

studying with them, while those who have been using them for between one and three years are divided only among the answers less interesting, the same and 'I don't know'. This is a logical result, because getting used to a form of studying could mean that it becomes less interesting, since it is nothing new. Especially among young children, constant change and variety in the way they work sparks their interest.

**10.3.2. Teacher survey data – fourth hypothesis**

Teachers were also asked about the level of focus of students when using Snappet. It could be considered that this is a more reliable result, since an outside person can account better for someone else's focus than himself or herself. 40% of teachers report students are slightly distracted when using Snappet and 20% think they are very distracted. This is shown on figure 18:

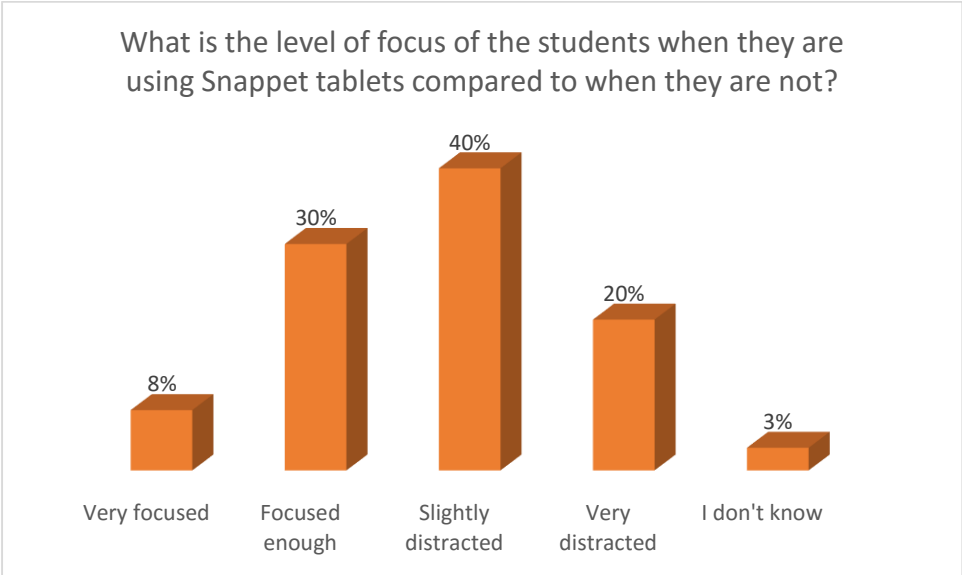


Figure 18

It can be seen that 30% of teachers have indicated students are focused enough and 8% believe they are very focused. There are 4 system missings. It appears the prevalent opinion supports the fact that students are distracted when using tablets.

**10.3.3. Observation data – fourth hypothesis**

In addition, the level of focus was looked at during the observations. In the first observation, besides working with Snappet, students had a group work task and they were focused on it, but there was a bit of chaos and they were much louder than when working individually with

the tablets, which could be expected, so a clear difference between the focus levels cannot be distinguished. While working with Snappet, some students got more distracted than others and started talking and moving around. Overall, however, they were calm and focused most of the time.

In the second school, there was individual work, apart from working on Snappet. On that task, some students were not very focused, while the rest were. In this case, it is easier to compare and it could be seen that there was less focus when using Snappet. That was mostly due to the fact that some students were finished earlier than others with regular tasks and were not given adaptive tasks or anything else, so it seemed they had nothing to do. They walked around the room, which was permitted by the teacher. Some talked a lot, so the teacher moved them. One of the students was singing after being done with the tasks and another was playing around with the tablet. Some students stopped doing the tasks and started playing, although they still had tasks to finish.

Overall, there was less focus in the second school and the reason for this could be partially the lack of adaptive tasks, unlike the first school. This is not necessarily due to Snappet, but rather to the fact that the teacher was not using the additional tasks that Snappet includes.

From the results in the surveys and observations, the fourth hypothesis is partially confirmed, since students are unsure about their focus level and not a lot of them think they are more focused. In general, they do not find working with Snappet more interesting than the rest of the class work. Teachers also report higher levels of distraction when using tablets and one of the observations showed that students could be rather unfocused when working on Snappet. It has to be kept into account that observations show not only Snappet in itself, but the way it is used in schools, influences student focus.

#### *10.4. Analysis of the open questions*

In addition to the closed questions, in the teacher survey, there were also open questions about what are the changes, uses, challenges and additional things the teachers would like to say about Snappet. These bring valuable information to the whole research and results and touch upon the discussed topics, as well as add to the recommendations and help answer the

policy and overall research question. Therefore, they will be commented here but also discussed in the final chapter of the thesis.

All of the four open questions were coded and combined, since they are connected to each other. A total number of 64 specific codes were created and those that were mentioned most could be seen in figure 19 below<sup>11</sup>:

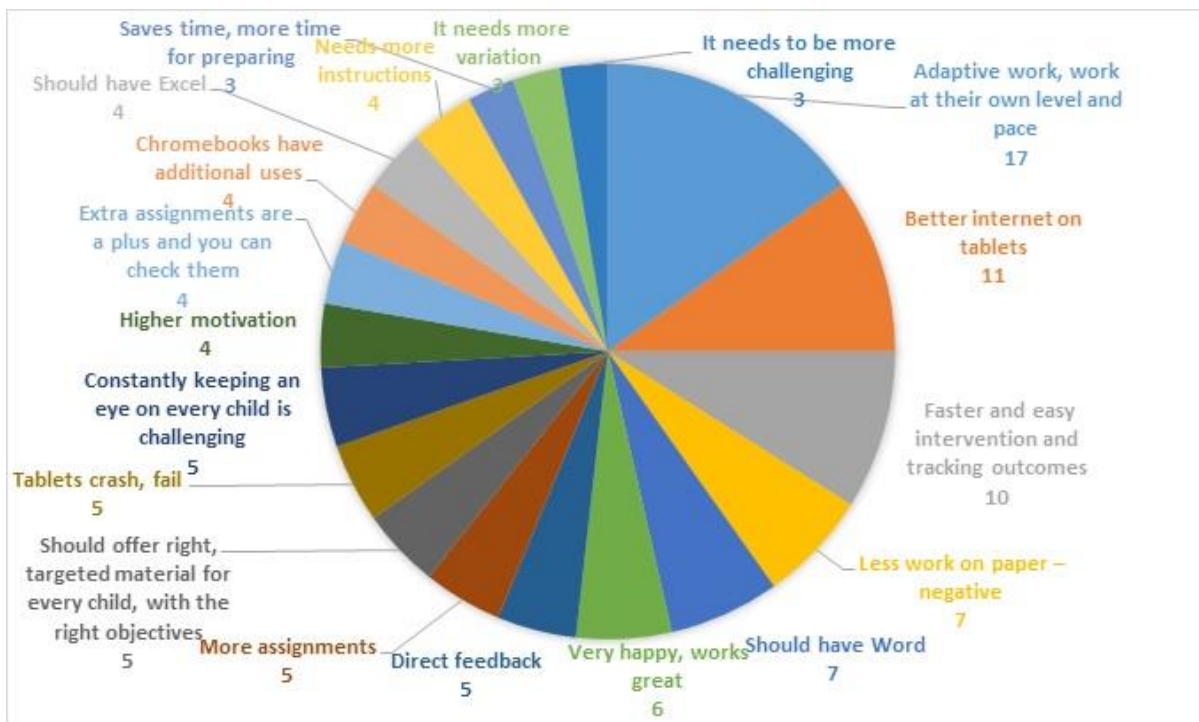


Figure 19

There were a few changes and uses of tablets that were mentioned by many teachers. Notably, the most commonly mentioned thing was that tablets bring adaptive work and the possibility for every child to work at their own level and pace. Among other useful changes are the faster and easy intervention, whenever a child needs additional work, the opportunity to track students' progress in a fast and easy way and give direct feedback, the adaptive assignments for children working faster than others do with the general ones, saving time and leading to higher student motivation, having more assignments done in less time. However, there were also some challenges and needed improvements pointed out by the teachers. They expressed the opinions that there needs to be better Internet connection or any connection at all, using tablets leads to writing less on paper, which could have a negative

<sup>11</sup> No percentages are commented on, the numbers show how many times a code was repeated in the answers of the teachers. The reason for this is that the coding combines answers from four different questions and the same person might repeat the same sentence in those different replies.



effect, especially regarding grammar skills, children need to be able to open the Word and Excel programs on the tablets, the failure and crashing of tablets in some instances, the need to constantly keep an eye on every child, the need for more instructions, variation and challenges, as well as offering the right, targeted material to every child. There turned out to be a distinction between schools working with Chromebooks and Snappet tablets. According to teachers' views, Chromebooks have additional advantages and are better connected to the Internet, as well as offer the Microsoft Office package programs. All of these topics will be commented additionally in the next chapters.

The topics from the four hypotheses, analysed above, have also been touched upon, but by only a few of the teachers. It was mentioned twice that children need to learn together without that having a negative effect on the results. One teacher said cooperative learning on the tablets should be made easier and another expressed the opinion that children lose focus, when working with Snappet. All of these confirm the results from the quantitative analysis of the closed questions for each hypothesis.

## **11. Discussion and conclusions**

The general research question, which was posed in this master thesis, was how does an e-learning platform such as Snappet influence the teaching and learning environment. In order to answer it, several specific aspects of this environment were researched. The research results have broad implications for both theory and practice. As cited in the theoretical section from Clarke & Svanaes' work, there are a number of pedagogical benefits to e-learning platforms involving tablet usage, identified across academic research. These include increased independence, engagement and motivation among students. West argues that ongoing digital assessment can give students opportunities to reflect on their learning progress and therefore support greater student autonomy (as cited in Clarke & Svanaes, 2014). Personalisation and autonomy are cited as main benefits of using tablet in schools (Clarke & Svanaes, 2014). All of these were confirmed by this research, since teachers indicated independent learning as an important purpose of using Snappet. One of the most important findings is the fact that students' motivation increases and this affects their behaviour and study results. This was also seen in literature - the use of tablets has the potential to help acquire knowledge faster and more efficiently and contribute to motivational levels (Haßler et al., 2016). This research adds

to what has been done so far by focusing on a specific platform as an example of many platforms, involving tablet usage.

### *11.1. Communication and collaboration*

The first factor that was looked at was the process of communication and collaboration and the research question is whether and how does Snappet improve cooperation and communication between students and students and teachers. It can be seen that it has two aspects – student-to-student communication and teacher-to-student communication. The distinction between teacher-student and student-student communication has rarely been made, so this is an important implication for theory, especially keeping in mind that Snappet influences differently these two aspects of communication. It was frequently seen in literature that there is a potential for mobile devices to support collaborative learning thanks to their high mobility and their small form factor (in other words, they are unobtrusive and do not interfere with face-to-face interaction). Tablets are accessible, allow students to create, access and display information in multiple modalities (text, video, audio, graphics) and give them the ability to communicate and share information. These are cited as facilities of mobile technology that support collaboration between students and between students and teachers (Clarke & Svanaes, 2014). The finding that tablets may be best suited for individual use was also suggested in literature (Haßler et al., 2016). The results from the data analysis show that students work on their own on the tablets and there are no group tasks involved. Some teachers expressed the opinion that there should be group work, but currently it is not involved in Snappet. Regarding the communication between students and teachers, there are different types of interactions between them happening while using Snappet and both teachers and students said they work together either more or equally when using the platform. It was also seen in observations and from results in the teacher survey data that teacher-student communication is not significantly different when using Snappet and in the regular lesson. Therefore, the platform does not have a strong influence on changing regular communication between students and teachers. *It can be concluded that Snappet is related to cooperation and communication between students and teachers, but not to communication solely between students.* In relation to literature, this means that tablets may offer the ability to share information and may be accessible at all times, but it is important what kind of platform is used on them and how they are implemented in schools. If there are no group

tasks included on Snappet, perhaps it would not help enhance student-student communication, irrespective of its potential to do so.

### *11.2. Influence on self-reported and teacher-reported student outcomes*

The next aspect of the teaching and learning environment was related to study results and, more specifically, what is the influence of Snappet on them. The student results that were looked at were self-reported and teacher reported, using input from the two types of surveys. The data showed that the Snappet platform could lead to improvement of student results in an indirect way, but it is not sure whether it has a direct increasing effect on student results. The indirect effect is achieved via possibly increasing student motivation by providing students with input about their progress levels. When teachers show the results of well performing students, the rest want to follow their example. However, this probably is not done by every teacher, since it was not observed in both of the schools. This shows that both high performing and struggling students have the opportunity to work at their own pace and this could also contribute to increasing the average results of the class (although no direct effect could be observed). This is not only an effect of the platform, but it is due to a combination of the educational approach of the teacher and the use of Snappet. The additional work with a different teacher for struggling students, and the way the teacher shows the progress of the most improved students to others in one of the observations are part of the teaching style in the school. Assessments are an integrated part of Snappet, which allows seeing who are the struggling and well-performing students and take the necessary actions. The motivation factor was also looked at in the literature review. Students were said to be able to acquire knowledge faster when using tablets, which could lead to improvement of their results (Haßler et al., 2016). In addition, it was tested whether there could be a mediation effect of tablets improving communication and communication improving student outcomes, therefore tablet usage would improve student outcomes. Data showed that communication could be related to higher student results, but tablet usage is not related to more communication between students, so there turned out to be no mediation effect. *In conclusion, the answer to this research question is Snappet could lead to improvement of student results, but mostly in an indirect way.*

### **11.3. Focus levels**

The third topic that was looked at were the focus levels of the students while working on tablets. The research question was whether tablets could divert students' attention from the teacher. The results from the surveys confirmed that students are distracted when working on Snappet, but observations showed that this could be due to not having adaptive tasks or the way the teacher spreads the tasks throughout the lesson, so the platform is not the only reason for it. *Therefore, the answer to the research question is that tablets can divert students' attention from the teacher, but this could be due to external reasons, such as the way the teachers use the platform.* In the theoretical framework, it was indicated that the level of students' focus needs to be investigated further (as cited in Haßler et al., 2016). This is why this research brings added value to this research question and the results in academic literature. Results show that distraction could be due to the way teachers use the platform and whether they give adaptive tasks to students and not, as suggested in literature, to students being tempted to play video games or chat on the tablets (Clarke & Svanaes, 2014).

### **11.4. Contribution to research projects on Snappet**

The findings in this master thesis also contribute to the two bigger researches on the Snappet platform. The results from the project in the University of Twente showed that most of the class time is devoted to individual processing and teacher-led activity, the least time is spent on collaborative learning, which confirms the findings of this research. The results from the Radboud study indicate that all students benefit from Snappet, but the 20% highest scoring students benefit most, which is explained by students' ability to work independently at their own level. This is in line with the results here and teachers' opinions that independent learning is an important purpose of Snappet, unlike collaborative work. The research on focus levels and the distinction between teacher-students and student-student communication are both contributions to the overall findings of academic research on Snappet, since they have not been included in previous research.

### **11.5. Contribution to practice**

The main contribution of the research to practice is the distinction between the Bulgarian and Dutch educational systems and the laying grounds for a possible testing of the Snappet

platform in Bulgaria. These were, notably, the younger age in which children enter school in the Netherlands (4 years old in comparison to 7 in Bulgaria), meaning that first grade in Bulgaria might be too early to implement such a platform, since children are not yet used to the school environment. The grading scale would allow for less differentiation in the Bulgarian context, therefore it might not be suitable for measuring the results of students on the Snappet tablets, because the platform has adaptive tasks for students performing better or faster than others. The third important thing is the grouping in levels, based solely on age in the Bulgarian context, so children in one class might have bigger differences in skills and interests and it might be necessary to group them in a different way when using Snappet. These factors should be taken into account when implementing the e-platform in the Bulgarian context, since they could influence the effectiveness and change the added value of the tablets for the teaching and learning process, which are the essential policy questions in this research.

### *11.6. General discussion and conclusions*

Combining the several questions, we can conclude that Snappet influences the teaching and learning environment in a meaningful way and can bring changes to it. It leads to high levels of communication between teachers and students, but does not involve student group work and in this way could decrease cooperation and communication between students. Tablet work on Snappet might increase student results, not through the process of communication, but through other indirect factors such as increasing motivation. It could also have a negative effect on student outcomes, since children are not very focused when using the platform. It is important to point out, however, that this is not due only to Snappet, but also to the way it is used by teachers. This could influence their communication and relationship with the teacher and the other classmates.

Some of these findings fit with the literature and others seem to be different from it. Some of the benefits of the platform, which were highlighted, were communication and collaboration due to instant access to information, ease of use and the accessibility (Clarke & Svanaes, 2014). These are true as potential benefits, but findings of this research show that the platform and the way tablets are used in schools are crucial to whether the platform would indeed include and improve communication between students and students and teachers.

The potential to increase student motivation, when using one-to-one tablets was shown to be an important contribution of tablet usage in schools (Haßler et al., 2016). In addition, the results from the data analysis showed that focus levels could be low when using Snappet, but literature suggested this was due to the temptation to play games or chat on them (Clarke & Svanaes, 2014), while data showed that it could also be due to teachers not using additional tasks, when children are finished with the regular ones.

In sum, the policy question that is posed in the beginning of this research project was whether Snappet has added value to the learning and teaching process. The answer to this policy question is that it does - by involving student-teacher communication, increasing student motivation and being able to improve student outcomes in an indirect way.

## 12. Policy recommendations

Based on the answers to the research questions, a number of policy recommendations could be formulated to stakeholders such as schools, teachers and Snappet itself. Since the platform is not related to communication between students, but only between students and teachers and some teachers expressed the opinion that there should be more group tasks on the tablets, the first recommendation towards the developers of Snappet and schools using it is to include at least one group task or some other form of group work per lesson. It could take up 1/3 of the time for the whole lesson or less than that, depending on the task itself. This might lead to enhancing student outcomes, because it was seen that communication could be related to higher results.

The other recommendation, based on the conclusions above, is related to students' focus levels. The observations showed that students were less focused in the school, in which the teacher did not give them adaptive tasks when they were finished with the regular ones. Therefore, a recommendation toward teachers working with Snappet is that focus levels could be enhanced by providing all students with tasks, either group work or individual tasks on the tablets, so that they will not lose focus in the lesson. This could lead to improvement of the overall results. Since the platform includes adaptive learning and it was indicated as one of its main benefits, it should be used accordingly.

The additional recommendations that could be formulated are based on the answers to the open questions in the teacher survey. According to teachers' views using tablets leads to

writing less on paper, which could have a negative effect, especially regarding grammar skills. The recommendation is that usage of Snappet could be limited to half a lesson, followed by a task on paper, for example. In addition, a number of teachers expressed the opinion that there needs to be more variation and more tasks that are challenging for the children. This is something Snappet could work on, to enhance the educational content on the tablets.

## 13. Limitations and future research

### 13.1. *Strengths*

This research project, as any other, has its strengths and limitations. The first strength that could be highlighted is the choice of subject – as pointed out in the introduction, education is an important field in every society and its improvement and development are in the interest of many stakeholders. It is also a fruitful area for sociological analysis, because it has contextual specifics and changes over time. The development of technology affects all public spheres, including education and a channel of influence of technology on it is the use of one-to-one tablets in the classroom (Haßler et al., 2016). Therefore, this topic is valuable for researching in a master thesis. It also deserves attention, because there have not been many researches done on the impacts of tablets on education (Rikala, Vesisenaho, & Mylläri, 2013). Since tablets are becoming more popular and used (Ozok et al., 2008), it is important to find out what their impact is on education (Clarke, Svanaes, & Zimmermann, 2013).

An additional strength that should be pointed out is that the main focus points are the processes of communication and collaboration, which are highlighted as important aspects of tablet usage at schools in a number of researches (Clarke & Svanaes; Voogt & Knezek; Haßler et al). They are looked at not as a whole, but rather as two dimensions – the communication between teachers and students and the communication between students. This distinction has not been made in the two previous big researches on Snappet (Molenaar, Knoop-van Campen, C. A. N., & van Gorp; Faber, Luyten & Visscher), so this master thesis project brings added value to the findings. Results for both types of communication are different, so it is a valuable distinction to be made.

The third important strength of this master thesis is the combination between quantitative and qualitative methods of data collection and analysis. The surveys showed the points of

view of students and teachers and made possible to quantify results and use statistics to come to conclusions. The observations benefit the research by showing the atmosphere in the room, the types of interactions between students and students and teachers and the differences in the ways teachers use the platform, which could influence student motivation or lead to distraction.

### *13.2. Limitations*

The limitations that could be pointed out are related to the research questions and data collection process. An important one is the number of schools, which were observed. They were only two and since this method of observations was a very valuable addition to the surveys, it would have probably enriched the research findings, if more observations could have been done. However, this was not possible, due to the issue with access and the response rate from schools. This is also related to another methodological limitation – the two catholic schools, which were observed, may not be representative of the wider sample of schools in the Netherlands, so there may be differences that could be seen across schools, if it was possible to make a bigger number of observations in given time frame. Due to the sample size, the ability to make inferences about variations in the data was limited.

Another limitation, which is important to take into account, is students' age. The respondents to the student survey were aged 7-10, which led to a more difficult process of getting consent and designing the questionnaire. It also has an inevitable influence on their responses and what kind of conclusions could be made. It was seen in some questions that there were many 'I don't know' answers and students' age could be the reason for that. This limitation was taken into account and that is why student surveys were combined with teacher surveys with similar questions, as well as observations.

### *13.3. Future research*

As any other research project, this one was limited in time, people who could conduct it, resources, etc. All of these factors could be taken into account in future research attempts on this topic. An additional data collection method that would be valuable are interviews, which could grasp the detailed opinions and attitudes of different social actors about Snappet, as well as give more recommendations. The research could include more schools, also parents



and their point of view, as well as people working at Snappet. It could also be made into a longitude project, in order to see what are the developments over time. All of these factors could be valuable and provide more insights on the topic and they have been included in reviewed research (Clarke, Svanaes, & Zimmermann, 2013; Clarke & Svanaes, 2014). Additional attention could be paid to socio-economic background and actual results of students. This would be a valuable focus, since one of the two previous researches conducted on Snappet, looked at the influence of socio-economic status (SES) and found that students with low SES do more tasks in class than students with average SES (Molenaar, Knoop-van Campen, C. A. N., & van Gorp, 2016). This difference could have an impact on student results.

This research has shown that e-learning platforms have added value for the teaching and learning process in primary schools in the Netherlands, because they involve teacher-student communication, can increase student motivation in this way improve student outcomes. However, tablet usage is highly individual – there is no group work and collaboration between students. In addition, Snappet and the way it is used by teachers can lead to student distraction, which could have a negative effect on academic performance. Based on these insights, policy recommendations are that there should be at least one group task per lesson on Snappet and the adaptive tasks on the platform should be used to increase focus levels of students. It would also be valuable to balance the time spent writing on paper and working with the tablets, due to teachers' concern about spelling and writing skills. The findings and recommendations in this master research project have hopefully laid the grounds for future academic research on this topic, which would lead to improvement of platforms used at school and the way they influence the teaching and learning environment, so that it could ultimately be improved over time.

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## 15. Appendices

### *Appendix A*

#### *Teacher survey – English version*

##### **Introduction and study purpose**

My name is Raya Mihaylova and I am conducting a research project for my master's thesis in Utrecht University. The purpose of this project is to find out whether and how the Snappet platform could change the teaching and learning environment and what kind of effects it has on the teaching process. You are invited to participate in this research project, because you are working at a school, which uses Snappet.

##### **Participation**

Your participation in this survey is voluntary. You may refuse to take part in the research or exit the survey at any time. You are free to decline to answer any particular question you do not wish to answer for any reason. The procedure involves filling a survey that will take approximately 5-7 minutes.

##### **Material benefits**


You will receive no direct material benefits from participating in this study. However, your responses will help me learn more about the way Snappet affects the teaching and learning process.

##### **Confidentiality**

There are no foreseeable risks involved in participating in this study. The survey is anonymous and all of your answers will be kept private and confidential. The only person who will have access to this information is me, therefore your data is secure. When I write up the results of the study, I will not connect your name to anything that you said.

##### **Contact**

If you have any questions about the research, you may contact me:

 00359 899 564 472

 [r.mihaylova@students.uu.nl](mailto:r.mihaylova@students.uu.nl)

By continuing with filling out the survey, you indicate you have read the above information and voluntarily agree to participate.

##### *General questions about the use of Snappet tablets in school*

1. How long have you worked as a teacher for?  
(Tick one box only)

- Less than one year

- Less than 5 years
- 6–10 years
- 11–20 years
- Over 20 years
- I don't know

2. Which school do you work at?

.....

3. What level/group do you teach?

.....

4. What subject(s) do you teach?

.....

5. For how many years have you been using Snappet tablets at school?  
(Tick one box only)

- Less than 1 year
- Between 1 to 3 years
- Between 4 to 6 years
- More than 6 years
- I don't know

6. How are tablet devices used in your school?<sup>12</sup>  
(Tick one box only)

- In shared use by the students
- In private use by students
- Other (open field).....
- I don't know

7. How often do you use tablets at school?<sup>13</sup>  
(Tick one box only)

- Never or almost never
- Several times a month
- At least once a week
- Every day or almost every day
- I don't know

8. For what purposes have you used tablet devices?<sup>14</sup>  
(Tick as many boxes as apply)

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<sup>12</sup> Rikala, J., Vesisenaho, M., Mylläri, J. (2013) *Actual and potential pedagogical use of tablets in schools*, Human Technology: An Interdisciplinary Journal on Humans in ICT Environments, 9 (2) (2013), pp. 113-131

<sup>13</sup> Same source

<sup>14</sup> Same source

- Strengthening the individual learning experience
- Increasing learning motivation
- Increasing practical skills – learning by doing
- Strengthening problem-solving skills
- Strengthening communication skills
- Strengthening collaboration
- Improving learning outcomes
- Supporting low-performing students
- Supporting gifted students
- As an assessment tool
- Learning knowledge content
- Supporting independent learning
- Other (open field) .....
- I don't know

9. Which are the top three purposes you have used tablets for?

*(Tick up to three boxes)*

- Strengthening the individual learning experience
- Increasing learning motivation
- Increasing practical skills – learning by doing
- Strengthening problem-solving skills
- Strengthening communication skills
- Strengthening collaboration
- Improving learning outcomes
- Supporting low-performing students
- Supporting gifted students
- As an assessment tool
- Learning knowledge content
- Supporting independent learning
- Other (open field) .....
- I don't know

10. To what extent do you disagree or agree with each of the following statements about the types of changes that tablet devices have brought to teaching and learning?<sup>15</sup>

*Tick one box for each row: Strongly disagree Rather disagree Neither agree nor disagree Rather agree Strongly agree I don't know*

- Diversified ways of working
- Diversified materials
- Facilitating motivation
- Facilitating assessment
- Encouraging students to be more active and independent
- Increased collaboration between students

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<sup>15</sup> Same source

11. Are there any other changes that tablet devices have brought to teaching and learning?  
(open field)

.....

12. To what extent do you disagree or agree with each of the following statements about the use of tablet devices at school?<sup>16</sup>

*Tick one box for each row: Strongly disagree Rather disagree Neither agree nor disagree Rather agree Strongly agree I don't know*

Tablet devices should be used for students to:

- Do exercises and practise ○○○○
- Retrieve information ○○○○
- Work in a collaborative way ○○○○
- Learn in an autonomous way ○○○○

13. Are there any other uses tablet devices should have for students? (open field)

.....

#### *Communication and collaboration*

14. How often do students work together when they are using tablets in class?

*(Tick one box only)*

- Always ○
- Very often ○
- Occasionally ○
- Rarely ○
- Very rarely ○
- They do not work together when using tablets in class ○
- I don't know ○

15. Rate the performance of students when working together in class, compared to working individually, regarding their study results and grades.

*(Tick one box only)*

- Students perform worse when they work together than when they work individually ○
- Students perform about the same when they work together and when they work individually ○
- Students perform better when they work together than when they work individually ○
- I don't know ○

16. Do you interact with students more or less frequently when you use Snappet tablets, compared to when you don't?

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<sup>16</sup> Same source

*(Tick one box only)*

- I interact more frequently with students when we use Snappet tablets
- I interact with about the same frequency with students when we use Snappet tablets and when we don't
- I interact less frequently with students when we use Snappet tablets
- I don't know

*Level of focus and performance*

17. What is the level of focus of the students when they are using Snappet tablets compared to when they are not?

*(Tick one box only)*

- Very focused
- Focused enough
- Slightly distracted
- Very distracted
- I don't know

18. Do students finish more tasks when they are using Snappet tablets compared to when they are not?

- Yes
- No
- I don't know

19. How do students perform in math compared to other subjects when using Snappet tablets?

*(Tick one box only)*

- Better than other subjects
- About the same
- Worse than other subjects
- I don't know

19.1. How do students perform in math and grammar compared to other subjects when using Snappet tablets?

*(Tick one box only)*

- Better than other subjects
- About the same
- Worse than other subjects
- I don't know

*Additional information*

20. What challenges do you face when using Snappet tablets in the classroom? (open field)

.....



21. What else would you like to say about the use of tablet devices at school? (open field)

.....

*Questions about you*

22. What is your gender?

- Male
- Female

23. What is your age?

- 30 or less
- 31-35
- 36-45
- 46-55
- More than 55

*Thank you very much for your participation!*

## Teacher survey – Dutch version

### Introductie en studiedoel

Mijn naam Raya Mihaylova en ik ben bezig met het schrijven van mijn masterthesis aan de Universiteit Utrecht. Het doel van dit onderzoek is om na te gaan of en hoe het Snappet-platform de onderwijs- en leeromgeving kan veranderen en welke effecten het heeft op het leerproces. Omdat jullie Snappet gebruiken op school wil ik u vragen mee te doen aan mijn onderzoek.

### Deelname


Deelname aan dit onderzoek is vrijwillig. U kunt elk moment stoppen met de vragenlijst en vragen die u niet wilt invullen kunt u overslaan. Het duurt ongeveer 5-7 minuten om de vragenlijst in te vullen. Aan de deelname aan deze enquête kunnen geen rechten worden ontleend. Uw antwoorden helpen mij meer te weten te komen over de manier waarop Snappet invloed heeft op het les geven en leerproces.

### Vertrouwelijkheid

Er zijn geen voorzienbare risico's verbonden aan deelname aan dit onderzoek. De enquête is anoniem en al uw antwoorden worden vertrouwelijk bewaard. De enige persoon die toegang heeft tot deze informatie ben ik, daarom zijn uw gegevens veilig. Wanneer ik de resultaten van de studie verwerk, zal ik uw naam niet verbinden met iets dat u zei.

### Contact

Heeft u vragen over mijn onderzoek dan kunt u contact opnemen met:

 00359 899 564 472

 [r.mihaylova@students.uu.nl](mailto:r.mihaylova@students.uu.nl)

Door verder te gaan met het invullen van de enquête, geeft u aan dat u de bovenstaande informatie hebt gelezen en vrijwillig toestemt om deel te nemen.

### *Algemene vragen over de Snappet tablets in school*

1. Hoelang bent u werkzaam als leraar?  
(Kies één antwoord)

- Minder dan een jaar
- Minder dan 5 jaar
- 6–10 jaar
- 11–20 jaar
- Meer dan 20 jaar
- Ik weet het niet

2. Op welke school werk je?

3. In welke groep geef je les?
4. Welke vakken doceer je?
5. Hoelang maakt u gebruik van Snappet tablets in de klas?  
(Kies één antwoord)

- Minder dan 1 jaar
- Tussen de 1 en 3 jaar
- Tussen de 4 en 6 jaar
- Meer dan 6 jaar
- Ik weet het niet

6. Hoe is het tabletgebruik op uw school geregeld? <sup>17</sup>  
(Kies één antwoord)

- Leerlingen delen de tablets
- Elke leerling beschikt over een eigen tablet
- Anders.....
- Ik weet het niet

7. Hoe vaak worden de tablets op school gebruikt? <sup>18</sup>  
(Kies één antwoord)

- Nooit of bijna nooit
- Een paar keer per maand
- Tenminste 1 keer in de week
- Bijna elke dag of elke dag
- Ik weet het niet

8. Voor welke doeleinden heeft u de tablets gebruikt?<sup>19</sup>  
(Kruis aan wat van toepassing is)

- Versterking van de individuele leerervaring
- Vergroot de leermotivatie
- Verhogen van praktische vaardigheden – leren door te doen
- Versterking van probleemoplossende vaardigheden
- Versterking van communicatievaardigheden
- Versterkt samenwerken
- Verbetering leerprestaties
- Ondersteuning van slecht presterende studenten
- Begunstigde studenten getalenteerd
- Als een assessment tool
- Het leren van kennisinhoud
- Ondersteunt zelfstandig leren

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<sup>17</sup> Rikala, J., Vesisenaho, M., Mylläri, J. (2013) *Actual and potential pedagogical use of tablets in schools*, Human Technology: An Interdisciplinary Journal on Humans in ICT Environments, 9 (2) (2013), pp. 113-131

<sup>18</sup> Same source

<sup>19</sup> Same source

- Anders (open vraag) .....
- Ik weet het niet

9. Wat zijn de drie belangrijkste doelen waarvoor je tablets hebt gebruikt?  
(Kruis aan wat van toepassing is)

- Versterking van de individuele leerervaring
- Vergroot de leermotivatie
- Verhogen van praktische vaardigheden – leren door te doen
- Versterking van probleemoplossende vaardigheden
- Versterking van communicatievaardigheden
- Versterkt samenwerken
- Verbetering leerprestaties
- Ondersteuning van slecht presterende studenten
- Begunstigde studenten getalenteerd
- Als een assessment tool
- Het leren van kennisinhoud
- Ondersteunt zelfstandig leren
- Anders (open vraag) .....
- Ik weet het niet

10. In hoeverre bent u het eens met elk van de volgende uitspraken wat betreft de eventuele veranderingen die het gebruik van Snappet heeft gebracht op het gebied van lesgeven en leren?<sup>20</sup>

*Kruis één vakje aan voor elke rij: Helemaal mee eens, Niet mee eens, Helemaal mee eens, Niet mee eens, Ik weet het niet*

- Maakt de manier van werken gevarieerder
- Gediversifieerde materialen
- Faciliteert de motivatie van leerlingen
- Faciliteert assessments
- Stimuleert leerlingen om actiever en zelfstandiger te zijn
- Vergroot de samenwerking tussen studenten

11. Zijn er nog andere wijzigingen die tablets hebben gebracht op het gebied van lesgeven en leren? (openvraag)

.....

12. In hoeverre bent u het eens met elk van de volgende uitspraken over het gebruik van tablets op school?<sup>21</sup>

*Kruis één vakje aan voor elke rij: Helemaal mee eens, Niet mee eens, Helemaal mee eens, Niet mee eens, Ik weet het niet*

---

<sup>20</sup> Same source

<sup>21</sup> Same source

Tablets moeten worden gebruikt voor studenten om:

- Het doen van oefeningen
- Het opzoeken van informatie
- Samen te werken
- Op een autonome manier te leren te leren

13. Moeten de tablets ook andere mogelijkheden bieden dan die er nu voor handen zijn?  
(openvraag)

.....

### *Communicatie en samenwerken*

14. Hoe vaak werken studenten samen wanneer ze tablets in de klas gebruiken?  
(Kies één antwoord)

- Altijd
- Heel vaak
- Af en toe
- Zelden
- Zeer zelden
- Ze werken niet samen bij het gebruik van tablets in de klas
- Ik weet het niet

15. Beoordeel de prestaties van studenten bij het samenwerken in de klas, in vergelijking met individueel werken, met betrekking tot hun studieresultaten en cijfers.  
(Kies één antwoord)

- Studenten presteren slechter wanneer ze samenwerken dan wanneer ze individueel werken
- Studenten presteren ongeveer hetzelfde wanneer ze samenwerken en wanneer ze individueel werken
- Studenten presteren beter wanneer ze samenwerken dan wanneer ze individueel werken
- Ik weet het niet

16. Heeft u meer of minder vaak contact met studenten als u de Snappet-tablets gebruikt, vergeleken met wanneer u dat niet doet?  
(Kies één antwoord)

- Ik heb meer contact met studenten wanneer we de Snappet-tablets gebruiken
- Ik communiceer met ongeveer dezelfde frequentie met studenten wanneer we Snappet-tablets gebruiken en wanneer we dat niet doen
- Ik communiceer minder vaak met studenten wanneer we Snappet-tablets gebruiken
- Ik weet het niet

### *Focusniveau en prestaties*

17. Wat is het focusniveau van de studenten wanneer ze Snappet-tablets gebruiken in vergelijking met wanneer ze dat niet doen?

*(Kies één antwoord)*

- Zeer gefocust
- Gericht genoeg
- Iets afgeleid
- Zeer afgeleid
- Ik weet het niet

18. Voltooien leerlingen meer taken wanneer ze Snappet-tablets gebruiken in vergelijking met wanneer ze dat niet doen?

- Ja
- Nee
- Ik weet het niet

19. Hoe presteren studenten op rekenen in vergelijking met andere vakken, onderwerpen bij het gebruik van Snappet-tablets?

*(Kies één antwoord)*

- Beter dan de andere vakken/onderwerpen
- Ongeveer hetzelfde
- Slechter dan andere vakken/onderwerpen
- Ik weet het niet

19.1. Hoe presteren studenten op rekenen en taal in vergelijking met andere vakken/onderwerpen bij het gebruik van Snappet-tablets?

*(Kies één antwoord)*

- Beter dan de andere vakken/onderwerpen
- Ongeveer hetzelfde
- Slechter dan andere vakken/onderwerpen
- Ik weet het niet

### *Extra informatie*

20. Welke uitdagingen ondervindt je als je Snappet-tablets in de klas gebruikt? (openvraag)

.....

21. Wat wil je nog meer kwijt over het gebruik van tablets op school? (open vraag)

.....

### *Vragen over jou*

22. Wat is je geslacht?

- Man
- Vrouw

23. Wat is je leeftijd?


- 30 of jonger less
- 31-35
- 36-45
- 46-55
- Ouder dan 55

*Heel erg bedankt voor uw deelname!*

## Appendix B

### Student survey – English version

My name is Raya Mihaylova and I am a student. Help me finish my studies by telling me what you think about Snappet. You can stop answering whenever you want. It will take you only around 5-7 minutes. I will not ask you about your name and only I will see your answers. If you have any questions, you can call me:

 00359 899 564 472

If you agree with this, you can continue with answering the questions. Please, circle the numbers.

*You use Snappet tablets at school. I will now ask you about that.*

#### **How long have you used tablets at school?**

*(Tick one box only)*

- |                            |   |
|----------------------------|---|
| Less than 1 year.....      | 1 |
| Between 1 and 3 years..... | 2 |
| Between 3 and 4 years..... | 3 |
| I don't know .....         | 4 |

#### **How often do you use tablets at school?**

*(Tick one box only)*

- |                                     |   |
|-------------------------------------|---|
| Rarely.....                         | 1 |
| Several times a month.....          | 2 |
| At least once a week .....          | 3 |
| Every day or almost every day ..... | 4 |
| I don't know .....                  | 5 |

*I will now ask you about working together, working with the teachers and your focus when you use Snappet tablets.*

#### **When I use tablets in class:**

*(Tick one box only)*

- |                                   |   |
|-----------------------------------|---|
| I am less focused .....           | 1 |
| It does not change my focus ..... | 2 |
| I am more focused .....           | 3 |
| I don't know .....                | 4 |

#### **When I use tablets in class:**

*(Tick one box only)*



- More often I work together with other students ..... 1
- I work equally with other students and on my own ..... 2
- More often I work on my own ..... 3
- I don't know..... 4

**When I use tablets in class:**

*(Tick one box only)*

- I work more with the teacher ..... 1
- I work equally with the teacher ..... 2
- I work less with the teacher ..... 3
- I don't know..... 4

*I will now ask you what you think about studying with Snappet.*

**Is it easier studying when you use tablets?**

- Yes ..... 1
- It is the same ..... 2
- No ..... 3
- I don't know..... 4

**Is it more or less interesting studying when you use tablets?**

- More interesting..... 1
- The same ..... 2
- Less interesting..... 3
- I don't know..... 4

*I will now ask you what you think about studying at school and working together.*

**Is it easier studying math than other subjects?**

- Yes ..... 1
- The same ..... 2
- No ..... 3
- I don't know..... 4

**Is it more or less interesting studying math than other subjects?**

- More interesting..... 1
- The same ..... 2
- Less interesting..... 3
- I don't know..... 4

**Is it easier studying grammar than other subjects?**

- Yes ..... 1

No ..... 2  
I don't know..... 3

**Is it more or less interesting studying grammar than other subjects?**

More interesting..... 1  
The same ..... 2  
Less interesting..... 3  
I don't know..... 4

**Is it easier in class when you work together?**

Yes ..... 1  
No ..... 2  
I don't know..... 3

**Is it more or less interesting in class when you work together?**

More interesting..... 1  
The same ..... 2  
Less interesting..... 3  
I don't know..... 4

**What is your gender?**

Male..... 1  
Female ..... 2


**What is your age? (open field)**

.....

*Thank you very much for helping me!*

## Student survey – Dutch version

Mijn naam is Raya Mihaylova en ik ben student. Je kan me helpen mijn studie af te maken door te vertellen wat je van Snappet vindt door onderstaande vragen in te vullen. Je kunt op elk moment stoppen met het antwoord geven op de vragen. Het invullen duurt ongeveer 5-7 minuten. Je hoeft je naam niet op te schrijven. Ik kijk alleen naar de ingevulde antwoorden. Als je vragen hebt, kun je me bellen:

 00359 899 564 472

Vind je dit goed? Dan kan je onderstaande vragen gaan beantwoorden. Onder elke vraag staan meerdere antwoorden. Kies het antwoord dat het beste bij jouw situatie past door het bijbehorende cijfer te omcirkelen.

*Je gebruikt Snappet-tablets op school. De volgende vragen gaan over hoe lang en vaak je dit gebruikt.*

### Hoe lang maak je al gebruik van de Snappet-tablets?

*(Omcirkel één antwoord)*

- |                             |   |
|-----------------------------|---|
| Minder dan 1 jaar .....     | 1 |
| Tussen de 1 en 3 jaar ..... | 2 |
| Tussen de 3 en 4 jaar ..... | 3 |
| Ik weet het niet .....      | 4 |

### Hoe vaak gebruik je een tablet op school?

*(Omcirkel één antwoord)*

- |                                  |   |
|----------------------------------|---|
| Bijna nooit .....                | 1 |
| Een paar keer per maand .....    | 2 |
| Minstens een keer per week ..... | 3 |
| Elke dag of bijna elke dag ..... | 4 |
| Ik weet het niet .....           | 5 |

*De volgende vragen gaan over samenwerken, werken met de juf of meester en jouw focus wanneer je met Snappet tablets werkt.*

### Wanneer ik in de klas de tablet gebruik:

*(Omcirkel één antwoord)*

- |                                     |   |
|-------------------------------------|---|
| Ben ik minder gefocust .....        | 1 |
| Verandert dit niet mijn focus ..... | 2 |
| Ben ik meer gefocust .....          | 3 |
| Ik weet het niet .....              | 4 |

**Wanneer ik in de klas de tablet gebruik:**

*(Omcirkel één antwoord)*

- Werk ik vaker samen met andere klasgenoten..... 1
- Werk ik even vaak alleen als met klasgenoten ..... 2
- Werk ik vaker alleen..... 3
- Ik weet het niet ..... 4

**Wanneer ik in de klas de tablet gebruik:**

*(Omcirkel één antwoord)*

- Werk ik vaker met de juf/meester ..... 1
- Werk ik hetzelfde met de juf/meester..... 2
- Werk ik minder vaak met de juf/meester ..... 3
- Ik weet het niet ..... 4

*Ik ga je nu vragen hoe jij leert met Snappet.*

**Kan je makkelijker leren wanneer je een tablet gebruikt?**

- Ja..... 1
- Hetzelfde ..... 2
- Nee ..... 3
- Ik weet het niet ..... 4

**Vind je het leren interessanter wanneer je een tablet gebruikt?**

- Rekenen is interessanter..... 1
- Even interessant..... 2
- Rekenen is minder interessant..... 3
- Ik weet het niet ..... 4

*De volgende vragen gaan over leren op school en samenwerken.*

**Vind je rekenen makkelijker dan de andere vakken?**

- Ja..... 1
- Nee ..... 2
- Ik weet het niet ..... 3

**Is rekenen interessanter dan de andere vakken?**

- Rekenen is interessanter..... 1
- Even interessant..... 2
- Rekenen is minder interessant..... 3
- Ik weet het niet ..... 4

**Is taal makkelijker dan de andere vakken?**

- Ja..... 1
- Nee ..... 2
- Ik weet het niet ..... 3

**Is taal interessanter dan de andere vakken?**

- Taal is interessanter ..... 1
- Even interessant ..... 2
- Taal is minder interessant ..... 3
- Ik weet het niet ..... 4

**Vind je samenwerken in de klas makkelijker dan alleen werken?**

- Ja..... 1
- Nee ..... 2
- Ik weet het niet ..... 3

**Vind je samenwerken in de klas interessanter dan alleen werken?**

- Taal is interessanter ..... 1
- Even interessant ..... 2
- Taal is minder interessant ..... 3
- Ik weet het niet ..... 4

**Wat is je geslacht?**

- Jongen ..... 1
- Meisje ..... 2

**Wat is je leeftijd? (openvraag)**

.....

*Heel erg bedankt dat je me wilde helpen!*

*Appendix C*

*Observation protocol*

Time of starting and stopping in which students work with Snappet:.....

Number of assignments, using Snappet: .....

Time of starting and stopping in which students work together in general:.....

Time of starting and stopping in which students work together, using the tablets:.....

Time of starting and stopping in which students work on their own in general:.....

Time of starting and stopping in which students work on their own, using the tablet:.....

How long is one lesson in general: .....

Number of interactions between teacher and student:.....

Number of interactions between teacher and students when using Snappet:.....

Types of interactions between student and teacher, e.g. teacher asks questions to the students, students ask the teacher, the teacher helps students with the tablets, etc. (could add number of times these things happen to each one):

.....

.....

.....

.....

Types of interactions between students (e.g. students ask each other questions, they work together on a task, etc.):

.....

.....

.....

.....

Observations on the level of focus of the students (when using tablets and when not):

.....

.....

.....

.....

Any comments that the teacher makes on their results?

.....

.....

.....

.....

Could I see who gets adaptive tasks and who doesn't?

.....

.....

.....

.....

Connect that to the collaboration?

.....  
.....  
.....  
.....

How often do students ask the teacher questions?

.....

How does the teacher give the tasks on the tablets?

.....

What is the general atmosphere in the room (e.g. is it loud, are they laughing, working quietly and calmly):

.....  
.....  
.....

Is everybody using tablets in the same time? If not, what are the differences?

.....  
.....

Any unwanted interrupting circumstances, reasons for change in students/teacher's behaviour, change due to my presence?

.....  
.....  
.....



Additional observations:

.....

.....

.....

.....

## *Appendix D*

### *Consent form – parents (Dutch)*

2-04-2018, Alkmaar

Beste ouders van.....,

Volgende week woensdag komt er een student onderzoek doen naar de positieve en negatieve effecten van onderwijs via de Snappet.  
Ze heft een vragenlijst de kinderen en ze zal een les in de klas observeren.  
Ze zal de antwoorden anonym verwerken in het onderzoek.

Voor het verwerken van deze ggevens wil ik jullie toestemming vragen.

De stuent mag de antwoorden wel/niet van mijn kind anonym verwerken in een onderzoek.

Wilt u dezee brief zo snel mogelijk weer meegeven naar school?

Met vriendelijke groet,

.....

.....