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A study of students' perspective on the teaching-learning activity in a digital society

En studie om elevers perspektiv på lärande i ett digitalt samhälle

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Abstract

This case study looks at upper-secondary school students' opinions about the use of digital and non-digital tools in the classroom. One of schools' most important aims is to prepare students for a well-adapted citizenship. In a world of digitalisation, schools are also implementing more and more digital tools in teaching situations and many students in Sweden have access to a computer each at school. This paper investigates how students feel about note-taking using paper and pen or computer, what they feel is important for their futures and what preferences they have when it comes to the use of digital media in their lessons. A focus group interview (n=7) was carried out. From the themes found through the interview, a questionnaire was constructed and answered by 66 students. The results show that students are divided in their preferences for taking notes by hand or by computer. Students see the benefits and limitations of both methods. They generally find it easier and faster to type on the computer, but are concerned about the distractions that the computer offers. They feel that hand-writing is more time-consuming but that it is better for remembering the material. Overall, they find that hand-writing is better for learning (better now) but that being dexterous using the computer is important for their future (better in the future). It is important that teachers foster both skills so that students get a balanced education.

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1. Introduction

When I went to school we did not have any portable computers. Information gathering from the internet during school time was done mainly through the school library's stationary computers - in the classroom we used books. Class notes were therefore always taken on paper (as opposed to digitally) and it was important to be able to write somewhat fast and legibly by hand. Today, the classroom situation is completely different. More and more schools opt for offering every student access to an individual computer (Skolverket, 2016). According to Statens Medieråd (2017), 92% of 17-18 year-olds in Sweden have access to their own computer and/or tablet (in 2016), and 97% have their own smartphone. The same survey concluded that 99% of all teenagers in Sweden have access to the internet. One could argue that this constant access to and use of digital tools for lecture, script, and communication, would lead youths to be used to writing digitally and lose the opportunity to develop a dexterity in writing by hand.

During my VFU, I was surprised to see that all students had a laptop each and that they used them prolifically for gathering and sharing of information, group work, homework, and note-taking. What also surprised me was that, while teachers used computers as a tool during virtually every lesson, they encouraged their students to take notes by hand, stating that "research has shown" that learning is more efficient when taking notes by hand; that it stimulates a deeper and more durable knowledge and understanding. Most students, however, chose to use their computers for this. During my time as a teacher student, there were also a few students that commented that they were pretty bad at writing by hand and that they would like to improve this skill.

There have been many changes in the educational system during its lifespan. One of them is the digitalisation, which entails new educational tools, new learning channels, and new forms of expression via the internet and computers instead of the teacher's body of knowledge, books, and paper and pen. Research has conversely also shown that students have the time to take more notes when they type on their computers (Aragón-Mendizábal et. al., 2016), which means a vaster substance and therefore less risk of missing something when, for instance, studying for a test.

I began to wonder whether students would benefit more from taking their notes by hand or on their computers. As I see it, there are at least two aspects of this; one is the actual learning and memorising that takes place, and the other is the dexterity they develop and how well adapted it makes them for the society they live in – or will live in when they are done with their studies. As the European Commission puts it, "In an increasingly globalised world, individuals need a wide range of skills to adapt and prosper in the rapidly changing environment" (EU, 2006b).

Another question that arose was how students themselves view the use of different tools in the classroom – specifically the use of different note-taking methods; the "traditional" pen and paper versus the current use of digital tools. What do the students themselves consider to be best for them?

Inquiring into this topic, I discovered that the research carried out on this topic seems to be mostly on *skills* and not much about students' *opinions*. Many changes are being made that will affect the students – for instance the introduction of digital tools in the classroom and the prescriptions in the national syllabus. Students' opinions about these changes and adaptations seem to be difficult to come by. Therefore, I found it would be interesting to inquire into this.

2. Aim and Research questions

We find ourselves in a time of digitalisation, and this of course comprises schools and education. Maybe we are in the breaking point in which handwriting, paper and books are swapped for typing on computers and using digital documents. The youths that now study in Swedish upper secondary schools have grown up with great access to computers in school. Much of their information gathering and communication with peers and friends has taken and takes place online (Statens Medieråd, 2017).
The education system should be customized to make students adapted to their society (Skollag 2010:800, 15 kap. §2). The digital world is rapidly becoming a larger part of many societies. Does this, however, mean that schools should step away from "traditional" education methods using books as well as paper and pen? When it comes to language education, such as English classes, should school be the place youths take part in the "classical" methods and tools, or should education be adapted to students' everyday lives? These are rather large questions which require investigating many points of view. This paper will focus on students' perspectives. It investigates into what skills and knowledge students themselves consider they will have a greater need for - and what they therefore want to focus on in school.

The aim of this project is therefore to investigate students' perspectives on their learning. There will be an investigation into preferences in the use of digital and non-digital media, with a focus on note-taking. By finding out what preferences students have, how they experience that they learn best, as well as how their school supports them in their education, one would gain more substance concerning the discussion about digital media in the classroom. The answers could provide an indication of to what degree the use of computers and other digital tools should be promoted and how much one should stick to handwriting and to helping students develop a greater dexterity to do so. It could also open up a discussion about how teachers could adapt their lessons in order to ensure that they integrate the necessary skills that students are considered to require in their future society.

Although it could be argued that, because of (among other factors) their under-developed prefrontal cortex, teenagers might not be well suited to know what is best for

them (Blakemore and Robbins, 2012), gaining their perspective on the matter could be valuable as a step for further investigation.

Research questions:

1. What method do upper secondary school students prefer for note-taking during lessons (typing or handwriting)?
    a. What do they find easiest and why?
    b. Which method do they consider better for learning?
    c. Which method do they perceive that teachers encourage them to use?
2. When it comes to writing and note-taking, what aptitudes do upper-secondary school students consider are important for them now and in the future?

3. Literature review

3.1. Theoretical framework

What will be referred to as "learning" in this paper, is knowledge and skill acquisition. In order to gain and retain knowledge one must remember it. Therefore, memorization is in this paper considered an integral part of learning.

3.1.1 The multi-store model of memory

New memories are created while learning and gaining new information, such as what is read in course books or other literature, or what the teacher conveys. According to Atkinson and Shiffrin's multi-store model of memory, new memories are created by paying attention to sensory information, coding it in the short-term memory (STM), and, if the information is rehearsed, it is encoded into and stored in the long-term memory (LTM) from where it can later on be retrieved (Passer et. al, 2009). The three processes involved in memory formation are thus *encoding*, *storage* and *retrieval* (ibid). It is, according to Atkinson and Shiffrin, when the information is processed in and can be retrieved from the long-term memory, that one can say that the person in question has learnt the information.

3.1.2 Levels of processing

According to Craik and Lockhart's (1972) concept levels of processing (LOP), the recollection of a memory is better the deeper it is processed at the time of encoding. The three levels of processing at the time of encoding of, for instance, words, from STM to LTM are *structural processing* (the word's physical features), *phonetic processing* (the acoustic properties of the word), or *semantic processing* (reflection on the word's meaning) (Craik & Lockhart, 1972).

3.1.3 Assimilation and accommodation

Schemata (or schemas) are mental frameworks in which patterns of thought and action are organized (Passer et al, 2009). Jean Piaget proposed two key processes in the development of schemas – *assimilation* and *accommodation*. Assimilation is "the process by which new experiences are incorporated into existing schemas" and

accommodation is “the process by which new experiences cause existing schemas to change” (ibid. p.543). For instance, a student might learn a poem with an aabb structure. When the student then encounters another text with the same structure, he or she might identify it as a poem; he or she assimilates the new text into their schema of “poem”. The student might then come across a haiku – it does not have the structure aabb, but it is still a poem. When the student “learns” this, he or she is accommodating this new text structure into their schema of “poem” thus changing said schema.

3.1.4 Multimedia learning

Mayer and Moreno (2003) propose a theory of multimedia learning (learning from words and pictures). The theory is based on the following assumptions: the *dual-channel assumption* (pictorial and verbal material are processed in separate systems); the *limited-capacity assumption* (the amount of material that can be processed at one time is limited in each channel); and the *active-processing assumption* (“meaningful learning involves cognitive processing including building connections between pictorial and verbal representations”) (Mayer & Moreno, 2003). Mayer and Moreno also state in their study (2003) that people have a *cognitive load*, which means that people have a limited capacity for cognitive processing during learning. If the learner’s intended cognitive processing is greater than their cognitive capacity, the learner will – according to Mayer and Moreno – be subjected to *cognitive overload*.

3.2. Note-taking

Here, “note-taking” encompasses writing down what is being said or shown by the teacher during a lesson, but also taking notes during individual work in class.

When writing by hand one is often limited by the speed in which one can script. As most people are incapable of writing fast enough to take down every word that is said at normal talking speed, the writer is forced to be attentive of the content of what is being said, so that they can choose which information is most relevant (Mueller & Oppenheimer, 2014). According to Mueller and Oppenheimer (2014), the more time-consuming activity of writing by hand thus means that the note-taker must focus on what is relevant to have time to jot everything down. This in turn means that they must understand the significance of what they are hearing and transcribing, because they

must choose what is relevant and reformulate it in more concise formulations. This reflection on the words' or sentences' meaning at the time of learning and processing would according to the model levels of processing lead to a semantic processing of the information, which would result in a deeper learning and better memorization (Craik & Lockhart, 1972). This note-taking method would therefore be more time-consuming, but in return it would lead to a better remembrance of what has been written down.

When it comes to taking notes on a computer, it is possible to take notes faster than when writing by hand (Aragón-Mendizábal et. al., 2016), which gives a greater chance of getting everything down word for word. This, however, means that the level of processing does not need to be deeper than phonetic, as one is not forced to an immediate reflection and therefore does not need to focus on what is being said at the time of writing it down.

When it comes to knowledge acquisition for upper secondary school students, one could argue that it is not necessarily the quality of the notes taken and the encoding of them at the time of writing them down that will give them most knowledge and information-memorization; having the quantity that computer-typing allows can be beneficial and lead to a lower risk of missing something important. One of the benefits of typing on a computer is that it is faster than writing by hand (Aragón-Mendizábal et. al., 2016), which gives a greater chance of writing down everything verbatim. That way, one does not risk "missing" important information that one might not have had time to take down if writing by hand. On the other hand, one does not need to reflect on the content and meaning of what is being said at the time of the note-taking and would, according to LOP, subsequently need to revise the material more. A risk is having written down things that one does not understand. For students, this might mean a missed opportunity to ask questions (and consequently gain a better understanding) to the teacher. Through their studies, Mueller and Oppenheimer (2014) further argue that, even if people who type on computers have more material to retrieve information from, people who have taken their notes by hand have a better conceptual understanding of the content when both groups (people who type and people who write by hand) have had the chance to go through their notes before a test.

3.3. Technology in society

Children and youths of today learn to master digital tools from a very young age and they are probably more used to and more proficient at typing on a keyboard or a screen than they are at writing by hand. Society at large is also on its way to becoming more digitally adapted. In times of digital communication in which we no longer write letters on paper, but send e-mails, sms and other forms of digital texts; and in which diaries, receipts, calendars, memos, shopping- or "remember"-lists are typed into machines: do we really need to be able to write by hand? With different types of digital authentication (such as "BankID"), we do not even need to be able to script our own signature.

It is no wonder that digital competences are becoming increasingly important and are nowadays considered essential to be able to meet the challenges the future labour market offers (Tallvid, 2016). The European parliament and the council of the European Union have developed a recommendation of *key competences for lifelong learning* (2006a) that "all individuals need for personal fulfilment and development, active citizenship, social inclusion and employment" and that they encourage the EU's member states to use as one of their strategies for lifelong learning (ibid.). The eight key competences they have identified as fundamental for every person in a knowledge-based society are: 1. Communication in the mother tongue, 2. Communication in foreign languages, 3. Mathematical competence and basic competences in science and technology, 4. Digital competence ("the confident and critical use of Information Society Technology (IST) for work, leisure and communication"), 5. Learning to learn, 6. Social and civic competences, 7. Sense of initiative and entrepreneurship, 8. Cultural awareness and expression (EU, 2006a). The presence of the fourth key competence, *digital competence*, among this short list of aptitudes that the EU considers to be crucial for its citizens' "lifelong learning", shows how relevant it is to endorse it at schools – our learning facilities.

3.4. Technology in education

In this paper, the main digital tool that will be referred to is computers. Although technology or "digital media" encompasses many tools and methods, the use of

computers in class work will be the focus. This includes the use of computers to take notes, to search for information, to read and to do classwork.

A crucial goal of schooling is for students to become well adapted to society. The Swedish Education Act (2010:800, kap. 15 § 2) states that upper secondary school education should give a solid foundation to engage well in a future occupation and further studies as well as to foster personal development and an active participation in society. In modern times, having a good basis for future employment and continued studies most likely means being proficient at using technology. This leads to the conclusion that schools must take part in furthering students' technology skills, which includes computer-skills. As mentioned earlier, a step that has already been taken in Sweden is the introduction of 1:1 (one computer per student).

There are of course both benefits and limitations of handing students a computer each. One limitation is the distraction that computers and everything they encompass (games, YouTube and other endless internet-sites…and even the possibility of working on other school subjects without the teacher noticing) present. Blakemore and Robbins (2012) reveal that adolescents have a slower development of impulse control as well as a higher risk-taking behaviour, partly due to the slow development of the brain-regions that are involved in cognitive control. Adolescents also display a preference for immediate reward (rather than a larger, but delayed reward) when it comes to decision-making (ibid.). This would mean that it is more difficult for adolescent students to delay the gratification of engaging in social media, for instance, if they feel the urge to do so during class. Having a computer with access to the internet at all times during a lesson might thus be too challenging for their still developing impulse-control. Sana, Weston and Cepeda (2013) carried out a study in which they investigated the effect that multitasking during a lesson has on performance. Participants were asked to take notes on their laptops during a lecture, and half of them also had to complete a set of online tasks that were designed to simulate the type of browsing that students normally do. After the lecture, all participants completed a comprehension test. The results showed that participants that were in the multitasking condition (that listened to the lecture while completing online tasks) scored significantly lower on the comprehension test than the participants who had not been multitasking (Sana et. al, 2013). The results of said study indicate that multitasking – in the form of online browsing while taking notes

– during a lecture is detrimental for comprehension of the taught content. This leads to the conclusion that if upper secondary school adolescents succumb to the impulse of browsing other pages while they are listening to their teacher or classmates, their learning will be negatively affected. Another study by Junco (2012), explored the extent to which American college students used information and communication technologies (ICTs) during class, and how the frequency of usage affected their grades – measured by their grade point average (GPA). The results showed that multitasking while using Facebook and texting were correlated with lower GPAs, while there was no apparent effect on GPA when the students had been instant messaging, emailing, searching, and talking on the phone (Junco, 2012). This study suggests that the type of multitasking the students engage in has different effects and that multitasking while learning does not necessarily affect student grades.

3.5. Steering documents

Are the knowledge and skills that schools convey and the methods that are used to mediate them well adapted to today's society and the society that the students later will search for jobs in? The Swedish government has decided to make changes in the educational systems' curricula concerning digital competences. The purpose is to clarify schools' mission to strengthen students' digital competence (Regeringskansliet, 2017). A clarification made in the curriculum about the schools' mission is that: schools should contribute to developing students' understanding for how digitalisation affects the individual and society's progress, and that all students should be given the opportunity to develop their ability to use digital technology (ibid.). Furthermore, students should also be given the chance to develop an analytical and responsible approach to digital technology in order to see possibilities and understand risks, as well as to be able to assess information (Regeringskansliet, 2017).

There have also been changes made to some subjects' steering documents (as this paper concerns upper secondary school, other levels of education will not be mentioned); among others, in civics (*samhällskunskap*), in which it is stated that it should include clarifications of how digitalisation affects society and amplification of media- and information knowledgeability; and in Swedish as a second language, in which it states that digital lecture and digital texts should be more noticeably covered, as well as the

digitalization's effect on texts and communication (Regeringskansliet, 2017). However, no changes concerning digitalisation have yet been made to the English curriculum. Right now, there are no prescriptions in the English curriculum about furthering students' digital competencies - neither in the *aim of the subject* nor in the *core content* of the individual courses. For this subject, the degree to which digital resources are used, and the extent to which students' digital proficiencies are fostered, are thus left to the individual teacher to decide. Although it does say in the schools' mission (in accordance with the above-mentioned information from the Swedish Government Offices) that students should be given the opportunity to develop skilfulness and critical thinking linked to digital technology, it says that *schools* should contribute to this. Consequently, individual teachers whose subject guide mentions nothing of digital media, can disclaim responsibility of this by referring to other subjects' teachers' obligations. Is it not at least as important to in the subject English, from which students encounter material daily in social media, talk about "how digitalisation affects society" or "its effect on texts and communication"? Or should English focus, in a world of rapidly changing digital bombarding, on the more enduring and "classical" works and processes which the students might not otherwise be acquainted with? Would the students be content with no use of digital tools in an English class? What are their opinions on teaching methods in English as compared to other subjects when it comes to the use of digital technology?

4. Methods

A school in which a considerable restriction on computer use has been implemented has been selected for this study. The students have been provided a laptop each and have previously been able to use them as they wanted to for school-work. Now, the two senior years must take all of their notes by hand. I wondered how they experienced this change. Therefore, I decided to carry out a case study in which my sample consists of students (male and female) aged 15-20 from this school. As it is an international school, the grade levels are not the same as the national Swedish ones. The students first attend six years of PYP (primary years programme), followed by five years of MYP (middle years programme) and then finish with two years of DP (diploma programme). The grade levels of my target population are upper-secondary school – the Swedish *gymnasium* –, as well as the year prior to entering the gymnasium. In this school, that would correspond to MYP4 (9^{th} grade) and then MYP 5, DP1 and DP2 (which would correspond to year 1-3 in *gymnasiet*). Being a case study, the results cannot be generalizable to the entire Swedish upper-secondary student population.

Several methods were used for gathering of data.

To gain an initial picture of what upper secondary school youths consider to be important when it comes to learning – especially when it comes to note-taking and writing skills when exiting *gymnasiet* – I decided to carry out a semi-structured focus group interview. The themes and opinions that were brought up were analysed through a thematic analysis. Then, using an inductive approach, an idea of how students feel about the change from using their computers freely to being restricted in their use, could be developed.

The second part of the study is a questionnaire based on the results from the focus group. Based on the themes extracted from the interview transcript, questions for the survey were generated. Carrying out a questionnaire meant that more students' opinions and input about note-taking and learning could be collected. Hence, there was triangulation of the two data collection methods focus group interview and questionnaire. This means that subjects that students found important were raised

through the qualitative method focus group. The results were then tested quantitatively through a questionnaire to increase the external validity.

4.1 Focus group interview.

By way of introduction, in order to get a better picture of what youths consider to be important when it comes to note-taking and competences at the end of their schooling, a semi-structured focus group interview was conducted.

4.1.1 Instruments

An interview manuscript (see appendix 2) was formed based on the research questions formulated in this document. Each question was numbered and space was given to take notes or add unplanned follow-up questions during the interview.

4.1.2 Participants

The participants were seven senior year upper secondary school students (3 female and 4 male) of ages 17-19 at an international school in Malmö. It was a purposive sample. The students have been classmates for at least two years, and are therefore comfortable in each other's company as well as with engaging in discussions and debates with one another. The fact that the sample consists of senior year students means that they have experience of studying and note-taking. Furthermore, these students have experienced the shift from having a choice in how much and for what they could use their computers, to being restricted to taking their notes by hand only. This means that they have a broader perspective on the use of different methods – both digital and non-digital.

4.1.3 Procedure

The participants were via email invited to take part in the focus group interview. They were asked, if interested, to come to a specific classroom at their school at a certain time that did not interfere with their regular lessons. At the time of the interview – before we began – all the participants were briefed both verbally and in written form about the purpose and nature of the study. They were told that the interview would be used for a degree project that would be published via Malmö University, that it would be recorded

and transcribed, that they had the right to withdraw at any time and that they would remain anonymous throughout the study and publication. All seven participants agreed and signed the informed consent form (see appendix 1). Because all of them were over 15 years old, they could give their own consent without permission and a signature from their guardians (Vetenskapsrådet, 2002).

Following, we placed tables and chairs in a circle formation so that everyone could see one another and have an equal contact and communication.

I asked questions based on the interview script (see appendix 2) and then let the students discuss and answer them. The interview was recorded auditory (with the participants' permission) and I took notes of themes and ideas that emerged. When the students comments about the current question seemed to lessen/abate, I proceeded to ask next question. Sometimes the participants fell into discussions that invited to another question than the one that came next in the interview script. I then posed – depending on the situation – one of the other interview questions that fit with the subject, or a follow-up question that was not in the script, but that I considered would lead to interesting answers and discussions pertinent to the subject. At the end of the interview I asked the participants if they had anything else to add. That way they would have the chance to append any other thoughts or ideas that I might not have thought of asking.

After the collection of the data, I made a transcript by listening to the recordings and writing down everything verbatim. My questions and comments are in bold. The following codes were used for simplicity: questions were denominated "Q", and the number of the question in chronological order followed the letter (Q1, Q2, Q3 etc.). The question itself followed the number. The students were denominated "P" for participant and each student was given a number based on the order in which they made their first comment. That is, the first student that spoke was named P1, the second one P2 and so on. Having pseudonyms is a way of ensuring the participants' anonymity. To take notes of which student said what was done for several reasons. Firstly, it makes it easier to understand the conversation and follow the discussion as the students sometimes spoke simultaneously or interrupted each other. For instance, one person might have begun a sentence and then finished it after an interjection from someone else. Secondly, keeping track of who says what makes it easier to find patterns in the individual participants' opinions. Finally, it allows for removing someone's comments from the interview if

they should choose to withdraw from the study (according to their ethical rights as stated in the informed consent form).

After the completion of the transcript, a thematic analysis was carried out to ascertain which themes were important. Each question was added to a table (in the first column). The participants' answers were added to the second column. The answers that consisted of only agreements, and the interjections that were not related to the subject were in this phase removed. In the third column, key words from the participants' answers to the questions were added. These key words – or codes – were then interpreted and themes were generated from them. Themes were then grouped to categories.

4.1.4 The choice of focus group as a method

This method – to begin with a focus group – was chosen as the main goal is to gain students' input on what they consider to be important when it comes to digital tools and note-taking methods. By carrying out a group interview, I was hoping that the participants would feel comfortable in having each other's company, and that they would be more open to share their opinions. Another strength of a focus group is that the participants can give each other ideas and develop reflections together. A limitation of this method is that participants can get affected (and biased) by each other's opinions or that there is a dominant respondent that could impose his/her opinions on the others. However, because these participants have been classmates for at least a couple of years and are used to having debates, the risk of such effects was deemed to be low. As an interviewer, I was of course vigilant of the students' tone and interplay – on their effect on each other – in order to create an open and safe environment.

Usually, one might carry out several interviews with either the same interviewees or different focus groups. That would strengthen the reliability of the study. In this case, greater focus was set on the questionnaire.

4.2 Questionnaire

4.2.1 Instruments

After the focus group interview analysis was made, themes (key words) were extracted from which seven major categories were created. These, as well as this paper's research

questions, were used to synthesise the questions for the questionnaire, which came to consist of 13 multiple-choice questions with 2-4 alternative answers each (see appendix 3). In order to reach out to all the students in a neat, and time-efficient way, the questionnaire was constructed as a Google Forms. This is a data gathering method that the students are familiar with.

4.2.2 GDPR and ethical considerations constructing and using the questionnaire

Besides being a method that the students are familiar with, Google Forms allows the students to see that their email addresses are not collected, thus ensuring them that their answers will remain anonymous. The only personal information that was asked from the students was to enter their school grade (MYP4-DP2). Furthermore, it was thought that the students would feel less pressure to participate as no-one was controlling who partook in answering the questionnaire – thus hopefully avoiding participant bias, as well as keeping it strictly voluntary. Demand characteristics should be minimal. One of the greatest benefits of carrying out the survey digitally is that all participants must answer every question and can only give one answer per question – otherwise the form cannot be submitted. A limitation of carrying out this particular survey digitally (as opposed to doing it using paper and pen), is the bias it carries towards digital tools. However, whichever data collection method had been chosen, it would have been biased towards one of the two methods dealt with in this survey – digital or non-digital.

4.2.3 Participants

Students in MYP4, MYP5, DP1 and DP2 were emailed the questionnaire and asked if they were willing to participate. These year groups were chosen because they correspond to the Swedish *gymnasium* years and the year before entering the *gymnasium*. As the MYP4 students are in their last term prior to entering upper secondary school, it was found pertinent (and important) to the study to include their opinions.

The participants were selected because they were students at this particular school and they were in the grades that were to be investigated. They all volunteered after sending out the questionnaire asking for volunteers to participate. Therefore, it can be considered as a self-selected purposive sample.

The sample of 66 students that completed the questionnaire, consisted of 7 DP2 students, 10 DP1 students, 22 MYP5 students and 27 MYP4 students. The participants were between ages 15-20. As the questionnaire was digital and anonymous – and therefore no names or email addresses were collected – there is no record of the ratio of male and female participants. As it was not considered important to this study, they were not asked to state their sex in the questionnaire.

4.2.4 Procedure

The Google Forms questionnaire, together with a short description of the study and its purpose, was emailed to the students asking if they would be willing to participate. Mentor teachers for MYP4 and MYP5 were asked if they could give the students a few minutes to complete the questionnaire (for those willing to participate) during mentor-time in the morning. This would increase the probability of participation while keeping the choice involvement free of pressure.

When the data was collected, it was processed and the answers were calculated as percentage ratios.

5. Results and discussion

Following will be a presentation of the results, and discussion thereof, of both methods; the focus group interview and the questionnaire. The questionnaire with all the exact percentages of the 66 students' choices can be found in appendix 5. The results will be presented according to the seven categories (which make up the subheadings of this section). The categories with their corresponding themes are the following: 5.1 Preferences; 5.2 Time (time-management, speed, efficiency, planning); 5.3 Benefits (versatility, access, long-term benefit, needs, useful, comfort, convenience, easiness); 5.4 Understanding (comprehension, understanding, reliable, rehearsal); 5.5 Simplicity (neatness, organization, precision, simplicity); 5.6 Focus or distraction (laziness, self-control, distraction, focus); 5.7 Technology in language class.

5.1 Preferences

The participants of the focus group were in agreement that digital tools are very useful but that non-digital methods have great advantages. Six of the seven students preferred to take notes by hand, while one of them preferred the computer. They all agreed that taking notes by computer was faster, but that taking notes by hand led to better memorization, which relates well to the research by Mueller and Oppenheimer and of Aragón-Mendizábal et al shown in section 3.2 of this paper.

There was hence a higher degree of students that expressed a preference for writing by hand. This could be due to the fact that they are senior students and have had more practice in writing by hand after the implementation of the digital restriction for their and the previous year group. It could, of course also be coincidence as the focus group is a small sample of students.

The questionnaire-respondents were more divided in this question. As seen in Table 1, a more or less equal number of students reported preferring taking notes by hand (47%) as those that stated a preference to do so by computer (53%). These percentages correlated strongly with the percentages of students' opinions about which method is more convenient for later revision - 48,5% writing by hand and 51,5% typing on the computer. It is natural to assume that students would find one method easier or more

practical, that they would employ that method regularly, and thus find it more convenient for revision as well. But it is not possible from this data to determine the cause-effect relationship. The students might find that a certain method is more convenient for revision and therefore apply that method while taking notes. As seen in Table 1, a higher degree of students reported finding computer-use easier than the amount who reported preferring to use a computer for taking notes. Consequently, we can see that some students who find computer-typing easier still prefer taking notes by hand.

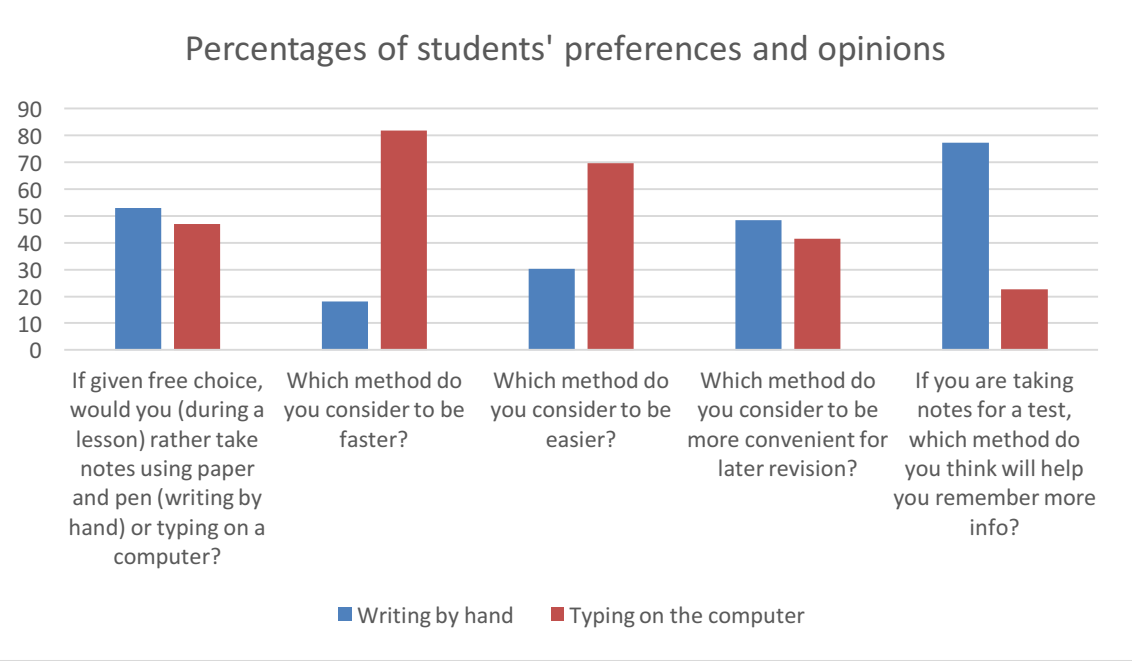


Table 1. Percentages of students' preferences on questions 1-5 in the questionnaire.

5.2 Time

The questionnaire showed that the plurality students find note-taking via a computer faster (81,8%) than taking notes by hand (see Table 1). This goes in agreement with the focus group's opinions, in which all participants stated that computer-typing was the faster method. However, the students in the focus group expressed that using paper and pen, though more time consuming at the time of taking notes, is more efficient. One student (P6) said "I actually wish that we had this note-taking [by hand] from MYP5 to DP1s, 'cause I think that we would have stud… not studied more but like for my own [inaudible] hours…" another student (P1) interjected "studied more efficiently", P6, agreeing, "studied more and concentrated more".

The students are expressing that paper and pen allows for better focus and more studying. This agrees with Mayer and Moreno's (2003) theory of multimedia learning; if the students do not have the distractions from the computer, they will not be subject to cognitive overload, which means that they can focus better. Therefore, the studies become more effective.

One limitation that the students in the focus group mentioned about taking notes by hand, which would be a benefit with writing by computer, is not having time to write everything down. P3. "I think one of the limitations [of writing by hand] is that sometimes you don't get all the information you're supposed to have and then you might not realise that you're missing it when you go back and look through your notes". This agrees with Aragón-Mendizábal et. al's findings that computer-typing allows for more extensive notes.

5.3 Benefits

5.3.1 Benefits of note-taking by hand

All of the students in the focus group seemed to agree that taking notes by hand lead to better memorization and thus better learning. Some of them argued that writing a text in their own way (paraphrasing) made it easier to remember. One student said:

> "…it's more about the quality of the information being stored rather than quantity. You can store a lot of information on computers, but if it's like, when it comes to the point of the exams I think that note-taking by hand is a better quality because you're more likely to remember what you wrote by hand than what you typed. Like, I can remember what I wrote down on paper like a week ago - like a groceries list - but I won't be able to remember what I wrote in like the computer just like a couple of days ago".

This outlook that paraphrasing is better for memorization supports both the MSM and LOP theories of memory, as the students would be both rehearsing the material more (which means a stronger encoding into long-term memory), and reflecting on what is being said (which means a semantic – deeper – level of processing).

Out of the students that answered the questionnaire, a vast majority (77,3%) found note-taking by hand more helpful in remembering information for a test than note-taking by computer. The questionnaire respondents and the focus group – illustrated by the above quote – agree with Mueller and Oppenheimer's research that hand-writing is better for learning. If students are aware of and accept this, and they feel that it is better to write by hand despite finding it easier and faster to type, does this mean that schools should promote more hand-writing? Should longhand be purposely more practiced in English lessons?

5.3.2 Benefits of note-taking by computer

The focus group argued that being able to use computers is important to their future. P5 said: "I think that it's very important to use a computer because that's basically the future; technology IS the future. So being able note-take on a computer is one of the most important things of our…of our lifetime pretty much, 'cause things are changing so drastically now from when we started that it's gonna be basically all computer and everything's going to be online. So, I think that using computers is a lot more beneficial in the long run than taking notes by hand". Another student said that the necessities and benefits will change in different situations and at different times in life; that working in an office might require being proficient using a computer, but that pen and paper help memorizing information for exams which is more beneficial right now.

In the questionnaire, 87,9% of students stated that they thought, considering today's society and their future, that they would have more benefit of being good at typing on the computer, rather than writing by hand. When it comes to reading, though, they tend to prefer paper books over digital resources. 72,7% stated that they preferred paper books, while 27,3% chose digital resources.

The students' opinions about their future concur with the EU's key competences for lifelong learning; digital competence is important for an "active citizenship" and "future employment". This means that it is important for the students to gain the necessary skills in using digital tools. The Swedish Education Act states upper secondary school education should give a solid foundation to engage well in a future occupation, which would then mean that it is important that schools foster digital competencies. This accords with the students' opinions. Maybe then, it would also be pertinent to include

stricter guidelines about digital resources in the English subject steering documents? When it comes to English as a subject it seems that the students prefer "traditional" tools in the form of paper books, which suggests that, for this particular subject, maybe it is equally important to foster non-digital methods.

5.4 Understanding

A theme that the students discussed as a strength for both hand-writing and computer-typing was comprehension.

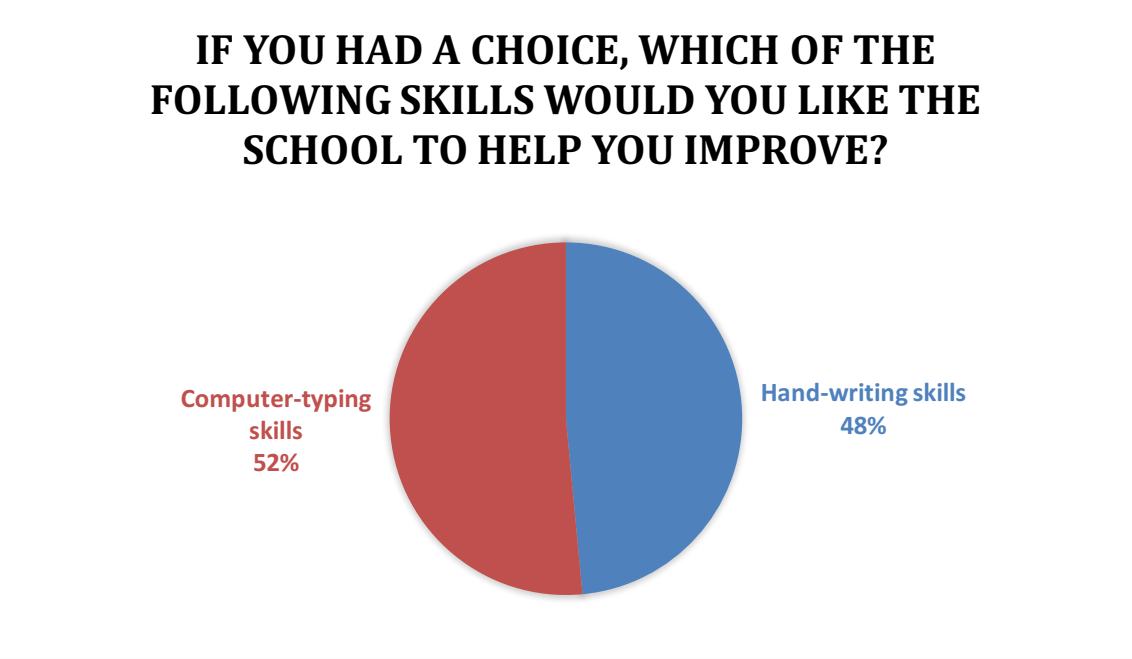
The main argument for hand-writing being better from this perspective was that they then paraphrase what is being said or what they see, and that putting it in their own words makes it easier to understand later on, as well as leading to better memorization. One student (P4) put it as "Buh, I can memorize more by hand it's like cause I'm writing it out and at the same time it's kind of as if I'm writing it in my brain while when I'm typing just more like just like typing random buttons". Another (P3) student agreed: "I think when you're typing you can get all the words exactly and then you don't have time to process it in the brain". Looking at the theory of levels of processing, the students are expressing that – in typing – they do not get as much deep semantic processing, because it is enough to stay at the phonetic or even structural level of processing in order to get the words down. With the more time-consuming longhand they would have to reformulate, which forces them to process at a semantic level. English as an upper secondary school subject is mainly about reflection, understanding, critical thinking and linguistic knowledge that needs to be "grounded" and developed further (Skolverket, 2013). As English examinations and assessments are likely to test conceptual understanding rather than pure remembrance of what was said on the lessons, it would according to LOP be more beneficial for students to process the information at a semantic level, which means that it would be more advantageous to take their notes by hand rather than on their computers.

The main argument for typing being more comprehensible (besides the time aspect of getting all information verbatim) is the quality of handwriting. One of the students in the focus group said that taking notes by computer is neater than writing by hand, and so, easier to understand during later revision.

The two standpoints can be appreciated through an exchange of opinions between two of the students in the focus group:

P4. One disadvantage of note-taking by hand is the hand-writing, especially if your hand writing is bad
P3. But it improves your hand writing…
P4. Yeah, I know, I know, and in the long term, but like, in the moment it's like, if your hand-writing is bad and then you want to go back to it later, it's like…
P3. …you don't understand…
P4.…yeah, I sometimes don't understand what I wrote and so I guess it
P3…But then you go and you read the notes again and then you learn it one more time, so it's actually beneficial for you!

Following this difference in opinion I found it interesting to see what students thought about writing skills. In the questionnaire, they were asked which skill – hand-writing or computer-typing – they would rather have the school help them improve if they had a choice. Students were divided in their opinions. 48,5% chose hand-writing skills and 51,5% chose computer-typing skills, as seen in Graph 1.



Graph 1. Students' preferences for further development with their schools' help.

Might it then be good that it is up to the individual English teacher to choose which method they prefer to foster? It is not ascertained from this study whether the students would like to improve the skills that they are most comfortable with or the ones that they feel they are not as proficient at. Nevertheless, it seems that an equal number of students have a wish for longhand as those who would like to type, which means that it

would be good for schools to have a balance in how they apply and promote both methods.

5.5 Simplicity

Students in the focus group argued that it is easier to organize notes on the computer, because it is easier to change them and edit. It is also easier, some of them stated, to create graphs and such: P1. "But if you take so many notes on the computer then you can organize it in your own way…quicker… if you do it on the computer [and] you have to edit…move this to this…move…add a graph, add a table, there you can just…" P4. "…It's easier to add pictures and stuff in the computer…" P3. "Yes, it's easier to just do a graph quickly and sketch a graph then have it… [interrupted by another student]. Another argument was that using the computer is easier for people who "feel lazier" but that note-taking by hand is better long term.

One student argued that notes on the computer are neater and "a lot better to go back and study from". Conversely, another student disputed that "I can read better on the paper than on the screen and especially if I'm on the bus it's much easier to just take out a notebook than the whole laptop". Here, we see two perspectives of which method is easier and more convenient. In order to gain a larger picture of what students think, the questionnaire contained a question about which method students found easier. 30,3% answered "writing by hand" and the majority, 69,7%, responded "typing on the computer". It is interesting that 81,8% of students find note-taking on the computer faster, but that the proportion (69,7%) of students that find it easier is lower. That is, at least some students, do not find the method they are fastest at easiest.

5.6 Focus or distraction

Students in the focus group discussed how one of the drawbacks of using digital tools in the form of a computer each is the distractions it invites. They found that writing by hand gave them greater focus, whereas having the computer open would tempt them to do other things than studying what they are doing in class. P1: "…if I'm using my computer and note-taking, I'll usually get distracted… I'll have the urge to open another window and do something else". P5 said "That's about self-control: being able to focus

on something. And that's something that I think that our generation is just really bad at… We can't sit down on the computer and just do one thing; we always have to do something else… we can't just sit and just do one task.". The students are expressing a concern of getting distracted. They are also voicing that they and their peers don't have the self-control to just focus on one task when presented with the possibility of multitasking. What the students convey goes in line with what Blakemore and Robbins (2012) inform us about the adolescent brain; it is more impulsive and has not yet developed full cognitive control. This explains why students have such difficulties in avoiding distractions. According to the research by Sana et. al (2013), multitasking during a lesson hinders learning. As the students in the focus group express not being able to avoid multitasking, this is quite a problem for a successful lesson, and thus something that needs to be considered by schools.

The distractions that the students face could be leading them to experience cognitive overload – according to the theory of multimedia learning – and therefore not be able to take in the academic information they need to process. The students themselves are aware of and express that if digital media such as computers are to be used in the classroom, they either have to have better discipline or the teachers need to be more in control. Distraction, as the students themselves identify as a problem, is an issue that would be very beneficial for schools to take action on.

5.7 Technology in language class

Teachers have a responsibility when it comes to the use of digital technology or lack thereof. Talking about note-taking by hand, P6 articulated: "Well, one of the disadvantages could be like you just… teachers go through like slides fast so you can't take notes fast enough…so you miss so many things…". Other students argued that it would be alright if the teachers went through the information slower and the students paraphrased while taking notes. If teachers are using a digital presentation, which is prepared by them in advance (and thus faster to go through), while expecting the students to take notes and do so by hand, they will have to adjust the pace and expectations accordingly. The students' feelings relate well to the multi-store model of memory, as taking notes means that one has to focus the attention on what is being communicated by the teacher. If teachers' use of digital technology means that they can go through the information faster and the students do not have time to take notes, it

might mean that they do not have time to process the information properly. In that case, the information might not be rehearsed in the short-term memory and then encoded into the long-term memory from which it can later be retrieved.

One student in the focus group voiced that technology is important to master, and that if they "fall behind on technology now" they won't "be able to contribute to the society we live in" in the future. This opinion goes well in line with the EU's *key competences for lifelong learning*, as digital competence is one of the eight. Students are aware of the importance of being dexterous in using technology and seem to find it important to be able to develop digital skills in school. Maybe the steering documents for English need to be stricter on the incorporation of digital technology in class?

The students seem to be aware of the problems that being distracted while using their computer poses, but they need help from their teachers and school in order to be able to avoid it. Even if they know that they might get into trouble from their teacher or that they will do worse in a test, the risk-taking behaviour that they are prone to, according to Blakemore and Robbins (2012), would mean that they would not be hindered from multitasking. Because the focus group students had expressed difficulties in concentration, and how easy it is to get distracted, as a concern when it comes to the use of digital media in the classroom, they were asked what they thought would be the best option for them in order to be able to focus more. They named the following suggestions: Having restriction from being able to go away from the document they are working on (If they use a notebook they only focus on the page they are on, according to the student); that the teacher has control over what the student is viewing all the time; that the teacher/school has control over what can be opened by the student on their computer, so that it is only school-related pages and documents.

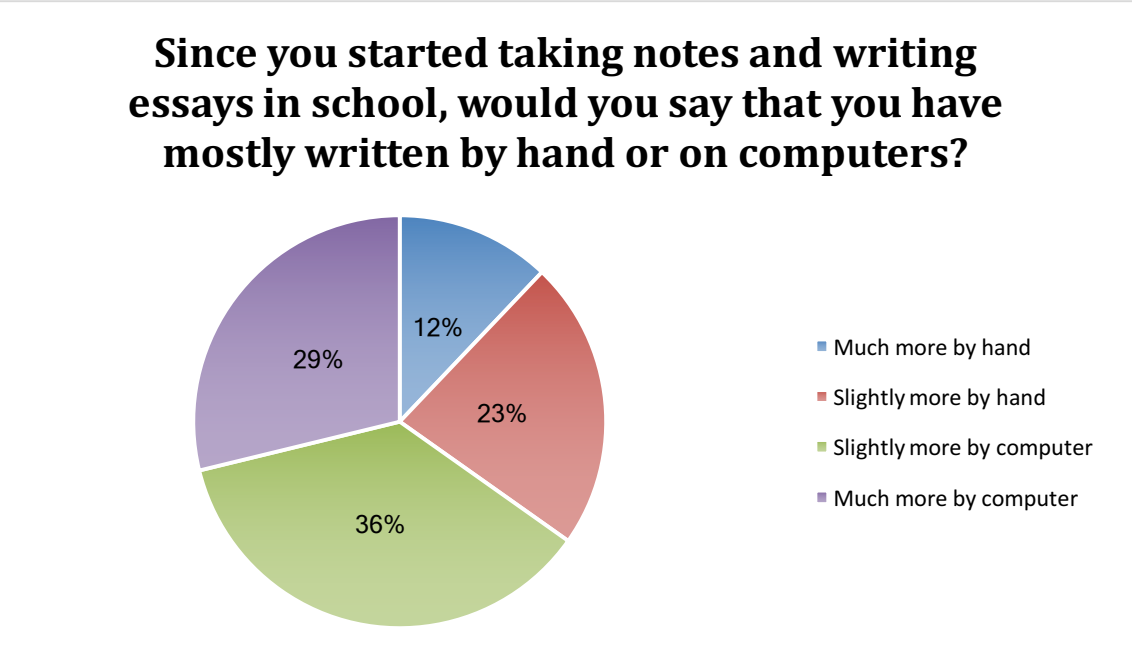
As suggestions of what the school or teachers could do to help students use digital tools without getting distracted, students answered: invest more in technology – for example, to get platforms that would allow teachers to monitor what students are doing at a certain time; the teacher should set goals every lesson so that it "applies pressure" to get that done (to learn and do more "in a smaller amount of time"); when students get access to using a laptop (when they are in lower grades), they should learn from the start how to use it correctly and that "when you're in school you focus on school."

To the question “In what way do you think that digital media should be used in the classroom?” the students answered:

P7. Only for education
P6. For research
P4. Research, education…unless you have those 5 minute breaks…I think
P3. Note-taking
P6. School related stuff
P1. Yeah
P4. Basically
P5. In class it should like, it should be used for school related stuff, but outside I think it should be pretty open. Because then it’s kind of your choice, your freedom.

The students’ opinions indicate that they find their education important and want to do well. These same students commented on the danger of getting distracted by other things on their computers, which shows the responsibility that schools and teachers have to make sure that digital tools are used correctly.

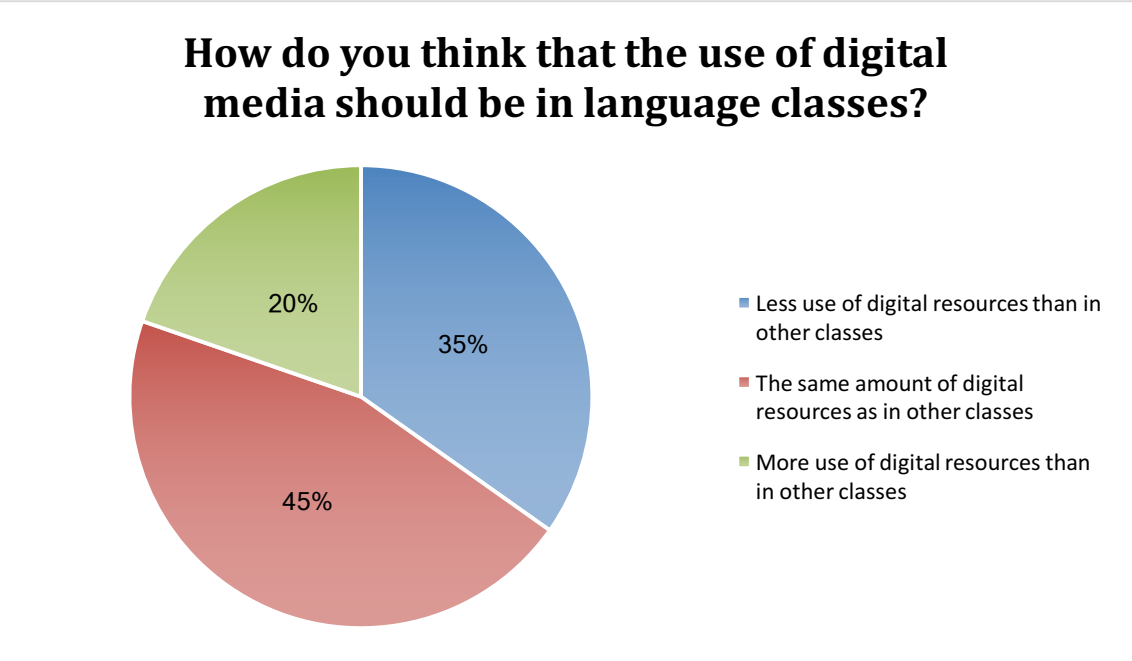
The results from the questionnaire (see appendix 5) also show that students experience that more teachers promote note-taking by hand. 74,2% of students responded that most of their teachers encourage taking notes by hand. There is thus a discrepancy between what the teachers recommend (longhand) and the direction in which society and education in moving (digital tools – hence typing). Research and recommendations stipulate different things; on the one hand, to incorporate more digital resources (mainly computers) into teaching (Skolverket, 2016); on the other hand, that handwriting is better for learning (Mueller & Oppenheimer, 2014). It is therefore a difficult task for both students and teachers to decide which methods to use in class.



Graph 2. Students' ratio of hand-writing vs. computer-typing since they began taking notes and writing essays in school.

As indicated in Graph 2, since the students started taking notes and writing essays in school, most of them (65%) have done so using computers. According to schema theory, if they have developed their language skills (writing, reading, speaking and listening) using computers, these are an integral part of their language schema. They would find typing more natural and automatic in transferring auditory language to written text. If they then have to write longhand, they have to accommodate those automatic processes to writing by hand, which would actually mean that they might learn less when writing by hand as, according to multimedia learning theory, they would have one more thing to focus on and thus sooner reach cognitive overload.

Regarding language classes, a similar number of students considered that more digital tools should be used in teaching as those who considered that more "traditional" resources should rather be encouraged (see appendix 5, question 10). The steering documents for English state that students should cover "Strategies and *modern technology* to participate in, lead and document conversations and written communications in *various media*, such as in work processes and negotiation situations related to social and working life" (Skolverket, n.d., my italics). Therefore, it seems that – according to both the steering documents and the students' opinions – it would be best for teachers to try to combine working with computers and with paper and pen.



Graph 3. Preference for digital media use in language classes.

The highest degree of students (45,5%) think that the amount of digital media use in language classes should be the same as in other subjects. More students (34,8%) feel that there should be less use of digital resources in language classes than those who feel that the use of digital resources should be greater in language classes than in other subjects' classes (19,7%).

When it comes to the general use of digital technology in schools, most students (69,7%) find that there should be an equal balance between digital and non-digital tools. The opinions that digital technology should be used as much as possible in school or that it should conversely by minimized, are divided by a similar degree of students each (15,2% and 12,1% respectively). This too shows that teachers have an important role in ensuring that their students get to practice various methods of working in class and of taking notes, and that they – according to most students' preference – should try to keep a rather even balance of digital and non-digital methods.

6. Conclusion

6.1 Findings and implications for teaching English

Questionnaire participants were divided in their preferred method of note-taking. A more or less equal number of students reported preferring to take notes by hand as those who reported they preferred using the computer to take notes in class, if given the choice. Six out of seven of the focus group students, however, stated that they preferred longhand. They agreed that handwriting was better for memorization. The majority of students found typing on the computer to be both faster and easier than writing by hand, but a considerable majority reported finding hand-writing more helpful in remembering information when studying for a test. However, when it comes to taking notes for later revision, the degree of students who preferred longhand was only slightly higher than the percentage of students who preferred typing.

Students expressed that one of the benefits of taking notes on the computer is that, because it is faster, they have more time to get everything down. They also said that it is neater, and so easier to understand (the font). They also expressed the convenience of being able to edit as well as to create graphs and plots quickly and easily. Most importantly, it seemed in the minds of the students, is that digital technology will be important to master for future jobs and everyday lives. Thus, being proficient in using their computers is important for their futures, the students affirmed.

When it comes to the perceived benefits of taking notes by hand, the students maintained that they remembered what they had written better. They also said that paraphrasing (as they do when they write by hand) made it easier to remember the content. They also found that they focus better when they do not have the distractions that the computer and the internet present.

Most students have mainly used computers to write on at school. But, when it comes to reading, they expressed a preference for paper books rather than digital ones. An equal number of students conveyed that they would prefer to improve their hand-writing skills as those who would prefer to improve their typing skills if given a choice to do so in school. Students also said that they thought that digital media in the classroom should

only be used for "school-related stuff". A large number of students opine that the amount of digital media use in language classes should be the same as in other subjects. When it comes to the general use of digital technology in schools, most students (69,7%) find that there should be an equal balance between digital and non-digital tools.

From this study, we can see that students have a wish to do well in school. They do not always choose the fastest and easiest method, but use the method that they think will be most beneficial for them in the long run – that is, for the exams and not just in the moment or for an individual piece of homework. Half of the students would like to acquire better handwriting skills and half want to improve their typing competence. This means that schools should support them in developing a dexterity in both methods. This is what the students seem to voice.

Students find it very important for their futures to master digital tools, but they also state a preference for using non-digital tools in classroom learning. Teachers should find a balance between the methods. But it would also be good for the use of various methods to be more standardized so that all students feel equally comfortable using them (as students at other schools).

Students are aware of the distraction that using computers poses and would like help in not falling into temptation. Maybe schools need to employ tools that control or overview what the students do on their computers during class. The students voiced a wish to have teachers monitor what they do so that they will not fall for their distractions.

6.2 Limitations and suggestions for future research

I began by carrying out a focus group interview to gain an initial image of what students opined about the use of digital technology for note-taking and other classroom activities, and then do a questionnaire to confirm those opinions with a larger sample. As with all questionnaires, the data is self-reported, which always carries the risk of participants not being completely honest or falling for demand characteristics. However, these risks should be minimal as the answers were anonymous and participation was voluntary. It would have been useful to after the completion and analysis of the questionnaire be able to ask follow-up questions. Therefore, it would have been more informative to also carry out an interview afterwards. The questionnaire did not allow

for explanations of students' preferences, which would also have been interesting to gain. However, making such an analysis was deemed too extensive for the scope of this paper.

The investigation was carried out as a case study, which means that all students were from the same school. This means that the sample is not representative of the Swedish population. To give a more reliable nationwide analysis, one would need to gain the opinions of students from different parts of Sweden and take into consideration factors such as socioeconomic and cultural background. The students might also have been biased if they have studied areas covered in this paper. It is not unlikely that they have covered such themes in class.

Most students (74,2%) reported that the majority of their teachers encourage taking notes by hand. It is unclear whether they are basing their endorsement on research or if there is some other reason, such as not wanting the students to get distracted by other things on their computers. It would be interesting to know if this is really the best method to encourage today's students to use. I suspect that many of the studies that support the benefits of longhand probably are carried out on students who have grown up first writing by hand and then learning computer-typing. This would entail that said students have built certain types of cognitive schemata in which the "writing memory" is adapted to longhand and then has had to accommodate (reshape) to fit to type on a keyboard. Nowadays, however, it is more common to use a laptop/tablet/mobile phone from the time one begins to learn how to read and write. It would be interesting to see if students who have grown up mainly typing have the same processes when they type as students who have grown up writing by hand have when they write by hand. By finding out which method the students used while developing an efficient writing/note-taking technique, one might be able to discern whether it carries any correlation with their perception about which method allows them to best attain information.

Similarly, because today's students are so used to using and working on computers that they probably find it much easier than using pen and paper, it would be interesting to investigate if one could teach or influence students so that they would take notes on their computer the same way – with the same attitude – they would by hand. That is, with more reflection and less verbatim transcriptions. According to Mueller and Oppenheimer's results, these students (who take down many words, but paraphrase)

would have the greatest success when it comes to both remembrance of facts as well as conceptual understanding.

Some other questions that would be interesting to research are: How should digital media best be used in the classroom teaching? What are important competences for students to acquire in order to be functional citizens? How should language teaching be formed in a digital society so that students can get the best possible conditions for learning and a – to their future society – well-adapted skillset?

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8. Appendices

8.1 Appendix 1: Written informed consent for focus group

Informed consent

Hello!
This focus group is about the role of digitalisation in the classroom. Participants will be asked to discuss teaching and learning methods through a series of questions.
Results will be published in a paper via Malmö University.
Participation in this group interview assures all participants that their identities will remain anonymous and that nothing they say will be traceable to any individual person. The interview will be recorded, but upon transcription (in which code names will be given the participants), the recording will be immediately deleted. Participants have the right to withdraw at any time without needing to explain why they wish to do so.

I, _____ (full name), hereby accept participating in a focus group that will take about 20 minutes. By accepting, I agree to let the researcher use my data, remaining anonymous.

_____ (signature)

_____ (age)

_____ (date and place)

8.2 Appendix 2: Interview questions for the focus group.

Focus group interview

1. How do you feel about the use of digital tools in the classroom?

2. What is your preferred method of note taking?
    a. Why?
    b. Which method is faster?
    c. How do you think you will learn/remember the best?

3. What do your teachers encourage you to do when it comes to taking notes?
    a. No note-taking
    b. By hand
    c. By computer

4. What are the strengths/benefits and limitations/drawbacks of different methods of note-taking?

5. Considering today's society and your future, do you think that you will have more or less benefit of a specific method?

6. In what way do you think that digital media should be used in the classroom?
    a. How do you think other students feel about this question?
    b. Younger
    c. Older

7. What do you feel are essential skills for you to master in order to lead a normal, everyday life with an education and a job about 10 years from now?

8. When students that are now five years younger than you, reach your age, what do you think will be essential skills for them to master?

9. How do you think that the school/teachers could help you achieve this?

1.3 Appendix 3: Questionnaire

Your grade level:

- DP2
- DP1
- MYP5
- MYP4

- If given free choice, would you (during a lesson) rather take notes using paper and pen (writing by hand) or typing on a computer?
- Writing by hand
- Typing on the computer

- Which method do you consider to be faster?
- Writing by hand
- Typing on the computer

- Which method do you consider to be easier?
- Writing by hand
- Typing on the computer

- Which method do you consider to be more convenient for later revision?
- Writing by hand
- Typing on the computer

- If you are taking notes for a test, which method do you think will help you remember more info?
- Writing by hand
- Typing on the computer

- What do most of your teachers encourage you to do when it comes to taking notes during lessons?
- No note-taking
- By hand
- By computer

- Since you started taking notes and writing essays in school, would you say that you have mostly written by hand or on computers?
- Much more by hand
- Slightly more by hand
- Slightly more by computer
- Much more by computer

- Do you prefer to read literature through a paper book or through a digital resource?
- Paper book
- Digital book

- Considering today's society and your future, do you think that you will have more benefit of being good at a specific method?

- Better to be good at writing by hand
- Better to be good at typing on the computer

- Do you think that language classes should be taught using more digital tools or that they should encourage more "traditional" resources as books and handouts?
- Digital
- Traditional

- How do you think that the use of digital media should be in language classes?
- Less use of digital resources than in other classes
- The same amount of digital resources as in other classes
- More use of digital resources than in other classes
- Other:_____

- There are advantages and disadvantages of using different kinds of tools at schools. What is your preference when it comes to the use of digital technology?
- It would be good to use as much digital technology as possible in school.
- It's good to have an equal balance between digital and non-digital tools.
- It would be good to minimize the use of digital technology in schools.
- Other:_____

- If you had a choice, which of the following skills would you like the school to help you improve?
- Hand-writing skills
- Computer-typing skills

1.4 Appendix 4: Questionnaire with answers (percentage of participants that chose each answer).

1. If given free choice, would you (during a lesson) rather take notes using paper and pen (writing by hand) or typing on a computer?
    - Writing by hand **53%**
    - Typing on the computer **47%**

2. Which method do you consider to be faster?
    - Writing by hand: **18,2%**
    - Typing on the computer: **81,8%**

3. Which method do you consider to be easier?
    - Writing by hand: **30,3%**
    - Typing on the computer: **69,7%**

4. Which method do you consider to be more convenient for later revision?
    - Writing by hand: **48,5%**
    - Typing on the computer: **51,5%**

5. If you are taking notes for a test, which method do you think will help you remember more info?
    - Writing by hand: **77,3%**
    - Typing on the computer: **22,7%**

6. What do most of your teachers encourage you to do when it comes to taking notes during lessons?
    - No note-taking: **1,6%**
    - By hand: **74,2%**
    - By computer: **24,2%**

7. Since you started taking notes and writing essays in school, would you say that you have mostly written by hand or on computers?
    - Much more by hand **12,1%**
    - Slightly more by hand **22,7%**
    - Slightly more by computer **36,4%**
    - Much more by computer **28,8%**

8. Do you prefer to read literature through a paper book or through a digital resource?
    - Paper book **72,7%**
    - Digital book **27,3%**

9. Considering today's society and your future, do you think that you will have more benefit of being good at a specific method?
    - Better to be good at writing by hand **12,1%**
    - Better to be good at typing on the computer **87,9%**

10. Do you think that language classes should be taught using more digital tools or that they should encourage more "traditional" resources as books and handouts?
    - Digital **53%**
    - Traditional **47%**

11. How do you think that the use of digital media should be in language classes?
    - Less use of digital resources than in other classes **34,8%**
    - The same amount of digital resources as in other classes **45,5%**
    - More use of digital resources than in other classes **19,7%**
    - Other: **none**

12. There are advantages and disadvantages of using different kinds of tools at schools. What is your preference when it comes to the use of digital technology?
    - It would be good to use as much digital technology as possible in school **15,2%**
    - It's good to have an equal balance between digital and non-digital tools **69,7%**
    - It would be good to minimize the use of digital technology in schools **12,1%**
    - Other:
        - "**A bit more digital stuff**"
        - "**It's pretty good to use digital most of the time except for those occasions where traditional would be better for studying**"

13. If you had a choice, which of the following skills would you like the school to help you improve?
    - Hand-writing skills **48,5%**
    - Computer-typing skills **51,5%**