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## **Abstract**

Chromebooks have become integral tools in the educational systems of many developed countries. The present study explores the use of Chromebooks in English classrooms at lower secondary level in Norway and investigates the perceptions of teachers and learners regarding their use. Employing a mixed methods approach, the study utilized interviews with three teachers and a questionnaire completed by 131 students. All participants were involved in a one-to-one Chromebook initiative in lower secondary English. The findings highlight the efficiency and versatility offered by Chromebooks, along with the challenges posed by students' distraction and over reliance on the device. The findings also revealed a trend where teachers mostly believed Chromebooks' potential was close to limitless, but as of now, there were too many drawbacks to fully extract said potential. Students mostly held the same beliefs as the teachers that Chromebooks would increase their efficiency and learning output, but they also acknowledged that it caused many distractions. The study revealed potential gaps in the educational framework of which digital education is built upon, specifically the seemingly hasty integration of technology, not just limited to Chromebooks, which is seen in the lack of digital training procedures for teachers and the lack of solutions to long various downsides related to Chromebook. The study underscores the need for further research on the long-term effects of the use of Chromebooks in education generally and specifically in teaching English.

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# **1. Introduction**

## **1.1 Overview**

This study investigated Chromebooks in the Norwegian lower secondary EFL classroom, specifically, how Chromebooks are utilized by both educators and learners, and the opinions and perceptions they held toward the device. The study started by discussing trends from prior literature within digital technology in the educational setting. The main topics that were explored were related to computers and their abilities to enhance language learning alongside studies on Chromebooks and the accompanying Google applications. Literature relating to one-to-one computing and teacher competence requirements for teaching with computers were specifically important. Teacher and student beliefs were also visited as teacher and student experience may cause bias that may largely affect the outcome of the study. The present study utilized a mixed methods approach in collecting its own material, interviewing three EFL teachers and administering a questionnaire to 131 EFL learners, both the teachers and students were active participants of a one-to-one Chromebook initiative.

## **1.2 Theoretical background**

The theoretical background of this thesis encompasses a review of literature and studies pertaining to Chromebooks and digital technology in education. With Chromebooks having gained widespread adoption within education relatively recently, there is a noticeable lack of research on their direct impact on education. Consequently, this study also draws on literature surrounding computers in general, as Chromebooks share many similarities with traditional computers, albeit operating on different systems.

As noted by Courville (2011), technology, including computers and other digital tools, has played an important role in increasing efficiency in education regarding both the learning process and acquisition of knowledge. For instance, Alanazi (2013) investigated the effects of electronic writing as a means to enhance students' writing skills. The study saw a significant increase in both motivation and writing proficiency among its seven university student participants. Building on this, Wieking (2016) discovered that the integration of Chromebooks in 7<sup>th</sup> grade had a large positive impact on the student's motivation for learning and increased their engagement.



The theoretical foundation of this study further encompasses an exploration of one-to-one computing as a vital part of most Chromebook initiatives. One-to-one initiatives, according to Valiente (2010), aim to improve students' ICT skills and academic efficiency, while also bridging the digital divide, a belief that is shared by Zheng et al. (2016), who also stated that Chromebooks as a part of a one-to-one initiative also facilitate enhanced communication between both students and teachers. However, Zheng et al. (2016) and Valiente (2010) also recognizes that while providing students with computers as a one-to-one initiative, their presence is not enough by itself, their integrations need to be accommodated by teachers who possess the qualifications and competencies to properly utilize the devices to achieve the initiative's goals.

A one-to-one initiative requires a clear collective vision to be effective, and the teachers are required to obtain the necessary competence to harness Chromebooks effectively to make this vision reality. The European Commission's 'Digital Competence Framework', commonly referred to as DigComp, comprises the required teacher competences into five main competence areas, 'professional engagement', 'digital resources', 'teaching and learning', 'assessment', and 'empowering learners' (Punie, 2017), mastery of these competence areas is a necessity for teachers to harness the full potential of Chromebooks and their digital opportunities.

When exploring teacher and student experiences and perceptions, accounting for their beliefs is also necessary. According to Mohamed (2006), teacher beliefs refer to a complex set of theories, values, and assumptions based upon the teachers own experience and perceptions on specific topics that function as a filter for sorting new information and experiences. Phipps and Borg (2009) discovered that a teacher's beliefs are often established by the time they attend university and is heavily impacted by their own experience as learners and will in most cases influence their future teaching practices (Phipps & Borg, 2009, p.381). Similar to teacher beliefs, learner beliefs, while not affecting the entire class, will play a vital role in the learner's education themselves. Learner beliefs in an L2 setting encompass conceptions, ideas, and opinions regarding language learning, and will act as filters that influence the learner's decisions, approaches, and motivation (Kalaja et al., 2017).

### **1.3 Research questions and Methodology**

As mentioned above, the objective of the present study was to investigate Chromebooks in the Norwegian lower secondary EFL classroom. The research conducted to serve this purpose was guided by the following research questions.

**RQ1:** How are Chromebooks utilized by teachers and students during lower secondary English lessons?

**RQ2:** According to teachers and students, what are the benefits and disadvantages of using Chromebooks in English education?

To answer these questions, the researcher utilized a mixed method approach through three interviews and a student questionnaire. The interviews were conducted with lower secondary EFL teachers utilizing Chromebooks in their practice, while the questionnaire was administered on lower secondary EFL students who also utilized Chromebooks.

A mixed method approach was chosen to accommodate both detailed and nuanced experiences from teachers while also gathering valuable numerical information from students. The questionnaire was designed according to the guidelines provided by Dörnyei (2010) and Creswell & Creswell (2018), to accommodating for the short attention span of 13–16-year-old students, containing only two open-ended questions and a few Likert scale questions to garner more detailed data while retaining the students' attention.

The conducted interviews were semi structured and designed with the guidance of Dörnyei (2007) and Johnson & Christensen (2017). A semi structured approach was chosen to guarantee important topics was covered in the scripted part of the interviews, while allowing the researcher to probe for more information through follow up questions where necessary.

### **1.4 Relevance**

The findings of this study hold significant relevance for both research and practice within the field of educational technology. Through investigating the utilization of Chromebooks in the Norwegian lower secondary EFL classroom alongside the perceptions educators and learners hold toward them, this study addresses the current gap in the existing literature.

The insights gained from this study have the potential to inform educational policy and practice by offering valuable guidance on effective integration and utilization of Chromebook features within language learning. Furthermore, by exploring one-to-one initiatives and the

necessary teacher competence requirements connected to computer and Chromebook usage, this study provides insights that can lead to enhancing digital technology integration procedures and strategies.

Through the use of teacher interviews and student questionnaire, the study uncovered nuanced experiences and perspectives over a wide range of students and teacher from several schools, offering valuable knowledge for educators, school administrators, and policymakers when making decisions and strategies within computer assisted language learning.

### **1.5 Thesis structure**

The next chapter will explore the theoretical background of the thesis and explore relevant theories to guide this study. Following the theoretical background, Chapter 3 delves into the details of the methodology, outlining the research approach and methods underlying the data collection process and sets the stage for Chapter 4, which presents the findings from the data collection. Chapter 5 will analyze and discuss the results in depth before the conclusion is drawn in Chapter 6.

## 2. Computers in the Language Classroom

### 2.1 Technology in education

This chapter delves into relevant literature for this study, aiming to provide a comprehensive understanding of key concepts, theories, and previous research findings relevant to the current research questions and objectives. This review of existing literature and theories seek to explore what previous similar research has discovered and gain deeper insights into which aspects are in need of deeper exploration. This chapter will set the stage for the study's research, relevance, and significance.

In the 21<sup>st</sup> century, technology has become a necessity for most, permeating almost every aspect of our lives and it has revolutionized countless facets of our everyday existence. This widespread integration of technology has also made its way deep into our educational systems, affecting the way we educate the newer generations. In one of his articles, Courville (2011) accurately depicts this change, “The role of technology, in a traditional school setting, is to facilitate, through increased efficiency and effectiveness, the education of knowledge and skills.” (Courville, 2011, p. 3). Courville also believes that current technologies such as laptops can efficiently facilitate the aforementioned increase in efficiency and effectiveness through the removal of physical barriers such as textbooks, specialized classrooms, or the lack of specialized equipment, as well as reducing the time students need to retain their obtained knowledge till utilization (Courville, 2011, p.3). While Courville's article is dated, his view of the role technology play in education is still as relevant today as it was in 2011, if not more relevant as technology in education, especially laptops, have evolved to facilitate even higher levels of efficiency than ever before.

While digital technology encompasses a huge variety of inventions and devices, not all of them are fit for educational purposes. In the typical classroom the most prominent devices are the ones providing easier access to collaborative work and easier access to educational tools, sources, and the like. The most prominent devices commonly used in the classroom are smartboards and laptops and of course their counterparts such as iPads and projectors. The first two tools make massive contributions to enhancing both student development and the educational output.

Some might argue that, in well-equipped classrooms in developed countries where technology is readily available, smartboards and laptops are the most useful and dynamic

tools, however, it is important to note that access to technology varies across different countries and areas of the world. This also implies that this study is conducted with developed countries in mind, where students and teachers alike have access to technology. A smartboard is an interactive digital whiteboard with touch activation and a built-in computer. By using a smartboard with all its tools and functions, one can increase student interaction and increase the time students can retain their attention. Smartboards also contribute to creating a more interactive environment for the students in their classes wherein the students can actively participate and interact with the smartboard's features (Ross, 2022). Smartboards, while primarily used by educators, can ultimately create a more immersive and active learning environment. In parallel, laptops, which are primarily utilized by students, offer countless features and functions for enhancing students' knowledge acquisition and their learning experience. Some of the computer's most commonly used features are their ability to store tons of data and access the internet's vast library of information and resources.

## **2.2 Computers in education**

As mentioned by Courville, technology's role in education is to increase efficiency and effectiveness in learning and acquiring knowledge (Courville, 2011, p.3). Computers and electronic tools exemplify how technology enhances efficiency in education. In 2013, a study was performed to increase students' writing skills through electronic writing. This study contained a total of seven university student participants that were given weekly tasks to be written using select e-writing tools. The approach for these tasks was to combine the participants' enjoyment of technology with less enjoyable assignments and formal writing (Alanazi, 2013, p.51).

Following the research, results indicated that all seven participants had gained a deeper appreciation for writing, reporting an increase in motivation for future writing and improved writing skills. All participants reported that this study resulted in increased inspiration for writing and 85% reported that the study was enjoyable and boosted their writing confidence. Furthermore, 85% of the participants reported that e-writing had improved their formal writing skills (Alanazi, 2013, p.61-68). Multiple participants also made further comments about e-writing's effectiveness and efficiency with one such comment being "I can type faster than I can write." (Alanazi, 2013, p.64).

Though this study had a limited sample size, its results suggested that electronic writing and digital writing tools are able to not only increase efficiency, but also increase motivation and writing skill.

As shown in Alanazi's study, computers and their applications provide a platform which offers a vast variety of opportunities for enhanced learning. This increase in efficiency and learning output is gained from various functions, applications, and the vast accessibility gained through the internet. As such, the popular approach of one-to-one computing has become increasingly prevalent and widespread, being implemented in a large number of schools in countries such as the United States, Canada, United Kingdom, and of course, Norway, to mention a few.

In 2016, another study was conducted in Iowa, USA. The participants of the study were a total of five classes, with approximately 20 students in each class for a total of 100 students. All students were 7<sup>th</sup> grade students. The goal of the study was to determine how students' motivation for learning was impacted by the integration of technology in the classroom, more specifically, Chromebooks.

The study's duration lasted for nearly two months with a series of different data collection methods, surveys, formal and informational questions for the entire class, brief interviews, and lastly, weekly observations.

After conducting the research, results showed that careful integration of technology in education can have a positive effect on students' motivation to learn. The quantitative data collected proved that the students had heightened motivation for learning while several students expressed that they enjoyed learning with technology. The qualitative data, such as the observations, in line with the quantitative findings showed a positive response to technology and a higher level of excitement and engagement in class when using Chromebooks as opposed to working by hand. The study also found a trend for students' preference for digital learning activities (Wieking, 2016, p.12-20).

Wieking's study proved that careful integration of technology, and in his case, Chromebooks, could have a positive effect on students' motivational drive to learn, while revealing a trend of students preferring to learn through digital activities as opposed to by hand.

### **2.3 One-to-one computing**

One-to-one computing or the 1:1 initiative is an approach that entails schools providing every student with their own personal computing device. These devices are typically laptops or tablets, with the former being the most used option due to the broader use and functionality. In 2010, an international study was conducted to research the impact of one-to-one computing. In this study, Valiente (2010) stated that there are three main goals behind one-to-one approaches, providing students with ICT skills (Information and Communication Technology), removing or reducing any possible digital divides between students, and improved efficiency in education and academic achievements (Valiente, 2010, p.8).

The main goals of one-to-one computing mentioned above go hand in hand with the Norwegian national curriculum's educational aims. As stated by the national curriculum, the students are required and ought to be taught how to "use digital resources and other aids in language learning, text creation and interaction." (Kunnskapsdepartementet, 2019). The Core curriculum also states that "School shall facilitate for and support the pupils' development in the five basic skills throughout the entire learning path." (Kunnskapsdepartementet, 2017), with 'digital skills' being one of those five basic skills. As such, it is a vital skill that should be acquired and polished within all subjects as it is vital and necessary for learning and understanding. These basic digital skills will naturally be acquired through the application of one-to-one computing which is why it is both a beneficial and widely used initiative.

However, as Valiente discussed in his study, simply having access to laptops does not naturally provide any valuable output. "Although access is important, it is not sufficient." (Valiente, 2010, p.8). The teachers in charge of the classes need to be fully aware of the vision and goals behind the initiative to be able to fully put the computers to use. While simply using a computer might give the student some sort of security and digital skills, it will be very limited. The teachers will need to design classes based on these visions and goals in order for the students to gain the proper competence and skills, and in order to do that, the teachers themselves will have to learn how to use the computers in the correct manner. This again results in the schools having to employ an IT coordinator that is capable of teaching the teachers, managing the devices, network, software and dealing with potential technological difficulties.

Through his research, Valiente also discovered that the one-to-one computing initiative had positive effects on both basic ICT skills and academic skills within most

subjects, the exceptions being subjects where computing tools and internet access being vital, such as mathematics and arts (Valiente, 2010, p.13-14). While one-to-one computing has several beneficial outcomes, there are several factors that need to be accounted for when putting the initiative to use. Firstly, as mentioned earlier, the teachers and schools must have a clear vision and understanding of the initiative and what the goals and objectives are in order to accomplish them as the initiative will not magically make it happen on its own. One of the more obvious complications is funding. The schools would not only have to pay for several hundred computers to equip every student and teacher, hire qualified IT personnel, buy additional equipment compatible with their new devices (smartboards/projectors, extra charges, spare parts, additional outlets for charging), stable internet connection capable of sustaining hundreds of users at once, software and tool licenses, and professional training and tutoring for teachers. While most schools in developed countries will have suitable infrastructure to facilitate these recent changes, certain schools would also need to pay for additional changes to the infrastructure as well (Burstein & Peters Hinton, 2022).

In addition to Valiente's study, an article written by Zheng et al (2016), found similar results after conducting their analysis of both articles and studies researching one-to-one computing in a k-12 setting. In their research they reviewed 96 articles researching one-to-one computing in a k-12 setting, of which 65 were journal articles, with the remaining 31 being doctoral dissertations. Additionally, they conducted a meta-analysis of 10 studies researching one-to-one computing, also in a k-12 setting (Zeng et al, 2016, p. 1055-1056).

Zheng et al (2016), discovered that laptops led to more writing and editing activities across multiple subjects. The students would use laptops during the entire writing process and would receive more feedback. The results also found a positive increase in communication between students and teacher as well as communications between the schools and parents. Additionally, they concluded that laptops enhanced the development of several skills relevant to our modern digital society such as problem-solving, information literacy, and overall ICT skills. However, the article also mentioned that the evidence for these claims, while visible, were few or vague, meaning further research would be recommended (Zeng et al, 2016, p. 1058-1074).

While one-to-one computing seemed to enhance several aspects of learning and communication, Zheng et al (2016) addressed the same issue as discussed earlier by Valiente. Computers' presence, while providing the platform and tool required to provide a better



learning environment, requires educators to have the competencies needed to facilitate them (Zeng et al, 2016, p. 1058-1074).

## **2.4 Chromebooks**

In terms of funding the startup of a one-to-one initiative, the largest investment involves purchasing the hardware/devices along with any corresponding software and licensing. This aspect, however, was revolutionized by the appearance of Chromebooks. Powered by Google's Chrome OS, Chromebooks offer a more cost-effective alternative to their Windows counterparts or tablets. This affordability originates from the cloud-based storage and applications integrated in the device. As Chromebooks operate on Chrome OS, they leverage Google's cloud-based applications and storage, removing the need for any additional software and licensing costs. As a result, all of Google's tools, applications, and storage are integrated into the operating system of the device.

While one of Chromebook's strongest selling points lies in its affordability, it also offers a plethora of valuable resources and tools that can be used to effectively improve academic development alongside its instant boot-up feature. Though applications such as Word and PowerPoint are not supported by Chrome OS, Chromebooks integrate 'Google Workspace', a platform developed for education. This platform offers a wide range of collaborative and productive tools tailored specifically for educational use, including Google Docs, sheets, slides, and classroom. (Nguyen, 2023, p.105-109)

In 2023, Nguyen published an article discussing GWE (Google Workspace in Education), delving into Google Workshop and its application's impact on education. This research was prompted by 'COVID-19' and the surge in online education that resulted from it. In his article, Nguyen states that GWE is a user-friendly platform with a suite of cloud-based applications that promotes collaboration along with class and time management. The cloud-based applications allow for real-time collaboration and feedback which saves both students' and teacher's time by removing certain physical constraints such as device limitations and the need for private spaces for discussion and feedback. (Nguyen, 2023, p.105-117).

Google Workspace offers several vital tools for education with the most used being; google docs, sheets, slides, and calendar, all which Nguyen discusses in his research. However, out of these applications, Google Classroom is highlighted as especially useful when it comes to the LMS (Learning Management system). Google Classroom is in one of the

most used tools for LMS in well-equipped schools because of Chromebooks influence. This application allows teachers to create specific folders for each subject as they see fit and customize its members and content freely. Within this application the teachers can easily allocate tasks and information and even distribute certain tasks to selected students and also create collaborative tasks within groups or pairs. Google Classroom also allow teachers and students to communicate with each other in real-time, saving both time and allowing them to ask questions and provide/get the feedback they need digitally (Nguyen, 2023, p108-109). Finally, both Classroom and GWE, seamlessly integrate the use of any other Google applications, making it easier for assigning tasks in different subjects and topics while allowing the students a variety of methods to finish them (Nguyen, 2023, p106-109).

#### 2.4.1 Chromebook ease of use

The introduction of a new device inevitable brings forth new challenges, a common talking point in this regard would be user-friendliness. This is especially true within one-to-one initiatives, where hundreds of students are expected to effectively navigate their own personal device, which they may be somewhat unfamiliar with.

A study researching the user friendliness of Chromebooks was performed in Pennsylvania, USA, in school year of 2017-2018. The survey was conducted on 174 university students ranging from 18 to 75 years old. Nearly 90% of the participants were 18-24 years old. Before completing the survey, the students were given a brief introduction to Chromebooks and a note with Wi-Fi name and password, the students were then given the remainder of the lecture to use this information to familiarize themselves with the Chromebook. After the lecture was finished, the survey was issued online for the students to answer at their own convenience. The survey consisted of 7 questions related to Chromebook's ease of use. (Seyala et al., 2019, p.556-557).

Before mentioning the results, it is of value to mention that only 29% of the participants had ever used a Chromebook before the study was performed, giving 71% of them a more accurate first impression on ease of use. Additionally, the Wi-Fi on campus was experiencing some connectivity issues the day of the study, resulting in some of the students claiming to have trouble with connecting. This might have had a small impact on the participants' responses.

The overall results from the survey showed that 84% of the 174 participants agreed that the Chromebooks are easy to use and learning to operate one was also easy. Out of the remaining 16%, only 6% disagreed that the Chromebooks were easy to use, whereas the rest found them to be neither easy nor hard (Seyala et al., 2019, p.557-558). These results indicate that even people who have never used a Chromebook before, with only a minor introduction, are capable of maneuvering and familiarizing themselves with the device.

The ease of use in Chromebook is an aspect that comes from its similarities with the standardized Windows setup. While Chrome OS is a different system, most of the common functions and applications function in the same way as Windows laptops, making the transition very easy.

## **2.5 Chromebook and Google as one**

In discussing Chromebooks and Google Workspace/Classroom, it is important to note that, while Chromebooks are reliant on Google, Google is not limited to Chromebooks. Google applications are available for most devices, even those that run on differing operating systems. Being able to access Google applications ensures that users can gain access to their files and data without the need for a specific device. That being said, Chromebooks' natural integration of Google ensures that the Chromebook and Google's applications work seamlessly together, making Chromebooks the preferred choice for uses that heavily rely on Google, such as education.

While Chromebooks, with its integration of Google provide multiple benefits, there are also some critical limitations that are important to note. As mentioned by Nguyen (2023), as a cloud-based device, the Chromebook relies heavily on internet connectivity for full functionality and full access to files and other features. Additionally, as the device runs on Chrome OS, software designed for other operative systems may not be compatible with a Chromebook. While this limitation may be advantageous in educational settings by restricting access to hostile or distractive applications and software, it can be a limiting factor if a teacher wishes to use certain software that offers functions that the Google counterparts are yet to develop. Chromebooks may have limitations to the average consumer, such as small local storage or being limited to Chrome OS, however, these limitations do not affect the primary educational functions of the device.

Furthermore, as mentioned before, Chromebooks offer seamless integration with Google Workspace/Classroom and thus an enhanced learning environment with better aspects for collaborative learning and communication. However, this creates another limitation as it requires all students, as well as the teacher, to be using the same Google applications to function as implied. As a result of all the aforementioned factors, Chromebooks are usually used as a part of a one-to-one computing initiative.

Google being such an integral part of Chromebooks makes it impossible to research Chromebooks without an exploration of Google's suite of applications, including Workspace and Classroom. Without Chrome OS, and Google's integration in Chromebooks, they would not have become the affordable and collaborative educational tool. As a result, Chromebooks and Google's platform will be viewed as one system throughout this study.

## **2.6 Language learning with computers**

Digital language learning has been a substantial field of research ever since it was first introduced and has come to be named 'computer-assisted language learning' or 'CALL' for short. Using computers for language learning would not be viable if CALL did not provide any benefit above traditional methods.

In 2022, a review of research on CALL was published. Its goal was to make a scientometric review of existing research trends in CALL. A scientometric review consist of a quantitative analysis of scientific literature. A scientometric review uses citation patterns and the frequency of new research within a certain topic to gauge the most important topics and the most significant research papers within those topics.

In the scientometric review conducted by Lim and Aryadoust (2022) reviewed a total of 3697 studies researching CALL dating from 1977 to 2020, with the majority dating from newer years. These studies were collected from all around the world with the United States being the biggest contributor in terms of quantity of studies.

After narrowing down the number of articles to the most frequently researched and cited topics, results of their review showed that most research point at computers having a beneficial effect on students' education. Some of the trends they found were related to multimedia how its use could drastically increase motivation and increase student efficiency. Additionally, they discovered several study results indicating that the computers' possibility for increased variation in classes was a highly effective in creating a learning environment

with heightened motivation and engagement from the students, while its many tools and features could facilitate adapted learning (Lim & Aryadoust, 2022).

The most frequent trends in regard to CALL was the research of writing and writing skill development in students through computers. Most of the studies they reviewed presented results showing an increase in students writing skills after using computer assisted writing for an extended period during their data collection period. These writing skills were measured by both an increase in their grade but also the students themselves feeling and witnessing their development throughout the projects (Lim & Aryadoust, 2022).

Lim and Aryadoust's scientometric review present the usual trends in both research topics and results within CALL studies. While it provides an accurate overview of results and important topics, it does not provide any specific details or new information as they are reviewing existing data and creating it anew.

Sharma (2017) believes that CAL (Computer-assisted instruction), has "the potential to totally transform the education process and remarkably improve efficiency of learning by providing great motivation to kids" (Sharma, 2017, p.104). In her article, Sharma discusses various features of CAL, such as its advantages and various software or methods teacher could employ in their education. Her research is based on learning through computers as a whole rather than focusing on language learning, the article is however still relevant to this study because the methods she discusses are viable for most, if not all subjects.

In her article, one of her sections highlights the many advantages of CAL. By utilizing computers as an educational tool in a one-to-one, the students are able to work individually at their own pace without the interference of other students and remain unaffected by their work as they are constricted to their own devices. Working on computers is also usually more structured as the various digital tools and websites allow for editing and having structural templates, features that would not be possible working or reading by hand. Furthermore, by working on a digital device that has access to the internet, the students are enabled to interact with different topics and concepts directly and freely explore the topics at hand, which would often be a tedious task if done by hand or by reading several books. (Sharma, 2017, p.104).

Additionally, CAL and the features it offers can provide a large amount of scenarios and experiences that would be hard to experience or duplicate in a classroom without digital devices and internet access. By replicating scenarios or experiences through various software such as games, tools, or videos, it saves the teacher time in attempting to create alternative

methods to educate the students in the same areas while providing students with valuable knowledge and education. (Sharma, 2017, p.104).

While Sharma mentions several advantages, there are of course also limitations apparent in CAL. Sharma states that “CAL packages cannot develop manual skills such as handling an apparatus, working with a machine etc” (Sharma, 2017, p.104). While simulations and instructional videos/games are able to provide valuable information, it will not be able to teach the students hands-on experience. Computers can provide similar situations and scenarios digitally which can give students an idea of how machines work, but they will not have received any actual physical experience.

Another limitation Sharma discusses is the education and training of educators to effectively use computers in their educational approaches. She believes that the required training could pose a potential limitation as some teachers would likely rather continue their practice as they always have, making it harder to motivate them to properly learn how to operate and employ new strategies in the classroom. While teachers’ reluctance and missing motivation is usually not a problem, the education and training of teachers requires both time and money which could be a potential problem.

Moving along, she also briefly mentions a few other limitations, most of which refer to various expenses, such as software licensing, outdated software needing updates or new software all together, or the cost of administrative factors such as hiring IT-personnel and so on (Sharma, 2017, p.104). While all of these limitations could be fatal for one-to-one initiatives or CAL, many of these expenses will be removed or reduced by using Chromebooks as opposed to other devices as mentioned earlier.

When it comes to the various software applications and websites for educational purposes, Sharma mentions several different categories, some of which are not as relevant to language learning, which is why I will only present some of the more relevant categories she discusses.

Of the software and approaches she mentions, ‘Drill and Practice’ and ‘Discovery’ are some of most relevant ones for language learning. Drill and practice entails games or tools that allow students to practice through repetition, Sharma compares this process with flashcards. (Sharma, 2017, p.102). This could be activities or software that allow students to practice a certain skill such as grammar repetitively to improve, an example of this would be Grammarly, an app that offers arrange of exercises to help students progress their grammar and vocabulary that offers live feedback on their writing.

Discovery was a category where students were given a task where they are to create a product such as an essay, article, or presentation, where all information is explored and discovered by themselves. These activities are aimed at teaching the students how to explore new information and how to analyze and compare the information before making their product (Sharma, 2017, p.103).

Another study conducted in 2006 was performed in order to research L1 glosses' impact on L2 reading comprehension through CALL. The researcher, Taylor, wished to research the impact traditional first language glosses would have on L2 learners' reading comprehension through the use of CALL, and computers access to fast online information.

The study employed a meta-analysis to review previous and existing research, gathering sources from various databases and comparing their results and their data collection. The results showed that L2 learners' reading comprehension was lower in the absence of any glosses, and the use of L1 glosses proved to be even more effective than L2 glosses. He believed that unknown or complicated words and phrases would be easier to understand in one's mother tongue rather than one's second language, which proved to be correct (Taylor, 2006, p.313-314).

The reading comprehension of L2 learners using glosses would be significantly higher than those without any glosses. While the reading comprehension of the ones who utilized glosses in their first language would be even higher than those who used L2 glosses, though only by a slight margin (Taylor, 2006, p.313-314).

While Taylor's study showed result that heightened reading comprehension when using either L1 or L2 glosses and possibly enhancing the students abilities in research and efficiency in looking up information and unknown phrases, there were some drawbacks some of the studies he reviewed stated that prolonged use of glosses and look-ups of new words could create a necessity and dependance on them, reducing or removing the learners' ability to naturally comprehend new words according to texts and their surrounding context. Using L1 glosses could also reduce L2 learning capabilities in the long run as the learners would use their own mother tongue to comprehend foreign texts and words rather than to expanding their L2 through their lookups or glosses (Taylor, 2006, p.315-316).

## 2.7 Teacher competence in Chromebooks

Teacher competence is important within all areas of education, this includes the use of Chromebooks. To fully utilize Chromebooks' potential, the teachers will have to acquire the proper competence to utilize them. As Valiente mentioned, "Although access is important, it is not sufficient." (Valiente, 2010, p.8). As discussed, a one-to-one initiative requires a clear and unified vision, the teacher therefore needs the proper competence to utilize the Chromebooks in the proper way to turn that vision into reality.

When talking about digital competence in education, the European Commission's 'Digital Competence Framework', or 'DigcompEdu Framework', hereby referred to as DigComp, becomes an important asset. The DigComp consist of 22 different competences, of which 5 are related the learners' competences and the remaining 17 relating to the teachers' competences (Punie, 2017). The 17 teacher competences are divided into 5 areas of teaching competence. Instead of spending time focusing on all 17, I will focus on the 5 competence areas.

*Professional Engagement* – this area relates to the teachers' professional competences in terms of utilizing digital devices to; communication and collaboration with educators, parents, and learners, as well as a focus on self-reflection and improvement (Punie, 2017).

*Digital Resources* – Using, creating, searching, and managing digital resources that are relevant and useful for specific topics while also ensuring that they all adhere to the guidelines for privacy, copyright, and licensing (Punie, 2017).

*Teaching and Learning* – To use, explore and experiment with digital resources, tools, and devices in order to enhance effectiveness of teaching approaches, to actively use the resources to enhance communication and interaction to provide the assistance and guidance needed by one's students, both collectively and individually. To utilize the digital resources and devices to enhance collaboration and provide the learners the opportunities they need to collaborate while also enabling them to work individually at their own pace and explore on their own (Punie, 2017).

*Assessment* – Utilizing digital technologies to collect and analyze learner performance and progress, utilizing digital technologies to provide targeted feedback, based on the collected data. To use digital technologies to conduct both formative and summative assessments (Punie, 2017).



*Empowering learners* – Guaranteeing equal accessibility to all learners including those with special needs, to adjust and account for learners’ digital expectations and abilities as well as any possible misconceptions or cognitive limitations. To effectively use technology to adhere to the individual learner’s needs and abilities. Correctly employing different pedagogical methods and approaches to provide learners with variety in their lectures and enable them to be actively engaged in class (Punie, 2017).

These are the 5 teacher competence areas mentioned by the European Commission. The European Commission also has several tools and sites for evaluating and assessing one’s proficiency within the specific competences and the general competence area, as well as methods and approaches on how to further improve in specific competences.

These 5 areas of competence are all essential and evident in the utilization of Chromebooks and Google’s toolkit. The applications provided by Google offer real-time collaboration and communication, which can be used to efficiently provide students with feedback or as a line of communication with both co-educators and parents. Furthermore, Google Classroom provides a platform suitable for sharing resources, assignments, and conducting assessments. Additionally, the Chromebook’s ability to connect to the Wi-Fi opens access to a vast amount of resources and materials that can be used to further enhance the learning opportunities within the classroom. Mastering the 5 areas of competence and integrating them with a Chromebook’s utilities will therefore result in a richer environment that supports collaborative learning and a platform for vast resources for both learners and educators. The key point here is that Chromebooks will be of maximum benefit for students when teachers have the digital competences to use the laptops effectively.

## **2.8 Teacher beliefs**

When exploring the impact of Chromebooks in education, it is important to explore the teacher’ and learners’ beliefs and perceptions on the matter. As defined by Mohamed (2006), teacher beliefs refer to “a complex, inter-related system of often tacitly held theories, values and assumptions that the teacher deems to be true, and which serve as cognitive filters that interpret new experiences and guide the teacher’s thoughts and behaviour” (p.21). In other words, a teacher’s beliefs, values, and assumptions actively works as a selective filter that can both interpret or ignore incoming information, which can ultimately impact how the teacher

acts in the classroom. As a result, teacher beliefs can impact on the students and their learning outcomes.

As educators' previous experiences and perceptions may function as filters to alter the way they teach or perceive new information, it may also affect students' education. As mentioned by Phipps and Borg (2009), a teachers' own beliefs are often influenced by their experiences and observations throughout their own time spent as learners and are therefore often established before they even attend university. Their beliefs may also have a constant influence on their own long-term teaching practices (Phipps & Borg, 2009, p.381).

Furthermore, Phipps and Borg (2009) states that language teachers' beliefs have a large impact on the pedagogical decisions the teachers make as well as the possibility of affecting the how the teachers themselves learnt during their own education (Phipps & Borg, 2009, p.381).

Because of the many effects of teacher beliefs and how they are often established before attending university, it becomes evident that researching what and how we may affect these beliefs are important. While these beliefs can influence education positively in some aspects where a teacher's beliefs and perceptions have a positive bias toward a topic, which could result in a more engaged and motivated teacher, it may also have a negative effect if a teacher have negative biases towards certain topics. A teacher whose perceptions of technology or Chromebooks are negative, that teacher may interact negatively with these devices and ultimately lead to lower motivation and excitement when these devices are a part of one's lessons, further resulting in contributing to lower motivation and learning output from the students. A teacher's beliefs will in most cases become apparent in their classes, which will affect their students in some way or another.

## **2.9 Learner beliefs**

Having explored the impact of teacher beliefs on the learning environment, it is also equally important to explore the learner beliefs which in turn has a great significance on the individual's motivation and educational progress. Learner beliefs have featured in L2 research since the mid-1990s (Kalaja et al., 2017, p.222). They were first viewed as an important factor that impacted the individual's differences. They then came to be viewed as a crucial feature brought by the learners into the classroom alongside cognitive styles, attitudes, and motivation. Learner beliefs are therefore thought to play a substantial part in the students'

awareness of their own approaches and motivation in learning. (Kalaja et al., 2017, p.222)

Learner beliefs in a L2 sense broadly refers to “the conceptions, ideas and opinions learners have about L2 learning and teaching and language itself.” (Kalaja et al., 2017, p.222).

The early researchers of learner beliefs wanted to discover the differences between a successful and less successful L2 learner. This research led them to discover the importance of learner beliefs. They discovered that “Beliefs would function as a filter, influencing learners’ understanding of themselves, other people, and their surroundings, and thereby become important stimuli for action.” (Kalaja et al., 2017, p.223). Kalaja et al goes on to state that “Beliefs could thus be view to be good indicators of the decisions learners make and influence how they approach the task of learning an L2.” (Kalaja et al., 2017, p.223). In other words, a learner’s perception, experience, and assumptions will be a key factor in which methods and approaches they deem to be sufficient for themselves.

While the first researchers’ conclusions were not directly wrong, it has been a subject for criticism as it generalized learner beliefs and thought it to be static and universal. Newer research has been focused on a more contextual approach that delves into the context and nature of the subjects as a separate part and not ‘L2-beliefs’ as a whole. By viewing and studying the beliefs as a dynamic and changing subject differing for every individual and their experiences, it was discovered that the learner beliefs seem to be integrated with several social and cultural contexts shaped by the learner’s interactions with their peers, teachers, experiences, and learning environment as a whole. (Kalaja et al., 2017, p.224-225). Learner beliefs is therefore an important factor in this study as the students’ beliefs regarding digital tools and chromebooks in L2-education can have a large impact on their motivation and academic progress when using chromebooks and Google in the classroom.

To summarize, a teacher’s beliefs consist of their perceptions, assumptions, and values on given topics, chromebooks for instance. These beliefs can result with the teacher using these beliefs as a bias within the given topic. Beliefs can be both positive and negative, while positive beliefs often lead to a more motivational and energetic teaching style, the opposite can happen as a result of negative beliefs. A teacher’s beliefs are also often conveyed to the students through their approaches and may even be transferred to them. These effects as a whole will in turn affect the whole class. Learner beliefs on the other hand, are also of equal importance. Learner beliefs are similar in nature to teacher beliefs; however, they mostly revolve around and within the individual students. A learner’s beliefs, while not effecting the entire class, will have a major impact on the learner themselves. Even a teacher with positive

beliefs and outstanding class performances with Chromebooks, can struggle to motivate a student with opposite beliefs regarding the device. Therefore, it is important to not only tailor a lecture for a class, but also for the individual students.

## **2.10 Conclusion**

This chapter has provided a comprehensive overview of existing literature exploring various aspects of digital technology in education, particularly Chromebooks and the impact it has on education as well as the role of technology in the classroom. By exploring and reviewing existing literature, the chapter has presented various studies and theories that are important in technology's integration in the classroom.

The revision of existing and prior studies has highlighted potential benefits of technology's integration such as enhanced motivation, efficiency, and engagement from students while also addressing potential limitations such as distractions or digital dependence.

The literature chapter provides a foundation for which subsequent chapters will be built upon. By drawing from the theories and prior literature it is possible to create a framework of which to aim further research and fill in any potential discrepancies.

### **3. Methodology**

#### **3.1 Overview**

In this chapter, I present the methodological framework for this study of the role of Chromebooks in the EFL classroom and explain how I collected and analyzed data. By presenting this information, I aim to provide a clear basis for how the research was conducted while ensuring the collected material's reliability and validity. Additionally, I will also discuss any limitations and ethical considerations encountered during the research process. The goal of this discussion is to provide transparency and validate the research process' integrity. By acknowledging these limitations and considerations, I hope to enhance the reliability of my study, while providing insights for future research.

#### **3.2 Research questions**

The goal of this study was to investigate the utilization of Chromebooks in the lower secondary EFL classroom, while also exploring both student and teacher perceptions surrounding the advantages and challenges associated with their usage. In my search for these answers, I had two main research questions.

**RQ1:** How are Chromebooks utilized by teachers and students during lower secondary English lessons?

**RQ2:** According to teachers and students, what are the benefits and disadvantages of using Chromebooks in English education?

RQ1 explored the different ways teachers and students utilize Chromebooks in the English classroom. The goal is to understand how the Chromebooks are incorporated into the different elements of the learning process from both an educator's and learner's perspective to gain deeper insight into their roles and functions in an educational setting. While RQ1 focused on utilization and practicality, RQ2 aimed uncover the perceptions of both educators and learners to identify the perceived benefits and challenges associated with the utilization of Chromebooks. Studying these perceptions will help uncover how teachers and students react to the varying methods and employed in the classroom and gain a deeper understanding of the impact of Chromebooks in education.

### 3.3 Research Approach

In my search to answer these questions, I employed a mixed methods approach, which involved the use of both qualitative and quantitative methods to gain a holistic overview of the topic. Mixed methods, as defined by Dörnyei (2007, p.24) is a study involving “combinations of qualitative and quantitative research in either the data collection or at the analysis levels”. This study, as such, will contain elements of research and analysis underlying within both the quantitative category (through a questionnaire) as well as the qualitative category (through interviews).

#### 3.3.1 Quantitative research

“Quantitative research involves data collection procedures that result primarily in numerical data which is then analyzed primarily by statistical methods” (Dörnyei, 2007, p.24).

Quantitative research is typically conducted through structured data collection such as surveys, observations, or experiments. This data is then analyzed statistically with goal of identifying trends, patterns, or generalized data that can be used to make predictions, evaluations, decision making, etc., depending on what the data is purposed for.

A quantitative research approach offers both benefits and limitations. One of its primary strengths lies in the systematic and efficient data collection process gained through the usage of structured collection methods such as questionnaires. These methods enable the researchers to gather data from multiple participants simultaneously, ultimately streamlining the collection process. These structured methods also contribute to simplify and accelerate the statistical analysis of the collected data. The analysis process is often conducted using specialized software, increasing efficiency and accuracy even further. Additionally, quantitative research benefits from its built-in credibility originating from its numerical data, further strengthening the validity of the results (Dörnyei, 2007, p.32-35; Creswell & Creswell, 2018, p.49-50).

The downside of quantitative methods stems from the method’s tendency of averaging the responses and generalizing them upon analyzation. This means that the results represent the collective average response from all participants rather than accounting for individual participant nuances. Consequently, individuals who fall outside of this collective average are not adequately accounted for. Furthermore, quantitative methods may struggle to gather

detailed information due to their numerical structure. While quantitative methods excel at efficient and accurate generalization and average participant response, they fall short of detailed responses, overlooking individual nuances and participants experiences, limiting their ability to uncover potential underlying factors (Dörnyei, 2007, p.32-35).

### 3.3.2 Qualitative research

*Qualitative research* is a research approach used primarily to uncover more detailed and nuanced insights, exploring various individual perspectives and experiences. Qualitative research according to Dörnyei (2007, p24) involves ‘‘data collection procedures that result primarily in open-ended, non-numerical data which is then analyzed primarily by non-statistical methods’’. Typical open-ended qualitative methods consist of interviews, focus groups, or case studies. These methods are often employed to gain a deeper understanding of certain topics or to gather a more detailed sample of the participants experiences and nuances.

Qualitative methods’ primary strengths lie in their ability to gather detailed information and the possibility of deeper exploration. Using open-ended data collection methods, participants are enabled to discuss and elaborate on their experiences and reasonings, providing more nuances and deeper insights into the topic at hand. Methods such as interviews allow the researchers to actively ask follow-up questions or request clarifications to previous answers, leading to more accurate and insightful information. Quantitative methods, as mentioned, often overlook these nuances, and fail to gain insight into the reasons behind certain responses. However, the use of qualitative methods enables the researchers to explore these nuances and delve into underlying factors (Dörnyei, 2007, p.35-42; Johnson & Christensen, 2017, p.132-137).

While qualitative methods offer valuable insights, they also have weaknesses. Conducting qualitative research methods will present valuable information and access to detailed explorations of individual nuances and experiences. However, these methods are extremely time-consuming and labor-intensive. For instance, an in-depth interview can take between 40-80 minutes, and case studies as long as several weeks. Consequently, the sample sizes tend to be limited due to time constraints making it impractical to collect data from a larger number of participants. As a result, qualitative methods’ generalizability is often criticized, as a smaller sample size decreases the likelihood of the study to apply to a larger population (Dörnyei, 2007, p.35-42; Johnson & Christensen, 2017, p.132-137).

### 3.3.3 Mixed methods research

*Mixed method research*, as mentioned previously, combines both quantitative and qualitative approaches to leverage the strengths of each other while eliminating their weaknesses. Quantitative research emphasizes numerical data and statistical analysis which offer structured and standardized data which creates generalizations across certain groups. Qualitative research on the other hand, emphasizes the nuances of the participants experiences and perspectives, providing deeper insight and understanding than numerical studies are capable of. By combining both approaches, mixed methods research enables the researchers to achieve a comprehensive understanding of the research topic by providing a wider range of perspectives, enhancing the study's validity (Dörnyei, 2007, p.42-46; Johnson & Christensen, 2017, p.139-140).

A quantitative study's weakness of overlooking nuances, individual experiences, and reasons can be nullified by conducting qualitative interviews to ask follow-up question based on the results of the quantitative research to uncover underlying motivations and reasoning behind the results. Qualitative studies can save time by employing a quantitative survey for numerical questions, eliminating the need to research numerical factors during their qualitative research. Additionally, by employing both methods, researchers can confirm and strengthen their findings by cross-referencing their result from both methods' result, strengthening the study's credibility (Dörnyei, 2007, p.42-46; Johnson & Christensen, 2017, p.139-140).

While mixed methods research can use the strengths of each method to eliminate each other's downsides, it requires the researcher to be sufficiently knowledgeable in both methods. An inexperienced researcher might struggle to efficiently employ the methods in line with each other or spend too little time understanding how to sufficiently use them together. Therefore, while mixed methods research has the potential to provide valuable insight, it requires a certain level of expertise to execute appropriately (Dörnyei, 2007, p.46; Johnson & Christensen, 2017, p.139-140).

In this study, as I wish to explore not only how Chromebooks are utilized, but also gain insights into the participants perception of Chromebook, using mixed methods is the preferred research method as it will provide valuable detailed information through interviews and structured statistics through questionnaires. The interviews conducted in this study are aimed at English teachers actively using Chromebooks in their lessons to collect detailed data



on how the teachers use Chromebooks to educate their students and what their experiences have been in doing so. The questionnaire on the other hand is aimed at students who actively use Chromebooks in their English lessons to collect statistical data regarding their utilization, perception, and overall opinion on chromebooks as a tool for education.

### **3.4 Interview design**

As this study wishes to uncover a more detailed description of how teacher utilized Chromebooks in the classroom as well as some of the deeper nuances and perceptions related to the use of Chromebooks, a data collection method that enables a more open discussion is important. As a result, chose to use interviews. Depending on their design, interviews can be utilized to both collect data based on a set script as well as providing the opportunity to dive deeper into certain responses and topics uncovered during the interview.

The interviews conducted in this study were semi-structured, meaning they had a set of prepared questions to be answered for each interviewee, but contained the flexibility to ask follow-up questions should the response require further clarification or details. This provided a basis for deeper understanding into the interviewees' perspectives and experiences, which can be valuable information in my research (Brinkmann & Kvale, 2018, p.64). I chose this structure to ensure a coherence between the set question structured between the interviewees while also providing the possibility to explore deeper into certain areas if the responses allow it.

Brinkmann and Kvale (2018) and Galetta (2013) discuss in depth how to design a semi-structured interview, and how to develop the questions for the scripted section. When making the questions/script, it is important to consider several factors. The questions need to serve a purpose for your research. The questions within the interview need to be connected to the research topic, ensuring responses that provide valuable data to serve your research and aid your research objectives. Furthermore, using open-ended questions is an important factor to ensure that the participants can properly express themselves and talk freely without feeling a need to stay within a certain area. It is however still important to keep the questions brief and simple for the participants to fully understand the questions and avoid any misunderstandings. Lastly, it is also important for the interviewer to be flexible and not stick too strictly to the script. Deviating from the script to ask follow-up question can gather valuable data and insights that the interviewee

otherwise would not reveal (Brinkmann & Kvale, 2018, p.64-72; Galetta, 2013, chapter 1). In line with the guidance provided by Brinkmann and Kvale (2018) and Galetta (2013), I formulated my own interview questions, ensuring they align with my research objective. By utilizing insights from the literature, I formulated questions designed to provide the participants with open-ended responses, allowing them to freely describe their methods, perceptions, and opinions. The interviews were also conducted in the interviewees' mother tongue, Norwegian, to account for any possible language barriers as well as providing a better opportunity for the participants to express themselves fluently.

The scripted part of the interviews consisted of 25 questions, each divided into distinct sections focusing on essential questions to ensure coherence and consistency throughout all three interviews. These were 'Experience and digital teaching competence', 'Chromebook integration', 'Benefits and challenges', 'Chromebooks in language learning', and 'Student interaction'. For a detailed list of the specific questions, refer to Appendix 1.

### 3.4.1 Interview participants

I had three main criteria for participants for my interviews. Firstly, they needed to be an English teacher, second, they had to teach in the lower secondary level, and lastly, the school they teach at needed to be employing a one-to-one computing initiative that utilizes Chromebooks as its main device.

I found my participants by contacting co-teachers at the school where I work as a substitute teacher, as well as contacting multiple schools in my local area that fit my criteria through email. In my search for participants, I found one from my workplace, who also gave me the contact information for another teacher that was interested in participating. From the emails I sent to the local school I received one response, totaling in three interview participants that filled my criteria. In an attempt to find even more participants, I also tried reaching out to a few schools outside of my district for online interviews which did not yield any results. Overall, then, my sampling procedure for the interviews was purposive (I had some broad criteria in mind) but also convenience-based in that I did not have a larger pool of teachers to select from and had to work with those who were available.

### 3.4.2 Interview procedure

Before the interviews took place, the participants were sent a consent form entailing basic information regarding my study, what the goal of my study was, and how the information I collect would be used. The form also provided a page where the participant would sign off on their consent to participate and whether they allowed me to record the audio of the interview. To make sure these forms were signed by the participants, I brought physical copies with me and had them sign the form by hand on site. I also performed a pilot interview with one of my fellow master's students to test the effectiveness of my questions and refine the interview process which proved that a few questions were too broad and needed to be narrowed down, while some questions overlapped and could be altered for a smoother experience. All the interviews took place face-to-face and were conducted after the participant had signed the form. All the interviewees agreed to be audio recorded. For recording audio, I used the mobile app "Diktafon" developed by the University of Oslo which is directly connected to a website designed to make questionnaires and surveys, as well as storing interview recordings safely called "Nettskjema", also developed by the University of Oslo. This website is approved for use by the University of Stavanger and includes features such as an automatic transcription tool. To gain access to my surveys and interview files, my own personal student identification and password is needed.

The interviews were located in the respective participant's workplace, where we utilized a private and room for only the two of us for the duration of the interview. The length of the interviews ranged from 34 to 46 minutes.

The interviews were scheduled with a minimum of one week after another, allowing me to review whether the questions I asked provided the wanted effects and information. This gave me the opportunity to modify questions that did not fully attain the wanted knowledge, or add questions based on discoveries from prior interviews. It also gave me the opportunity to review my own abilities as an interviewer and possibly improve for the next one. For instance, some questions were expressed in a way teachers would find confusing, which prompted me to change the question design to make them more intuitive for the next participant. Another issues that appeared during the interviews were my own lack of experience which lead to some of the questions being formulated in a confusing manner, necessitating a need to practice or reformulate question before the next interview.

### 3.5 Questionnaire design

In alignment with SIKT's guidelines, a questionnaire that remains anonymous and avoids collecting any personal or identifiable information, does not require parental consent. As such, providing a brief description of the questionnaire's purpose and data usage will suffice for ethical considerations. The questionnaire used in this study was an online questionnaire designed on 'Nettskjema'. This digital approach circumvented multiple time-consuming limitations usually associated with qualitative alternatives. This approach also allowed swift distribution of the questionnaire for participants to answer at their convenience, reducing potential scheduling conflicts. Overall, the use of a questionnaire reduced the number of steps and time needed to conduct my data collection considering the age and circumstances of the participants. It also made it possible to distribute the questionnaire without any scheduling issues and allows the participants to participate simultaneously.

The goal of the questionnaire was to collect information from students regarding the use of Chromebooks, mainly, their opinions, perceptions, and preferred usage. The way Chromebooks are utilized in class is mostly dictated by the teacher, therefore, I wish to explore any potential patterns in the students' thoughts on these methods and how they respond to them. To achieve this, I used a mix between close-ended and open-ended questions, with the former being dominant throughout the questionnaire. While designing my questionnaire and formulating questions, I followed the guidelines established by Dörnyei (2010) and Gillham (2007).

According to Dörnyei (2010) and Gillham (2007), both close-ended and open-ended questions offer distinct advantages. Close-ended questions are characterized by predetermined response options from which participants choose one or more depending on the exact format. This format is ideal for designing quick, low effort surveys. Additionally, close-ended questions excel at gathering quantitative data, allowing for fast and simple analyzation to quantify responses. It is however important to note that close-ended questions lack the ability to gather detailed and subjective information (Dörnyei, 2010, p.11-59; Gillham, 2007, p.25-36).

In contrast, Open-ended questions provide participants room to freely answer questions as they please without being limited to predetermined responses. This format encourages the respondents to elaborate and express their perceptions and experiences in their answers, allowing for more detailed and nuanced insight. As a result, open-ended questions

excel at exploring more complex and subjective topics, however, they also demand more time for analyzation and increased effort from participants (Dörnyei, 2010, chapter 2; Gillham, 2007, chapter 3).

Overall, choosing between open-ended questions and close-ended questions depends on the type of data sought by the researcher. Close-ended questions efficiently gather quantitative data to review numerical trends, while open-ended questions offer the possibility of collecting nuanced information based on participants perceptions and experiences.

Dörnyei (2010) highlights an important consideration when utilizing open-ended questions, they demand more effort and time from participants compared to close-ended questions. The increase in demanded time and effort can therefore potentially lead to disengagement or hasty responses. This is especially apparent in voluntary surveys where participants have no intrinsic motivation to complete the questionnaire.

This issue is particularly relevant in my study, targeting lower secondary students. As adolescents, they have limited attention spans, making them more susceptible to a loss of motivation when facing open-ended questions. It was therefore important to ensure that my questionnaire design conserves the engagement of it targeted demographic.

A common way to address this issue is to intersperse the open-ended questions throughout the questionnaire, spacing them out to reduce participant fatigue. Dörnyei (2010) also advises researchers to refrain from presenting open-ended questions at the beginning of the questionnaire, allowing participants to become more invested before being facing more demanding questions. Additionally, employing a Likert scale offers an effective alternative to open-ended question while still providing more detailed responses.

Rating scales are commonly used elements within questionnaires as they are able to capture nuanced and personalized information while still functioning as closed-ended questions. Among the several scaling techniques, the Likert scale is the most common one. A Likert scale is most often used in accordance with a series of statements where the participants are asked to indicate to which degree they agree or disagree with said statement (Dörnyei, 2010, p.26-33).

*Example of Likert scale:*

Academic writing is easier on Chromebook than by hand.

Strongly Agree – Disagree – Neither agree nor disagree – Agree – Strongly agree

The nature of such a question is close ended, yet it still provides the researcher with a nuanced perspective from the participant on said topic. The format of the Likert scale can also be altered to better suit a specific study. For instance, the researcher can change the number of responses to gain a more accurate description of the participants thoughts, the amount can also be reduced. When altering the number of responses, it is important to consider what the change implies. If there are too many responses the participants might get overwhelmed. The question of whether the amount should be even or odd is also an important factor. An odd number of responses implies the usage of a neutral response which can often be useful for participants who are uncertain, however, it also poses a risk for participants to hastily use the neutral response to finish the survey (Dörnyei, 2010, p.26-33).

In developing my questionnaire, I followed the guidelines proposed by Dörnyei (2010) and Gillham (2007). The questions were crafted to cater lower secondary students, with a focus on clarity and relevance to my research topic. To facilitate comprehensive responses, yet catering to the participants, I mainly utilized close-ended questions, some of which utilized the Likert scale format to capture nuanced perceptions. By opting for four responses on the Likert scale, I intentionally removed the neutral response to encourage participants to express their opinions while reducing hurried responses. Open-ended questions were strategically used for clarification purposes to complement earlier close-ended questions to gather further details. These open-ended questions were also categorized as non-obligatory to sustain participation engagement by reducing the response burden for those may have had nothing further to add.

The students were asked a total of 20 questions, similarly to the interviews, these questions were divided into sub sections, 'experience', 'Chromebook usage', 'Benefits and challenges', 'preferences' and 'Chromebook satisfaction and motivation'. For a detailed list of the questions refer to Appendix 2.

### 3.5.1 Questionnaire participants

The participants for my questionnaire were lower secondary students in 8<sup>th</sup> to 10<sup>th</sup> grade, ranging from 13 to 16 years old. The criteria for the selection of students in these grades was that they were in classes where Chromebooks are routinely used within their school environment, including for English lessons.

To recruit participants, I contacted teachers who had students that met the specified criteria and asked them to conduct the questionnaire in their classroom. I presented the questionnaire to the teacher participants in my interviews to conduct in their classroom and sent emails to local qualified schools containing the same request. I also posted my questionnaire along with participation requirements on two Facebook groups dedicated to English teachers in Norway totaling 5 000 members after gaining permission from the administrators. The questionnaire totaled 131 respondents.

### **3.6 Data analysis**

The analysis process was divided into two main sections, qualitative analysis, and quantitative analysis. The qualitative analysis of the interviews focused on identifying patterns through recurring themes and exploration of teacher experience to gain a deeper understanding of the implications of the integration of Chromebooks in education. The quantitative analysis of the questionnaire responses involved summarizing responses and reviewing the numerical results which indicated the response of the average student, generalizing the responses as well as an analysis of the open-ended questions.

#### **3.6.1 Interview analysis**

The interview analysis was a long process that was divided into smaller sections, first, the interviews were transcribed to ensure no information went missing. Then, the interviews were analyzed individually using both the audio recordings and transcribed documents to categorize the information of each interview into the appropriate category based on the categories mentioned in the interview design, ‘Experience and digital teaching competence’, ‘Chromebook integration’, ‘Benefits and challenges’, ‘Chromebooks in language learning’, and ‘Student interaction’.

When the individual analysis of each interview was finished, the results were compared in order to find any potential patterns, trend, or differences that would be valuable to the study.

### 3.6.2 Questionnaire analysis

The questionnaire analysis was separated into two processes. Firstly, an analysis of the numerical and standard questionnaire results, and secondly, the two open-ended questions.

The questionnaire results were first summarized and presented through graphs and numbers to be analyzed accordingly. One of the features provided by 'Nettskjema' is related to the summary and presentation of results. By using these features the responses are easily summarized and placed into the corresponding categories. 'Nettskjema' also provides the option to present results according to number, percentages, or even graphs.

The results were summarized and presented through both percentages and graphs to be analyzed. The results of each question were then analyzed and compared according to their category in an attempt to locate any trends or patterns among the student responses.

After analyzing the numerical responses, the open-ended questions were separated into a new document to be reviewed, the responses were then filtered to remove any questions that were irrelevant or did not contribute any valuable information. The remaining responses were then analyzed and compared to each other in order to find any potential trends or valuable nuanced input that would be hard to locate in the numerical section.

Lastly the results of the questionnaire were compared to the results of the interviews to locate any similarities between the teachers' and students' perceptions as well as teacher observations and students' experiences.

## 3.7 Ethical considerations

In accordance with SIKT's ethical standards for research in Norway, this study was conducted within the guidelines for ethical considerations. All participants from both the interviews and questionnaires were assured their answers were anonymized. I also successfully applied for approval to start my data collection from SIKT by providing a proper interview guide, and a detailed process of how I would keep the information confidential.

For the interviews with the teachers, they were informed of the study's purpose and confidentiality measures. They were also informed of the study's voluntary nature, meaning they can withdraw their information from the study if they so wish. The questions were



designed in a way that would not reveal any identification information and any information used within the study would be anonymized. The participants were also given a consent form to ensure they consented to the interview and for their anonymous information to be used within the study as well as an audio recording of the interviews.

According to SIKT's guidelines, the questionnaire did not need to receive consent from the students' parents or guardians if the questionnaire contained no element of personal information. To ensure the anonymity of the questionnaire, I made sure to include a section in the introduction of the questionnaire as well as informing the students teachers that the questionnaire was to be completely anonymous and not to share any personal information in any of the questions. The students were also informed that the questionnaire was voluntary and that they could withdraw from the questionnaire at any time wanted without consequence.

Throughout the collection process and the duration of the study, any information collected is stored securely within Nettskjema. Careful consideration was also given to the wording questions to make sure no personal information was collected and to ensure the data was sufficiently processed before usage in the study, removing any identifiable information.

Overall, this study was conducted in accordance with SIKT's guidelines for research in Norway and anonymity. All participants were assured confidentiality and anonymity. The study also gained approval from SIKT to start data collection.

### **3.8 Conclusion**

To summarize, the present thesis applied a mixed methods approach for data collection. The employed methods were teacher interviews and a student questionnaire. The participants of both methods were active participants in a one-to-one Chromebook initiative and were either English teachers or learners. The interviews were semi structured to ensure all three interviewees were asked the same vital questions while also providing a platform for follow-up questions. The questionnaire consisted of mostly numerical questions to retain the students' focus, utilizing close-ended questions, some of which were presented in a Likert scale form. The questionnaire also contained two non-obligatory open-ended questions to gather nuanced and detailed information.

## **4. Results**

### **4.1 Introduction**

In this chapter I present the results of my study into the utilization of Chromebooks in the lower secondary EFL classroom and the associated perceptions of both teachers and students. My research questions were:

**RQ1:** How are Chromebooks utilized by teachers and students during lower secondary English lessons?

**RQ2:** According to teachers and students, what are the benefits and disadvantages of using Chromebooks in English education?

To answer these questions, I conducted interviews with English educators to explore their utilization of Chromebooks in English education as well as their experiences, opinions, and perceptions of the Chromebook itself. I also conducted questionnaires with students to gather information about their experiences and opinions on Chromebooks.

I will start by presenting the results of each teacher interview individually before comparing and summarizing the interviews as a whole. I will then present the results of the questionnaire before comparing the results of the questionnaire with the interviews.

### **4.2 Interview 1**

The first interviewee, hereby referred to by the alias of Emily, was a newly qualified teacher with one year of experience. She also mentioned working for multiple years as a substitute teacher throughout her education, primarily at the same school she where she is currently employed. The school has been implementing a one-to-one initiative with Chromebooks for as long as she has been present, making her familiar and well-experienced with Chromebooks.

When asked if she had received any training or professional guidance to prepare herself for handling Chromebooks and their many tools, Emily replied, “absolutely none, it went like; here is your Chromebook, here is your login details, we use Google Disc and Classroom. And that was it.” Emily was also asked if she had received any kind of training or guidance in regard to other sorts of digital devices or tools commonly used in her school, to which she stated: “No, I haven’t received any sort of guidance or instruction on how to use any of our devices, it’s almost as if I’m expected to have this knowledge already.” These

responses suggest that there were no specific measures in place for orienting or educating teachers in the use of Chromebooks.

Further questions revealed that, though Emily did not receive any special training, she could always ask her co-workers or even her students if she needed any help concerning the Chromebook. However, she feared that “my lack of experience and training has led to missing out on certain useful tools,” and it is certainly the case that without a proper course or walkthrough of the device and its tools, there is a chance that new users will be unaware of certain functions that would provide beneficial effect for education. That said, Emily still stated that “Chromebooks are not at all hard to understand or handle, I have rarely needed to ask for help, only when it comes to using new websites and tools,” a statement that highlights the user friendliness of Chromebooks. However, despite its user friendliness and similarity to standard Windows computers, certain applications and features remain hidden or challenging without proper training.

Technology is always advancing, new and old features are constantly added and tweaked to obtain peak efficiency and to enhance the user experience. When asked if she stays up to date on new updates and features to Chromebooks and/or other educational technology, Emily explained, “As a fresh teacher, the new environment and the amount of work is enough to wrap my head around, so it’s hard to keep up to date with new technologies at the same time, but I try my best to stay.” Emily seemed to point at the amount of work and focus required to get into all the necessary topics at hand as a newly qualified teacher, keeping up to date with new technology and Chromebook updates on her own would be too demanding.

When it comes to utilizing Chromebooks in class, Emily reiterated that she is newly educated and does not have what would be considered extensive experience in the field and is thus still exploring the devices she uses. However, she had tried a few different approaches. She had also experimented with using a more traditional approach of pen and paper as opposed to using Chromebooks. When asked about the effect and outcome of the traditional vs. Chromebook experiment, Emily says that “There is little to no difference in the effort and motivation from the students between the two methods, but I notice they tend to write shorter sentences and have worse grammar when writing by hand.” Emily also mentioned that the lower quality grammar seen on paper could be a cause of the students’ reliance on built-in spelling/grammar correction programs provided by Chromebooks. This indicates that students’ writing skills might become so dependent on correction tools that they might fail to

recognize their own mistakes themselves, or simply ignore mistakes, expecting the correction system to either correct or point these out. This results in less correct grammar in the absence of such features.

When asked further about Chromebook, and more specifically how the presence of Chromebooks affects her lesson planning, Emily delved into some of the basic functions of a Chromebook that she always had to consider. Since all the students were working on their Chromebooks, all information, tasks, and additional documents/sources had to be published in their corresponding subject folder for easy access. Consequently, she always had to make sure that any resources and tasks necessary for the lesson were published and functioning ahead of time for the lesson to proceed smoothly.

Additionally, any group activities need careful consideration depending on the task. Would the students work separately in a shared document, or would they work together on one computer, for example? Emily emphasizes that “the main factor to consider when I plan lessons is that all of my students work on Chromebooks, so unless I wish to change their usual lesson dynamic, I have to make sure my lesson is compatible with Chromebooks.” She implies that most tasks are performed on Chromebooks due to their multifunctionality and availability in the classroom, necessitating tasks to be compatible with Chromebooks. As such, being the students’ main tool in the classroom, the Chromebook demands any task from sharing information to planning groupwork to be planned in line with its features.

Lesson planning is not the only aspect of a typical lesson that is altered by the presence of Chromebooks. “Everything being prepared beforehand and published on classroom before the lesson makes it easier to start my lessons as the students already know where to find their tasks and information, all I have to do is tell them to start.” Emily firmly believes that information and tasks being gathered in the same application, Google Classroom, makes it easier for students to get started on their tasks and find information as they are already used to it. However, one common occurrence is “the occasional student or students that struggle to login or has forgotten to charge their laptop ahead of time,” an occurrence that often demands extra attention and will put the student(s) in question further behind the other on working on the tasks at hand.

There is also a trend of students working in their own ‘bubble’ - “the students often work by themselves, or if they work in groups, they will just contain themselves within their group, making it feel like the class isn’t working together as a class, but rather in their own bubbles.” As the students are working on their Chromebooks, they tend to focus entirely on

what happens inside the screen and subconsciously block out the surroundings. This ‘bubble’ can be further enabled by the features of a Chromebook where any potential issues or problems can be solved by searching for the answer online without the need to ‘exit the bubble’ to ask for help.

Though Emily was a newly qualified teacher, she has already explored various educational methods centering the Chromebook. “I have tried methods such as scripting, recording, and editing videos, creating presentations and reading e-books.” In her lessons, Emily has employed a variety of methods utilizing the functions of a Chromebook. Exploring and investigating topics and sculpting the result into a recorded and edited video or making a presentation. She has also used methods that require the students to research, take notes, and transform information into a product, often in a verbal and or visual way.

While she mentioned several methods she has used with Chromebooks, the most common method is simply writing. “Whenever the students are writing, we always write on Chromebooks, its very easy to just make a new Google doc and start writing, whether it’s a small text, a graded paper, anything that requires writing: Chromebook.” These writing methods could be anything from casual writing tasks such as making a blog post, comic strips, or writing a log, to the more formal tasks such as writing a short essay, book review, or news article. The students also often utilized the Chromebooks for researching the topics at hand, as a tool for finding information to answer questions or gather data to write about.

Chromebooks offer numerous educational approaches, however, Emily found Chromebook to be limited in enhancing verbal skills. According to Emily, “The Chromebooks are useful for writing and reading, but it doesn’t make the students talk.” Her observation underscores the challenge of encouraging oral communication using Chromebooks. Despite the possibility for online communication and audio recordings, Emily suggested that traditional activities such as games, debates, and discussions are more effective in encouraging verbal interaction between students. As such, she implied that Chromebooks are better suited for reading and writing activities than oral communication.

When it comes to the Chromebook itself, Emily believed that one of its strongest benefits lie in its versatility and vast opportunities, “The features of a Chromebook provide students the freedom to complete tasks in a variety of ways, such as podcast, video, presentation, essay, or even blogposts.” The many applications of a Chromebook allow for several methods to approach tasks, All within a single device. Chromebooks facilitate all of these features while remaining small and portable nature, which allows for easy relocation

while eliminating the need for dedicated computer rooms. “I enjoy giving my students the freedom to take their Chromebooks to work in a new location to change the environment, its one of the benefits of not being confined to a computer room.”

Emily also mentioned the disparities among students’ background and home situations, with emphasis on the varying access to educational resources. “Being able to provide all students with a Chromebook and giving them equal opportunities in education is one of the big advantages of Chromebook initiatives in education,” she explained. Chromebook initiatives reduce this disparity by providing their students equal access to educational resources.

Given Chromebooks have plenty of uses and opportunities, it sounds natural that Chromebooks should enhance student motivation. However, when asked about student motivation while using Chromebooks, Emily stated that “I don’t really see a difference in motivation between Chromebook and other education.” Her statement indicates that, while the device is a useful tool with a plethora of opportunities, its presence does not motivate the students. Emily believed that the motivation would rather stem from the lesson plan, “I have observed student motivation to be connected more closely to the lesson plan than to Chromebook usage, but in making a motivating lesson plan, Chromebooks offers more options than traditional methods.” As per her statement, Emily believed that student motivation is influenced by exciting and varying lesson plans. However, she also believed that a Chromebook offer more room for innovative and motivating lesson plans than traditional approaches.

The possibility of using a Chromebook as a tool for most tasks can be both beneficial, yet also a challenge. “We have become a bit too reliant on Chromebooks at times. If a student has forgotten their device at home, they basically don’t have their writing tool or even the ability to search for information”. This implies that once a student has forgotten their device, has issues logging in, or has forgotten to charge their laptop, they are unable to perform the tasks in class, and given most information is also published in classroom, there are no by-hand alternatives. Emily also mentioned that she often had to “plan lessons starting with the Chromebook as the starting point, and struggle to plan a lesson that is taking place outside of the digital classroom.” Becoming so reliant on the Chromebook in every activity may lead to a situation where the Chromebooks are no longer a tool, but a necessity.

Another issue Emily often met while utilizing Chromebooks were students who kept playing games or watching videos instead of working, something she found hard to supervise

as she does not possess the ability to watch all of the students' screens simultaneously. "The best I can do to prevent this is to walk around the classroom and watch the students' activity, or possibly give them a warning, the furthest I can go is to confiscate their Chromebook."

Overall, Emily found Chromebooks to be a valuable tool that, if used correctly, can enhance the students' learning output through various means, such as the various applications and features for completing tasks, the ease of sharing documents, having access to a vast toolbelt in one portable device. However, she believed her lessons had become heavily reliant on Chromebooks, which could be a challenge when students did not have access to their device. It could also post a challenge in trying to plan a lesson devoid of Chromebooks. "Overall, I believe that Chromebooks is a very important and valuable tool that can improve learning output, not only language skills, but most writing skills and research skills too, *if* used correctly."

#### **4.3 Interview 2**

The second interviewee, hereby referred to by the alias of Anna, is a seasoned teacher with 17 years of experience. Out of Anna's 17 years of teaching, she has worked at the same school, a school that implemented a one-to-one computing initiative in 2014, giving her 10 years of experience with computer-based teaching. The first year of this one-to-one computing initiative was however, executed with a mix of standard Windows laptops and tablets. These devices were, however, exchanged for Chromebooks the next year, though Anna mentioned "I used the Google system and applications on all of the devices, so for me, using Chromebooks versus Windows laptops and iPads did not make much of a difference." Anna claimed that the difference between Chromebooks and other devices was not that big if Google's systems were used on the regular devices. It is also important to note that Anna's reference to an 'iPad' was referring to Google compatible tablets, and not the actual iPad product provided by Apple. Anna also claimed to be more invested and possibly more educated in this area than the average teacher given she had a master's degree in 'ICT in an education setting'.

In her interview, like Emily, Anna stated that she did not receive any training in using Chromebooks or Google's systems. This implies that even as her workplace went from having zero personal devices, to implementing a one-to-one initiative, there was no additional training for any of their teachers. However, Anna found it important to mention that "I was in the forefront of implementing the new digital initiative, as such I found it important to train

myself so I could help others use the devices as the valuable tools they are.” Anna claimed that her ‘above average’ interest in the topic fueled her to train herself and use her knowledge to guide other teachers to unlock the potential of Chromebooks. Her interest naturally also kept her up to date on new features and additions in Google’s systems.

When asked about the administration and their stance on training and the use of Chromebooks in class, Anna replied “The administration has started offering voluntary basic courses for teachers to familiarize themselves with the Chromebooks.” Her response meant that the administration, in newer years, had set up courses for those who wish further training, an initiative originating from the teachers’ requests. Anna also stated that she herself was the ‘tutor’ in some of these courses. Additionally, when asked about the administration’s stance on the use of Chromebooks in class and whether they encouraged teachers to use or explore their devices in their lessons, Anna stated “It’s not encouraged, they have to.” Chromebook has become such an integral part of their education that the teachers simply could not ignore them. Several subjects did not have dedicated material in physical copies and required online platforms. Any information and document sharing happened in Google’s systems, such as classroom. This results in a Chromebook becoming a necessity.

Planning lessons can be a complicated endeavor requiring a vast amount of effort, though, after 17 years, the process had become quite streamlined for Anna. Her 10 years of experience using Chromebooks and Google in her lessons has also made her planning revolving Chromebooks quite natural. The main aspect of lesson planning for Anna was “planning or inventing new or efficient ways to utilize the Chromebook to create variety in the students’ lessons.” Anna implied that her years of experience has led to a more natural and subconscious inclusion of Chromebooks in her planning, but her main struggle was planning a lesson with variety in mind. She went on to elaborate that she experienced an increase in possibilities and activities when using Chromebooks, which made easier for her to include variety in her lessons. Apart from variety, Anna briefly mentioned the organization of classroom, distribution of files, and finding appropriate websites and articles, all of which were aspects she normally did not have to put much thought into after doing it for so many years.

When it came to the execution of her lessons, she noted that Chromebook has several functions within the classroom. “As we use Chromebooks for a majority of our tasks, it contributes to saving time and focus by removing the need for many additional physical needs, such as searching for books, pencils, and the like.” Having most, if not all of the



required tools to execute a lesson in one device, it removes the time and need for additional tools or activities that can be time consuming in the long run, Anna mentioned some of them: “Sharpening pencils, borrowing or searching for books, or a trip to the school library.” Additionally, Chromebooks brought multiple new features to the classroom that Anna observed to motivate the students, “I have observed having access to the internet and several different tools enables the students to be more independent in many of their tasks, which seems to motivate them.”

Furthermore, after the one-to-one initiative, Anna found students to write more compared to when they had to write by hand. She observed an increase in students actively taking notes, something she attributed to easy and fast process of creating or opening documents. She also stated that students’ feedback, as well as her observations proved that “the students write faster and more efficiently on their computers than by hand.”

Anna noted that “many students tend to get distracted and start playing games or go online shopping.” In an attempt to reduce the number of distracted students, Anna rearranged the classroom in a way that made the students’ screen face her desk. “Fewer students dare to wander around on gaming and shopping websites if they know I can view their screens.” She did however also mention that distracted students is not an occurrence originating from the Chromebooks as she had witnessed her fair share of distracted students before her school began their computing initiative. “The ones who want to avoid working will find a way no matter if they have a Chromebook or not, but the Chromebook contains more distractions than traditional methods.” Anna implied that the Chromebook does not necessarily cause students to become distracted, but the number of distractions offered by the internet was vaster than those of the pre-digital era.

When discussing specific methods for utilizing Chromebooks, Anna mentioned several. “The most common usage of the Chromebook is writing, all written tasks are performed on Chromebooks, I attempt to create variety by occasionally having them write blogposts, newsletters, or essays.” When it comes to English, Anna mentioned a focus on oral skills and to accomplish oral development through Chromebooks she takes advantage of recording features, both video and audio. “I often make the students produce podcasts or documentaries. Sometimes they also make presentations to either present in class or record.” In making documentaries and podcasts, Anna believed that the students got to explore various topics, while also improving their oral skills and vocabulary by having them record and edit the footage or audio into exciting clips to present in class.

Apart from these methods, Anna also used an approach where she would give her students notes with discussion topics; the students were then to discuss the topics and record their conversations. The students would then review their own discussions later to review their vocabulary, fluency, and pronunciation. Her group assignments would also often take the form of working on a single device as she felt this would increase the amount of discussion and cooperation, as she has observed students often ‘cooperate’ by working individually in one shared document, in the belief that they were working together.

When asked about a Chromebooks’ ability to enhance language learning, Anna firmly believed that the device had several features that served to enhance language learning such as, “spelling software, access to countless text and articles of all learner levels, a vast library of documentaries and audio recordings to both enhance language learning and general knowledge simultaneously.” Anna claimed that all of these features can be used to enhance language learning and she also mentioned that these features are not restricted to Chromebooks or Google, but were available for all computers with online access. “There is no question that Chromebooks have the ability to enhance language learning, it’s just important to employ them in the right way.”

Using personal digital devices from 2007 and Chromebooks from 2008 gave Anna a deep understanding of the benefits and challenges that arise from their usage. When it comes to challenges, Anna believed that there were only a few, such as the increased number of distractions mentioned earlier, or students’ neglect to charge their device; however, the main issue Anna found from her experience lies within the teachers themselves and how they use them. “It is crucial that the teachers know what to accomplish with Chromebooks, and how to use them to make that goal reality.” Anna stated that the main issue stems from teachers lack of knowledge or versatility. She claimed that many of the commonly discussed issues could, in most cases, be easily resolved by proper class leadership or the creation of more varied, and thus, more motivational lesson plans.

As for benefits, she could name plenty. “First and foremost, they offer countless opportunities,” as the many features provide teachers a wide variety of options when making their lesson plans. Additionally, “One of the large advantages of Google’s systems is the ease of sharing documents and information,” an aspect that opens even further possibilities for communication and remote collaboration.

Distributing a personal device to all students also open new opportunities to “relocate tasks from school to home. As every student now has their own device, giving them a task of

listening to a text, watching a tutorial or documentary becomes a viable option.” As the students now have their own school issued device, the teacher can expect them to perform tasks at home that require said device. This is something Anna found to be quite valuable as she often had to spend many school hours on simply watching or listening to these recordings in the pre-one-to-one era.

Anna also mentioned some smaller benefits, such as Chromebooks not getting system updates because of its cloud-based OS. This was a problem she had when using Windows laptops, where the computers would suddenly shut down and force a system update, effectively locking students out of its functions for a duration. While Anna could mention several benefits, the biggest advantage of the Chromebooks, according to her, was “variety.”

Overall, Anna firmly believed that Chromebooks and the accompanying Google systems have several features that can enhance educational output in, but not restricted to, language development. She mentioned several benefits from the usage of Chromebooks, with most weight on its possibilities for a more varied lesson plan. While stating that the largest limitational factor was teacher competence. She had also observed an increase in motivation and student efficiency from their use of Chromebooks.

#### **4.4 Interview 3**

The third and last interviewee, hereby referred to by the alias of James, was a teacher with four years of experience, all of which had been conducted at the same school which employed a one-to-one computing initiative utilizing Chromebooks. James mentioned using Chromebook during some parts of his education, effectively giving him more experience than just his four years of teaching.

When James first got employed as a teacher, he said that he was not offered any training in the school’s various devices and systems, “No, I did not receive any training, I have noticed a general lack of training in most of our systems and devices.” However, James also stated that “As a member of the younger generation I am also more acquainted with technology, so lack of training hasn’t really been an issue for me personally. As of yet, at least.” James did not find the Chromebook or the Google systems to be complicated, and his previous experience from personal use had given him a basic knowledge on how to use the device.

While the administration did not have any specific procedures or courses for training, James mentioned that they excel at keeping their staff up to date on new additions and features within their existing systems, though this information is usually basic and does not include any instructions.

“The administration does not make recommendations or demands for their teachers to use certain tools within their lessons. They rather give us freedom in deciding for ourselves which methods we prefer.” James explains that the teachers are free to plan lessons they deem to be best for their class. However, he also mentioned that the lack of textbooks and the heavy reliance on Chromebooks and Google are limiting this freedom unless you wish to spend countless hours producing your own material.

James mentioned the absence of textbooks in the school. “We don’t have any textbooks at all in our school, instead, we use a website called ‘Skolestudio’. It’s a website created by NDLA which contains online textbooks for subject in all grades.” NDLA, for reference, is the Norwegian *National Digital Learning Arena*. James went on to mention how he found this website to be quite ‘clunky’, whereas students would need to have several tabs open simultaneously to have access to both texts and questions at the same time, not to mention their own document tabs for notes and answers.

He explained how several teachers found Skolestudio to be counterproductive and chose to use alternatives such as making their own tasks or their own texts. Even the students started to grow tired of the ‘clunky’ website, “Even students have started voicing their opinions to bring back textbooks.” However, as of the time of this interview, Skolestudio was their only source of textbooks, which resulted in the teachers’ continued usage of the site as they had no other alternative. James additionally added a comment stating, “We could always print some of the texts, but printing out a text of 4-5 pages for 30 students would not only demand tons of money and paper, but also tons of time for every lesson.”

As a result of the absence of physical textbooks, a large majority of James’s lessons were planned to be conducted on Chromebooks. “As a result of our current systems, a large portion of my planning revolves around reviewing Skolestudio’s content for our current topic and evaluating if it is sufficient or if I need to find additional material elsewhere or possibly make my own.” James highlighted the amount of time and effort that was needed when making his own material instead of leaning on Skolestudio. “While I have no issue making my own material for my lessons, it is a very time-consuming process, and it simply can’t be done for a majority of my lessons as there isn’t enough time.” However, James also

mentioned that, while Skolestudio could be clunky at times, some of their content was very neatly organized and well put together. “Skolestudio, in general is fine, if it was too problematic, it would not be approved as an alternative to physical textbooks, but being limited to an online textbook that sometimes produces more problems than it solves can be tiring in the long run.” James implied that being restricted to online textbooks was not sufficient.

His responses to Chromebooks’ involvement in planning procedures was mostly regarding Skolestudio, however, he also briefly mentioned what he called ‘basic Chromebook considerations’, “I normally have to plan how and when I want the students to use their Chromebooks. I also have to make sure information and documents are organized and easily accessible for the students in the correct folders in classroom.”

When conducting his lessons, James believed that Chromebooks had several effects. “There are several effects, some good and some bad. The absence of physical texts is very noticeable, other than that there are also more online distractions, however, the classroom also tends to be calmer.” James explained how the presence of Chromebooks in his lessons provides the students with more distractions such as YouTube, Netflix, and games. However, he also found the classroom to be generally quieter and calmer when the students were immersed in their work, or even their distractions, when on their computers. The main difference, according to James, was the absence of physical text, which could be both beneficial and problematic. It made moving locations easier and removed limiting factors such as students forgetting their books, but the design of the website was, at times, clunky, and made it seem like a physical copy would be simpler to navigate and work around, which was problematic seeing how they had no physical copies at all.

When asked about which methods James employed specifically in his English lessons, he noted quite a few. He also stated that the students, as mentioned earlier, had grown tired of using Skolestudio and found it very monotonous. As a result, whenever he planned his own alternative lesson plans, he tried to focus on variety in his methods. “I commonly use ‘minitalks’ and customized workbooks. In addition to those I tend to prioritize presentations, research, and review tasks.” Minitalks, according to James was a method where students would be given X amount of time to research their topic online before discussing it verbally with other students. He also described ‘workbooks’ to be a document containing specific questions, questions that not only required the students to read and write, but discussion, watching short informative videos and the like. As Skolestudio usually consisted of a set of

text with questions from said texts, tasks that required the students to do their own research and or create their own work, such as presentations or reviews, tended to gain more engagement from James's students.

James also briefly mentioned a website called 'Blooket' which was a great tool for both entertainment and learning for the students. He described the website as "Kahoot with playable 'videogame-like' features that motivate the students to keep playing." – a quiz-based game where correct answers would give the students a 'card' or 'boost', that would be used to play against each other. The students would first answer the quiz to collect their boosts and cards, before playing against each other with their collected cards. Each turn required a correct answer to an additional question, all of which would be designated and designed by the teacher. There were also tons of pre-made quizzes, both for entertainment and education.

According to James's observations, he perceived Chromebooks to have a positive effect on students' efficiency, however, he also discovered that the Chromebooks offer a vast number of distractions. When he first started teaching, he perceived the students to be looking forward to working on their Chromebooks as opposed to him giving them a lecture, something he believed to be heightened motivation when working either digitally or independently. However, what he discovered; "The students are not eager to work, but rather looking forward to their distractions. When observing my students I witnessed several of them launching games or YouTube as their first actions." James explained how he has observed an increase in both the number of students who distract themselves, and also the amount of time each student is distracted. He concluded by stating that the increased efficiency in data collection and writing speed combined with the amount of time spent on non-school related tasks resulted in an overall loss of efficiency.

While he believed that there were a few measures that could help reduce the amount of distractions, such as blocking certain websites from the schools network, he believed that the time spent on school related work would not increase. He claimed that the students simply did not care about doing what they were told, because they were not aware of the consequences of neglecting their studies, and the immediate consequences from teachers were not 'harsh' enough for them to listen. "I have experienced that multiple students refuse to close their games because they are 'in the middle of a game', or students who outright start watching movies mid class and require an extensive amount of effort to start working." As he explained, the teachers were not allowed to do much besides talk to them or at worst

confiscate their laptop, which would effectively remove the student's ability to work on their tasks or access their textbooks as it is all done digitally.

James made sure to add that all students are not like this, the majority of them are working as they are supposed to and listens to the teachers, but "the ones who do act out ruin the experience for the others and slow down their progress as well." James moved on to further explain another limitation of the Chromebook, and especially in their school with online textbooks. "Whenever a student forgets either their Chromebook, or to charge it, they are locked out from the system." Without their device, they are unable to access their files and textbooks, to combat this issue James usually has to print out physical copies or pair the student with another.

Despite listing these limitations and challenges, James still found Chromebooks to have quite a few advantages, one of which was adapted education. "In my workplace, we have several students who struggle with dyslexia, and for these students, Chromebooks excel at enhancing their learning experience," James explained how the Chromebook, and computer features in general, allowed for adapted learning with spelling correction and text-to-speech, making it easier to both read and write for those who have learning difficulties. Adapted learning is then further enhanced by every student having their own personal device, enabling them to work at their own pace and not necessarily on the exact same tasks, "Every student having their own device makes room for the possibility of assigning more personalized tasks better suited for their current abilities." James's believed implied that web-based education had more opportunities that better suited adapted learning than traditional methods. His argument was based on the flexibility and accessibility gained from a Chromebook without altering the lesson structure for the entire class.

James also found lesson planning and execution to be simpler when using a Chromebook. "The only thing I need to plan a lesson is my computer, which holds all my documents and information, my lesson plan is then uploaded to classroom, removing the need to bring any additional notes, printouts or books into class." According to James, Chromebooks were effective in removing additional steps required in both planning and execution of lessons by integrating the work all into one device.

Furthermore, he discovered Chromebooks to have several features for enhancing language learning. "Whenever the students are in need of help in translation, spelling, or structure, they can now utilize various online tools to help themselves, as opposed to being restricted to asking the teacher for help or navigating a dictionary". He stated that language

and spelling tools were able to enhance the students' language development, making them more independent in their writing while pointing out their miss-spellings. He also mentioned some other language learning features in Chromebooks such as Duolingo and newly developed AI tools developed for writing assistance.

Overall, James thought the cons of Chromebooks outweighed the pros. He believed that Norway as a collective had rushed technology into our education without first observing the long-term effects its integration would result in. While he found the Chromebooks and Google systems to have several features able to simplify and enhance learning and educating, he claimed that the number of distractions and limitations they offered the students resulted in an overall lowered efficiency. James was also the only one of the interviewee's whose workplace had abandoned physical textbooks, relying solely on the online textbooks provided by NDLA's Skolestudio, an initiative he claimed was mostly fine, but the clunky design and lack of well put together tasks resulted in both teachers and students missing physical textbooks over time.

James ended the interview by stating, "The Chromebook is an extremely useful tool with tons of possibilities, however, the current educational framework along with students' lack of motivation are not sufficient to utilize them." James's closing statement implied that the educational framework coupled with the current student disposition, as per his observations, were not sufficient to facilitate Chromebooks in a way where the benefits would outweigh the challenges and limitations.

#### **4.5 Comparative presentation of interview responses**

The interview participants had diverse teaching experience, ranging from newly qualified with one year of experience to very experienced with 17 years. Additionally, none of the participants shared a workplace, making their experiences unique from one another and providing more diverse perspectives and practices.

Emily was a newly qualified teacher who had spent her entire one-year teaching experience using Chromebooks. Anna had 17 years of teaching experience, 10 of which she worked with computing initiatives, first one year with windows-based laptops, then nine years with Chromebooks. Anna was also the only interview subject who experienced the transition from traditional education to one-to-one computing. James was a teacher with four years of experience, all of which involved the use of Chromebooks. James was also the only one of the



interview subjects who believed that Chromebooks had more negative than positive effects in education.

In terms of training or instruction within the various digital skills, systems, and over all use of Chromebooks, all of the participants claimed to have received none. This also included Anna, who was present when the computing initiative was introduced. Out of the three, only Anna saw any change in this training as her workplace started offering voluntary courses for those who needed training after several teachers voiced their concerns for lack of training.

Furthermore, all the participants claimed that learning how to use Chromebooks was relatively easy, and given the similarities between Chromebooks and standard Windows computers, application and the device navigation alike were perceived to be intuitive.

When it came to Chromebooks and their integration in lesson planning, most of the process came naturally to the participants, as both participants one and three had only ever taught using Chromebooks. As for Anna, her 10 years of teaching with computers had also naturally made Chromebooks a natural part of her lesson planning too. Regarding specific considerations in lesson planning, all participants stated that their main concerns were to ascertain digital availability and compatibility, making sure any documents, links, videos, and tasks were readily available on classroom in its allocated subject folder and functioning as they were supposed to.

As for the more personalized planning experiences, Emily was naturally not as familiar with lesson planning and teaching in general and therefore had to put much thought into basic planning and making sure her lesson plans were not only compatible with her students and Chromebooks, but also with the curriculum and covered the proper aspects of their current topic. These concerns were already naturally a part of Anna's planning which she had worked with and polished for several years, as a result, she was more focused on creating new, innovative, and thus, a more diverse learning environment for her students. As for James, his concerns lay mostly with his workplace's choice of relying on online textbooks and had to make sure his lessons would facilitate the proper learning through Skolestudio while also including variety in his class. He focused on making sure Skolestudio's tasks and texts were sufficient and possibly supplying more material.

When it came to the effect of Chromebooks in conducting lessons and on students, the participants discovered mostly similar results, with a few exceptions. When conducting their lessons, the participants noticed that the students generally did not have any trouble

navigating their devices. They also noticed that students' efficiency increased when it came to writing tasks along with an increase in their independence as they were now able to 'help' themselves when they needed additional information or instruction by searching for answers online.

The participants also experienced an increase in the number of possibilities for educational methods, as well as features and task completion for the students when utilizing Google's features and the online capabilities of their device. These features however, also meant an increase in the number of distractions available for the students, to which all of the participants noticed could be problematic, students would often try to secretly play video games or watch movies in class. One participant in particular, James, observed some students that would even make use of these distractions openly and refuse to close them when confronted.

Facing these challenges, the participants all responded differently, Emily would first try to talk to the student before ultimately confiscating their device and making them work by hand, in some rare cases she would resort to discuss more serious situations with the principal and the student's guardians. Anna had observed her students attempt to secretly play video games and the likes but would quickly close the applications if caught in fear of getting written down and possibly had their parents contacted. She found rearranging the classroom to make the computer screens face her own desk to effectively reduce the number of distractions. While James would often struggle to even make the students close their applications and would often have to set their device in 'exam mode', removing the computer's ability to connect to their local Wi-Fi. This implied that James's students' disposition may be different to those of Emily's and Anna's students.

While there were several ways to handle the distraction issues, all participants concluded that the use of 'exam mode' and device confiscation were detrimental to the students' learning abilities, a result of their lessons deep reliance on Chromebooks and its ability to connect with Wi-Fi. The same was said about students who either forgot to charge their laptops or their whole laptop at home, effectively locking them out of 'classroom' and restricting their access to tasks, sources, information, and their documents.

It is safe to say that all participants largely agreed that Chromebooks, while offering plenty of possibilities, had become such an important and widely used tool that their lessons were heavily reliant on their presence in mostly all of their lessons.

The benefits of the presence of Chromebooks in their classrooms were many, according to all three participants, the Chromebooks offered a plethora of features, providing plentiful of opportunities for variety and diverse lesson plans, they facilitated adapted learning, and generally offered a wide range of educational methods, all the while increasing student efficiency.

When it came the specific methods utilized by the participants, there were plenty, some of which they all mentioned using, and some that were unique to a specific participant. Of these methods, a common trend was to use Chromebooks for every task that required writing, a trend that was not limited to English lessons, but writing tasks in general. The approach to these tasks could range from creative to factual, and some examples are blogposts, letters, news article, and reviews, with the factual methods often requiring the students to conduct their own online research before writing. All participants also admitted to using the Chromebooks to watch documentaries, instructional videos, or listening to audio recordings/text recordings, as well as making these types of recording themselves, podcasts, recorded presentations and the like.

The more individual methods were more of the features or tools found online that were not specifically designed for Chromebooks, but rather computers as a whole, such as James's use of Blooket. Other unique methods would be minitalks, conducted by James, and discussion recording and reviewing, conducted by Anna.

The aspect of these interviews that differentiated the participants the most were their opinions and perceptions of the Chromebooks. While there were some opinions that they all shared, there were also some opposing opinions. All of the participants were of the opinion that Chromebooks were a brilliant tool that had the potential to offer countless benefits within education. Such as variety, enhanced efficiency, simple data sharing, enhanced cooperation both in person but also remotely. They also found the Chromebooks to be helpful by combining several tools and put them together in one device, reducing the amount of physical items and tools students and teachers had to carry around and organize.

However, they did not agree on all issues. Emily found the Chromebooks to be useful in most areas but felt herself being limited by it at the same time. This limitation originated from the deep-seated reliance on Chromebooks. All tasks, information, organization, tests, and announcements were made in Google classroom, making it hard to move away from the device. As a result, she often found herself planning lessons to be compatible with Chromebooks, and sometime forgot to think about the compatibility with her students.

Emily also believed that Chromebooks only truly showed their full potential when used in the hands of an educator with the proper competence. And as a newly qualified teacher, who had not received any training in its use felt as if her competence was not sufficient and felt as if the training would make her more confident in experimenting with the device.

In contrast to Emily, Anna was a very experienced teacher with 10 years of experience teaching with computers. She was also further educated within ICT in education and claimed to be extremely invested in both Chromebooks as well as other educational technology. While she had not received any training from her workplace, she had studied herself and become quite competent with Chromebooks and Google's systems. While the other participants believed that Chromebooks increased both the number of students who got distracted as well as the number of possible distractions, Anna claimed that these issues lay mostly in class leadership, whereas those who were set on not paying attention, would not be paying attention whether they were working on a Chromebook or by hand. This argument was based on her observations from before and after the integration of one-to-one computing.

Furthermore, she believed that Chromebooks could offer several more opportunities and methods of education than traditional methods while requiring less preparation and items. Online websites and tools simply needed to be opened and then they were ready, as opposed to board games for instance, which required several copies to be procured and distributed within the class while hoping no pieces are missing. She did however state, like Emily, that these features and methods would require the proper competence to be conducted smoothly. She commented that using a Chromebook simply for writing was almost the same as plugging your pencil into the wall, you simply moved the text from paper to screen.

Lastly, James was the only participant who was mostly negative in the face of the widespread use of Chromebooks. He was of the belief that technology had been rushed into education without observing its long-term effect of students, which had ultimately resulted in negative dispositions and reduced attention spans from the students. He ultimately claimed that they would benefit more from removing the Chromebooks as a whole.

Additionally, James's workplace had employed an approach of having fully online textbooks as a replacement for physical textbooks. While mostly functional, the online textbooks had a reputation amongst teachers and some students of being clunky and insufficient at times. This approach, while practical in some cases, would often make lesson

planning uncertain and suddenly require more time than expected when a topic suddenly needed supplementing to cover more of its important areas.

A large portion of James's complaints about functionality seemed to originate from Skolestudio, however, his observations and experience with students and their dispositions and lack of motivation seemed to be unanswered. When compared to the students of Emily and Anna, his students seemed to be the odd ones out, which may imply that his students in particular do not necessarily represent the average demographic.

## **4.6 Questionnaire results**

The participants of the questionnaire, as mentioned in the methodology chapter, are limited to lower secondary students utilizing Chromebooks in their education. Students in this age group (13-16 years old) have a very limited attention span and the questionnaire was therefore designed to consist mainly of quantitative questions and limited to a total of 20 questions to retain their attention throughout the entire process and reduce the number of dropouts. The open-ended questions were also limited to two questions and made optional to account for their attention spans. There were 131 fully completed responses. I will first present the quantitative data and then move on to the qualitative data.

### **4.6.1 Quantitative results**

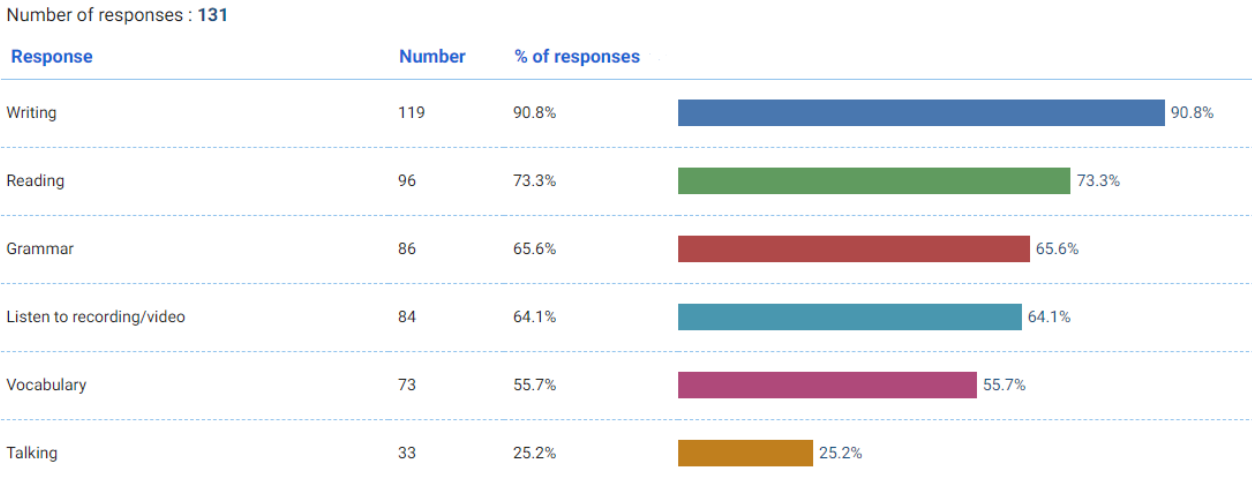
Out of the 131 participants, nearly 50% identified as male, and just over 45% identified as female. The remaining participants choosing the either "Other", or "Prefer not to say". In terms of grade, nearly 47% responded they were in the 8<sup>th</sup> grade, 16% in the 9<sup>th</sup> grade, and 37% in 10<sup>th</sup> grade.

In terms of experience, more than 75% of the participants claimed to have more than three years of experience on Chromebook, while slightly less than 20% claimed to have between 2-3 years. The remaining 5% responded either "Less than a year", or "1-2 years", implying that they had close to no Chromebook experience from primary school, and only had experience so far in lower secondary school.

When asked how often the participants used their Chromebooks in their English lessons, 37% chose the option stating they "Always" used their Chromebooks, while 62% responded they "Often" used Chromebooks during their English lessons.

The participants were asked to indicate which English skills they commonly practiced while working on Chromebooks. The list of skills consisted of, writing skills, Listening/watching recordings, Reading, Oral skills, Grammar, and vocabulary. Participants were allowed to check multiple boxes and Figure 1 shows their responses.

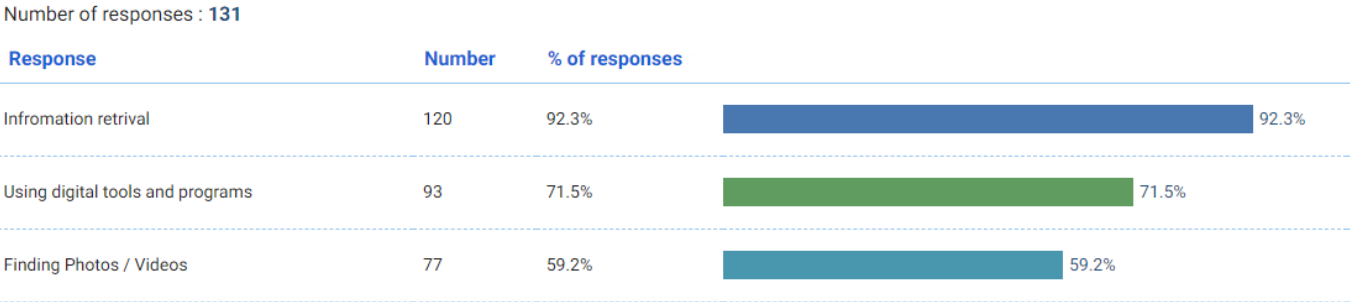
**Figure 1:** *Practiced English skills on Chromebook*



The figure shows both the number and percent of the participants who practiced each skill on their Chromebook. Out of the six skills, ‘writing’ was reported to be the most practiced skill on Chromebooks, with slightly above 90% of the participants stating that they commonly practice writing. ‘Talking’, on the other hand, was the least practiced skill on Chromebooks, with only 25% of participants stating that they commonly use Chromebooks for practicing their oral skills.

Following the question regarding practiced English skills, the participants were asked in the same format which digital skills they commonly practiced on their Chromebooks. Their responses are shown in Figure 2, as seen below.

**Figure 2;** *Practiced digital skills on Chromebook*



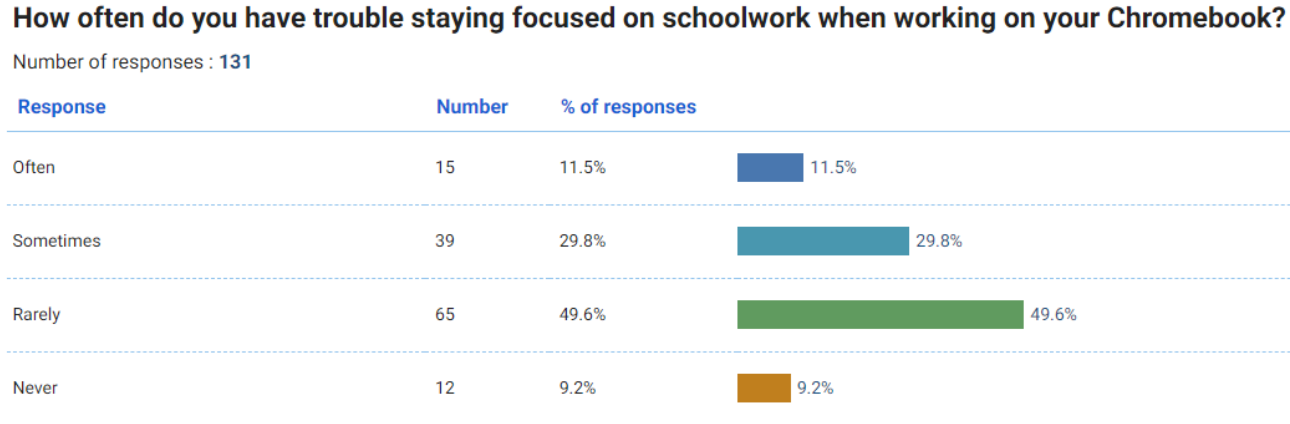
As shown in Figure 2, the most commonly practiced digital skill was online research and retrieval of information, with 92% of the participants commonly utilizing their Chromebook for these types of tasks, while video and photo retrieval was ranked the lowest, yet still had nearly 60% of the participants commonly using their Chromebooks for these tasks.

The participants were then asked about the ease of use of Chromebooks in a Likert scale format, with four response options, ‘Very hard’, ‘Somewhat hard’, ‘Somewhat easy’, and ‘Very easy’. Nearly 80% of participants responded that Chromebooks were ‘Very easy’ to use.

Participants were also asked how they usually worked in class - ‘Alone’, ‘In groups of two or more’, or ‘A mixture of both’. The majority, slightly more than 60%, responded ‘A mixture of both’, of the remaining participants, 30% responded ‘Alone’, and the other 10% responded ‘In groups of two or more’. The participants were later asked whether they found it easier to work in groups or to work alone when working on assignments on their Chromebooks, to which nearly 80% of participants responded in favor of group work, while the remaining 20% found it easier to work alone.

The students were also presented with a Likert scale format question asking about their ability to remain focused on schoolwork during their lesson conducted on Chromebook as seen in Figure 3. This question was followed up by a question asking how many minutes they would spend on activities not related to their schoolwork as seen in Figure 4

**Figure 3;** *Focus retainment when working on Chromebooks*



**Figure 4; Time spent on non-school activities**

**When you use your Chromebook in your English classes, how much time do you spend on non-school related activities?**

Number of responses : 131





Response	Number	% of responses	
0 minutes	60	45.8%	 45.8%
5-10 minutes	50	38.2%	 38.2%
10-20 minutes	8	6.1%	 6.1%
20+ minutes	13	9.9%	 9.9%

Figure 3 shows how often students said they get distracted on their Chromebooks, with only 9% of students stating they ‘Never’ struggle to stay focused, and nearly 50% stating they ‘Rarely’ get distracted. That means over 40% of the participants struggle to stay focused sometimes (30%) or often (10%). This is followed up by Figure 4, which illustrates the amount of time students said they usually spend on activities that are not related to their schoolwork in their English lessons. 45% of the participants responded they spent ‘0 minutes’ on off-task activities, 38% stated they spent ‘5-10 minutes’ on off-task activities, with 6% on ‘10-20 minutes’, and 10% on ‘20+ minutes’.

It is important to mention that the participants of the questionnaire were from different schools, where some schools used a format of 60-minute lessons, while others employed 45-minute lessons. By applying the same percentages from Figure 4 of time spent on off-task activities, an average class of 20 students will have spent a total of 115 minutes on off-task activities in the duration of one English lesson. If said class conducts 5 English lessons a week, that will amount to 575 minutes spent on off-task activities each week, or an average of nearly 30 minutes off-task for each student.

The participants were given a series of statements/questions related to their English lessons, to which they were asked to agree/yes or disagree/no. When asked if Chromebooks made it easier to work on assignments, nearly 90% responded ‘Yes’. 96% of the participants also agreed that Chromebooks make it easier to gain access to or find new information and resources. The respondents were also asked whether they had ever faced any technical issues



connected to Chromebooks, 52% responded they had experienced technical issues, while 48% stated they had not.

One of the questions presented a list of tasks/activities that could be done with or without Chromebooks. The participants were then asked to answer if they would prefer to perform these tasks with the use of Chromebooks, or without Chromebooks. If they had no preference that outweighed the other, they could respond by checking both boxes. The responses are shown in Figure 5.

**Figure 5; Performing task with or without Chromebook**

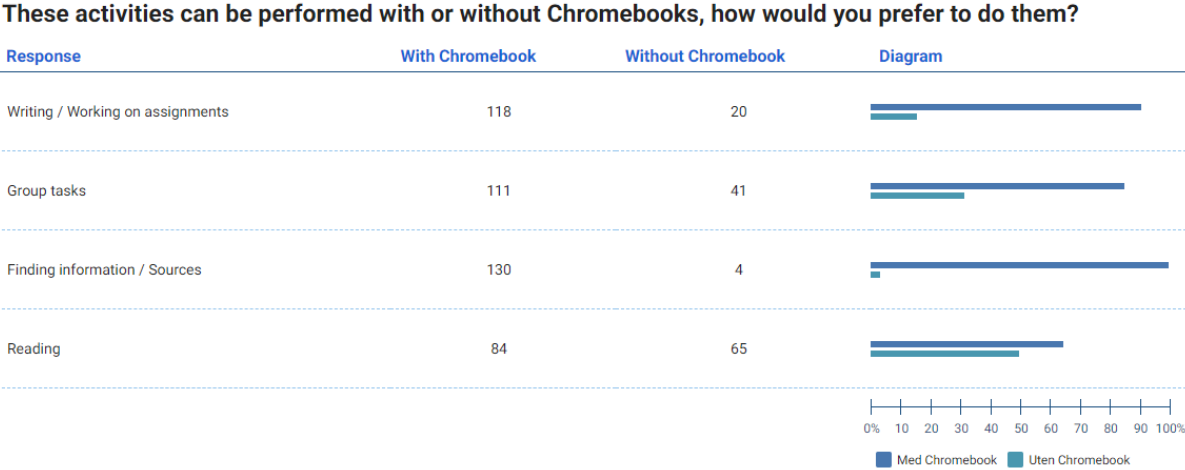


Figure 5 show participant responses regarding their preferred method for working on specific tasks. 118 participants stated that they preferred to write or work on assignments on Chromebooks, while only 20 stated that they preferred other methods. 111 participants preferred working in groups on Chromebooks while 41 preferred group tasks using other methods. The most one-sided response was ‘Finding information / Sources’, where 130 participants preferred to use Chromebooks as opposed to the 4 participants could either do both or another method all together. The response that had the most engagement from participants who would rather not use a Chromebook was in the ‘Reading’ category, where 65 participants preferred to read by other means, however, the majority, of 84 participants would choose to read on their screen.

As shown by the responses in Figure 5, the majority of the students preferred to use Chromebook for most common tasks in the classroom, with the reading being the item where Chromebooks were a less definite preference. This is further strengthened when the

respondents were asked what type of teaching they preferred, the responses are shown in Figure 6.

**Figure 6; Preferred teaching approach**

### Which type of teaching do you prefer? ^

Number of submissions: 131

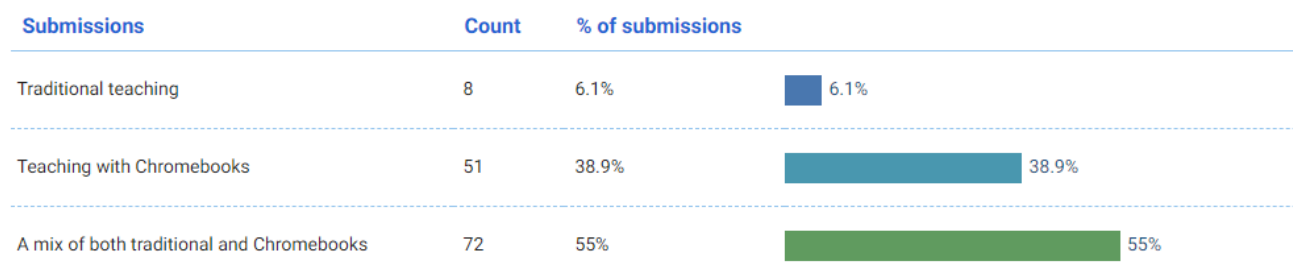


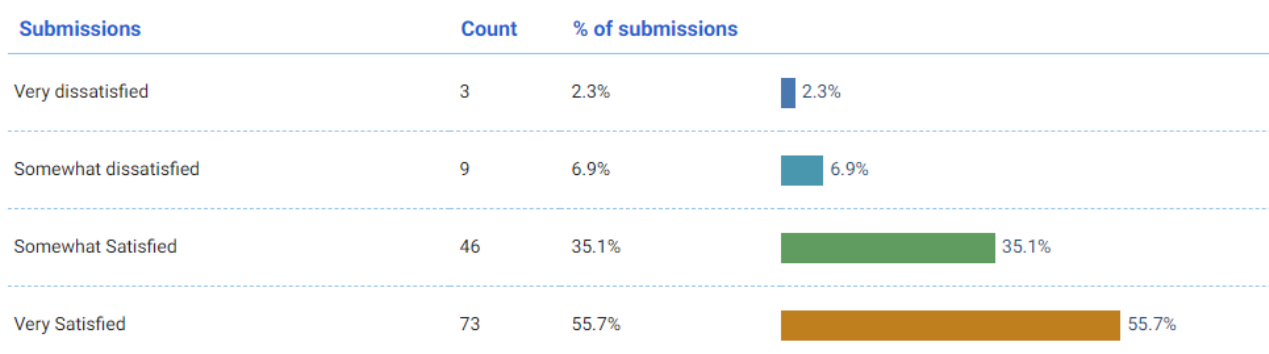
Figure 6 show that only 6% responded that they preferred traditional teaching, while nearly 40 percent responded that they preferred teaching through Chromebooks. The remaining students responded that they preferred teaching that made use of a mix of both traditional teaching and Chromebook, which aligns with the responses gathered in Figure 5.

In the last section of the questionnaire, students were asked if they were satisfied with the current use of Chromebooks in their English education and whether they felt more, less, or equally motivated when using Chromebooks as opposed to traditional methods, the results are shown in Figure 7 and Figure 8.

**Figure 7; Chromebook satisfaction**

### How satisfied are you with the use Chromebooks in your education? ^

Number of submissions: 131



**Figure 8; Motivation, traditional vs. Chromebook**

**Do you feel more, less, or equally motivated to learn English when using Chromebooks as opposed to traditional methods?**

Number of submissions: 131




Submissions	Count	% of submissions	
More motivated	60	45.8%	 45.8%
Less motivated	65	49.6%	 49.6%
Equally motivated	6	4.6%	 4.6%

Figure 7 show that 90% of the respondents were satisfied with the current use of Chromebooks in education, of which 55% were ‘Very Satisfied’. While Figure 8 show that 45% of students are ‘More motivated’ to learn English when using Chromebooks while nearly 50% claimed to be ‘Less motivated’ for English learning when using Chromebooks. While nearly 50% of the respondents claimed to be less motivated to learn English while utilizing Chromebooks, the majority of students still preferred to conduct their tasks on Chromebooks as, shown in Figure 5. This contradiction raises the question of whether students simply find English learning demotivating in general, or if the question was badly formulated causing confusion and inaccurate responses.

#### 4.6.2 Qualitative results

There were two open-ended questions in the questionnaire, both marked as voluntary. The first question asked participants if they ever encountered situations where Chromebook made tasks more difficult or limiting, while the second question asked participants if they had anything to additional comments or suggestions for improvement in terms of Chromebooks in education.

The first question generated for 78 responses and the second question gathered 69. Out of these responses, the vast majority were simple ‘no’ responses, some responses were also simply jokes or unrelated answers without any substance which is to be expected given the target demographic of the questionnaire. There were however some serious responses.

In relation to the first open-ended question regarding limitations or complications cause by Chromebook, some participants voiced their concerns. One of the participants mentioned a limitation or issue from “eye strain”. Another participant mentioned Google Maps being blocked by her school’s administration, which restricted them from acquiring addresses and the like. Another stated that “sometimes taking notes is slower on my laptop because it takes time to create new documents,” this participant implied that writing small quick notes by hand would be faster than opening the Chromebook, creating a new document, and then type.

While a few issues were raised, the majority simply replied “No”, implying that they had not encountered any limitations. Some participants even took the opportunity to compliment the Chromebook instead. Several participants stated that Chromebooks made tasks easier and made research and understanding simpler through its online capabilities. One participant also noted that “Chromebook don’t make tasks harder, because all the tasks we are given are designed and planned form Chromebooks. And writing on a Chromebook is much easier than writing with a pencil,” implying that the lesson plans designed by their teachers were designed to exploit Chromebooks and would therefore not be limited by them.

Multiple participants also stated that Chromebooks had the opposite effect of making tasks complicated or limiting, but rather simplified them and increased their efficiency. One such remark was “I haven’t encountered any limitations, my Chromebook actually makes me work faster and more efficient.”

Moving onto the next open-ended question, the final comments, participants were asked if they had any additional comments about Chromebooks or any improvements for how they could further facilitate language learning. Once again, the majority of the responses were “no”, yet there was some useful information to be gathered among the other comments. One participant added that Chromebooks made classes slower, but did not include any explanation. Some participants added that writing on Chromebooks was faster than writing in by hand in books and made information gathering faster and simpler by surfing online rather than flipping pages.

A participant responded that they usually enjoyed using Chromebooks, but at time they would “overuse” them, in which case they would prefer to work with physical books and be social. Lastly, one of the participants stated that “They should probably restrict access to some websites hosting video games and stuff,” implying video games and “stuff” could distract both themselves and others. Overall, while an attempt was made to give these lower

secondary school students the chance to comment more qualitatively on their experiences of using Chromebooks in English lessons, the volume of additional information and insight generated by the two open questions was modest.

#### **4.7 Comparing teacher and student perspectives**

This section will compare the results and observations from the teacher interviews with the student questionnaire responses on Chromebook usage in education.

The teachers' observations discovered that students' efficiency and motivation often increased when working on Chromebooks as opposed to by hand or other methods, which complies with the majority of the student responses where they themselves stated that they found Chromebooks simplified tasks and increased their efficiency. Students also claimed that access to the internet and its resources was a great asset in their lessons, another observation that teachers also reported.

Additionally, the teachers had voiced their concern for both distractions and the increase in distraction possibilities and believed that much student time was spent working on off-task activities. Students' responses seemed to confirm such concerns, especially around time spent off-task (see Figures 4 and 5).

Teacher responses claimed that Chromebooks and the benefits it could provide had the potential to positively impact the education process for both teacher and students. These beliefs were shared by the students as they reported both increased efficiency and learning output when using Chromebooks as well as an overall satisfaction with its implementation in education.

Teachers stated that they mostly used Chromebooks in tasks involving writing and reading, with some focus on oral skills through recordings and discussions, while students responded that they mostly used Chromebooks to practice Writing and reading, with the former being the most dominant activity, while oral skills were the least prioritized activity while working on Chromebooks.

#### **4.8 Conclusion**

The results presented here indicate that Chromebooks are very firmly established as a learning tool in Norwegian lower secondary classrooms. Teachers use Chromebooks regularly and

design most (or in some cases all) lessons with digital delivery in mind. Most students also have experience of Chromebooks during primary school and are thus accustomed to them in lower secondary. Teachers identified various benefits for education of using Chromebooks, especially flexibility, portability, and individualization, though they also recognized drawbacks such as off-task behavior by students. Technology in itself was not enough to motivate students and teacher felt it was important to have interesting and varied lesson plans. In one case where physical textbooks were no longer used, this was not seen by the teacher to be a positive development. For the teaching of English, Chromebooks facilitated the practicing of several skills, though writing was the most salient one. In their responses, students were also positive about the use of Chromebooks. Students found Chromebooks to increase their efficiency through increased writing speed, availability, and accessibility to online resources and information. They also stated they preferred to work on Chromebooks as opposed to working by hand. While they preferred to work on Chromebooks and found them beneficial for their efficiency, a large majority of students stated that they preferred teaching methods that involved a mix of both Chromebooks and traditional methods as opposed to strictly digital or traditional approaches.

## 4. Discussion

### 4.1 Overview

The objective of the present study was to gain deeper insight into the device that is most widely used within the school educational setting in Norway - the Chromebook. The study's purpose was to investigate the impact of Chromebooks in the EFL classroom both in terms of utilization but also the perceptions and opinions held by educators and students. The research conducted to serve this purpose was guided by the following research questions.

**RQ1:** How are Chromebooks utilized by teachers and students during lower secondary English lessons?

**RQ2:** According to teachers and students, what are the benefits and disadvantages of using Chromebooks in English education?

The answers to this question derive from a thorough research conducted specifically for this study through the employment of several teacher interviews and a student questionnaire. By combining and comparing the data from findings, the answers to the questions have been discovered.

*How are Chromebooks utilized by teachers and students during lower secondary English lessons?* According to literature and new findings, Chromebooks open vast possibilities for both students and teachers. As reported by the teachers in this study, the device is first and foremost a multifunctional educational tool that is employed in countless different ways. Teachers claimed to have utilized the Chromebooks not only as a tool for student writing or to achieve increased writing efficiency in their students, but for its many tools, applications, data sharing, ease of use, and internet access along with the plethora of features provided online. The teachers claimed that Chromebook had become an indispensable tool that they used throughout most, if not all processes leading up to and during the lessons, from planning, to execution, and afterwork such as feedback or grading. The teachers also mentioned that they often explored new features that would allow students to improve upon their English skills in new methods, such as recording discussions or audio for a presentation or documentary and reviewing their own vocabulary, fluency, and pronunciation. Their online access also opened the possibility of using language learning software and apps such as Duolingo while providing a better platform for adapted learning for students in need of simpler texts. All three teachers believed that the most useful feature

provided by Chromebooks were access and availability through the various applications and Wi-Fi capabilities.

Due to its immensely useful tools, the Chromebook was said to be carefully implemented in every lesson, meaning that the device is not only evident in a teacher's environment, but also in the students' every class. As reported by students through the questionnaire responses, the Chromebooks have become their solely most used tool to facilitate most of their information and tasks. The students claimed to utilize Chromebook as their main workspace, using them for notes, tasks, research, and information storage. For the average learner, the Chromebook is believed to a portable hub containing all the resources needed for their schoolwork, a device containing all their data and educational materials capable of easily being transported to and from school, providing easy collaboration between the work and homework students perform at home and on school. A belief that was confirmed through the responses of the 131 student responses. The features and online access of the Chromebook were reported to enhance independence in education, allowing them to actively search for new information, lookup new or difficult words, or expand their vocabulary through their online research alongside spelling and grammar tools and games. A majority of the students also claimed to prefer working digitally as opposed to traditionally, reporting an increase in efficiency and overall engagement.

Chromebooks are seen by both students and teachers to be a 'tool'. However, this one tool offers so many possibilities within its field that it has become an indispensable device within the teachers' educational process as well as an indispensable part of the students' education by enhancing and streamlining several aspects of everyday life education.

*According to teachers and students, what are the benefits and disadvantages of using Chromebooks in English education?* The results of this study showed that both teachers and students believe that Chromebooks have great of potential when it comes to enhancing learning, engagement, and motivation. All the interviewed teachers believed that a Chromebook had close to limitless potential when it came to the number of possibilities for varied teaching and teaching methods, a factor that would directly affects students' engagement and motivation in education which again increased their leaning output. Chromebooks simplified many aspects of their teaching such as information sharing, communication between student – teacher and even parent – teacher. The device also removed the need for several physical resources which simplified and hastened preparation and execution of lessons, making the device favorable in the eyes of the teachers. Through the



exploration of the applications and features included in a Chromebook, teachers believed that they could employ various methods that would be able to increase the students' language proficiency and possibly enhance their ability to improve on their own.

However, the teachers also found some issues relating to students' focus while using Chromebooks because of the increased number of distractions provided by online access, which increased the students' temptation do off-task activities. Some of the teachers were also of the opinion that they were becoming too reliant on Chromebooks. Chromebooks is a part of their every teaching process, making them very reliant on its presence, a reliance created from the framework of a one-to-one initiative and the heavy use of the device, though they still thought the reliance and heavy use of Chromebooks was overall beneficial due to the many features they offered.

Students reported that they enjoyed using Chromebooks. They stated that efficiency when writing or working on tasks in general was increased when working on Chromebooks. It was also discovered that most of the common digital tasks - information retrieval, writing, reading, and listening to recordings - were all activities students would rather perform digitally on their devices than traditionally. Many students also claimed that their overall motivation was higher when utilizing Chromebooks, yet many of them would still prefer a combination of utilizing both Chromebooks and textbooks together.

Students believed that their language skills were benefiting in many ways through Chromebooks, especially writing skills. While increased motivation and engagement alone often help increase leaning output, their increased efficiency coupled with several grammar and correction applications helped them vastly improve their writing skills. Spelling correction coupled with the possibility of online lookups helped the students work independently without the need to stop and ask for help, improving their workflow and focus.

I will now discuss some themes of interest that were highlighted by the study.

## **4.2 Teaching competence**

The review of prior literature and the results of the present study's research discovered several interesting themes along its search for answers. One of these was the importance of a teacher's digital competence. A teacher without training or competence will not be able to use Chromebooks to their full potential. Regardless of how user friendly or intuitive

Chromebooks are designed to be, a teacher will not be able to discover the full potential of the device and its uses by intuition alone.

According to both the literature and teachers themselves, Chromebooks have vastly improved and expanded upon the educational possibilities in a classroom through their many features and the removal of several physical boundaries. However, these advantages will not see the light of day if teachers are not qualified to operate them and employ their effects in their lessons.

As stated by Valiente (2010) and Zheng et al (2006), the presence of Chromebooks, while helpful, is not sufficient by itself. Simply moving educational work from paper to a screen does not necessarily have any significant advantages. The advantages of digital education and its presence in the classroom lies within the possibilities it provides alongside an educator who can harness these possibilities and employ them accordingly. Furthermore, Chromebooks as a part of a computing initiative, serve as a collaborative and collective device. They simplify the process of sharing information and collaboration through its shared document features and remote communication, thereby enhancing collaborative leaning and fostering teamwork among students and teachers. This also implies that there needs to be some sense of cohesion between educators and their basic approaches to make the transitions between subjects and teachers as seamless as possible for both students and the educators themselves. However, the teachers in this study reported to have received no training during either their education or from their workplace to accommodate the necessary competencies.

Furthermore, as stated by Valient (2010), all schools employing a one-to-one initiative need to have a clear vision for the purpose and expected outcome before its implementation. This vision will work as a signpost that guides teachers and students in their usage and decision-making when employing their devices. A clear, common vision will provide a basis for educators' decision making and approaches when planning and conducting their lessons to best fulfill said vision, which will in turn enhances the coordination and cohesiveness of the teachers.

All of the aforementioned factors highlight the need for a solid framework on which to build said cohesion and competence. According to the European Commission's Digital Competence Framework (Punie, 2017), teachers need to master the relevant competencies within the five main competence areas in digital teaching, *engagement, digital resources, teaching and learning, assessment, and empowering learners*. In addition to the five main competence areas, the teachers will need to gain a basic collective understanding of how to

operate the Chromebooks and the general layout of Google's systems in line with their fellow educators to create better cooperation and transitions between them.

Digital teaching competence is currently not a part of a teacher's education as it would need to revolve around one specific system or device, which as of now there are no standard universal device throughout the varying stages of education. Some may however argue that Chromebook has become such a widely used educational device that the accompanying digital competencies should be included in teachers' education. As of now, Chromebook is the most used educational device by far, its presence is mainly seen from 4<sup>th</sup> grade to the 10<sup>th</sup> grade in Norwegian schools, with IOS and Windows devices becoming more dominant in upper secondary where more demanding and system-specific tools are needed. As there is no set standard for a specific educational digital device, the schools are free to choose their own device. Different schools utilizing different devices results in a slight difference in the digital teaching competence needed, a natural result that would make most believe that schools will offer their educators courses and training within the exact system and device that they employ.

The assumption that teachers will receive the proper training was according to the results of the present study, proved to be wrong. All the three interview participants stated that they did not receive any training or education within the needed competence for their school's device. One of the participants was also present during the initial implementation of one-to-one computing, meaning none of the teachers received any training even when doing a full transition from traditional teaching to teaching with computers. Though it has to be said that the same school has offered basic training courses in later years as a result of the employees many requests, these courses were optional and non-obligatory, even for newly hired teachers.

Without receiving any training, any courses, nor any experience during their education, the teachers are still expected to be able to utilize Chromebooks in their lessons with utmost efficiency and proficiency. An expectation that in most cases would seem natural given they are the educators who will guide the new generations in their educational journey, but how will they be able to accomplish this feat without obtaining the competence needed themselves?

Chromebooks, as proved by both Seyala et al (2019) and the present study, are very intuitive and user friendly. Their interfaces and general layout are similar to what most students and teachers face every day on mobile devices or other computers, making basic usage easy and intuitive. However, using Chromebooks to educate students is a new field

entirely from normal everyday digital device usage, meaning it would require more than simple intuition to master, thereby necessitating the need for training or further education of teachers within the competencies needed for their schools dedicated educational device.

Computers have become a necessity for education in most developed countries, as such, making a standard device and operational system for all schools throughout the students entire educational journey would make the transition from grades and school seamless, as well as making it easier for educators to get a new job at another school without the need of getting into a whole new digital system, however, this general standard or demand is currently not present, at least in Norway. The absence of a standard device coupled with the absence of a standard training procedure, may indicate that technology, and more specifically computers, were integrated too deeply into the educational system before the necessary framework had been developed, a premature integration that has resulted in heavy reliance and dependence on computers before reviewing their long-term effects on students and education.

To summarize, digital teaching competence is vital in utilizing Chromebooks to its full potential, however, results show that there are no training procedures in place during teachers' education nor at their workplace, which results in teachers relying on their own motivation and intuition to explore their devices' features. Which implies that a change in the educational framework in regard to digital teaching competence could need to be rebuilt.

### **4.3 Advantages of Chromebooks**

While the extensive integrations of Chromebooks and computers may have been hastily arranged, the process would not have taken place if the expected benefits were outweighed by the limitations. The advantages and possibilities offered by Chromebooks are many.

Prior literature, such as Wiekling (2016), Alanazi (2013), and Sharma (2017) suggests that Chromebooks, and computers in general, have several beneficial effects on education and fulfilling a learner's potential through availability and accessibility. The many features offered by Chromebooks provide a larger variety of approaches to employ in lesson planning, leading to more varied lessons and heightened motivation and engagement from students. These features also include several tools, applications, and websites which are all accessible within the same device, removing the need for any physical relocation or resources, also reducing the time it takes students and teachers to swap from one activity or subject onto another. This also reduces the time students need to retain their obtained knowledge before

putting it to use in their notes or tasks as their sources are only a few clicks away from their own documents.

Additionally, previous studies such as Taylor (2006) and Alanazi (2013) as well as the present research has suggested that both students and teachers alike perceive Chromebooks to increase the students' efficiency when working on school related tasks, especially writing. Writing on a keyboard is much faster than writing by hand and offers easy correction of mistakes through the 'backspace' button as opposed to using erasers or scribbling if using a pen. Which results in an overall faster and more fluent writing experience, enhancing the students' writing proficiency and efficiency. This was also highlighted through students' reports of increased efficiency and a heightened ease for writing tasks through the questionnaire responses. Furthermore, both teachers and students within this study claimed that the presence of writing tools such as active grammar and spelling correction tools were especially beneficial for English learning.

Students' writing skills are further enhanced through the presence of spelling correction and grammar applications which will highlight misspelled words or any major grammatical issues. The students are then able to review their mistakes and get a brief explanation as to what their mistakes are and are in most cases presented with alternatives for corrections, giving students a deeper insight into their grammatical flaws and fixing them. Students themselves reported that digital writing had become easier and improved their writing skills through access to such spelling tools.

The internet access provided by Chromebooks is also highly beneficial to both educators and students. Through online access both educators and students gain access to a limitless amount of knowledge and sites containing valuable information and resources for learning. Through online connectivity, the students are also enabled to work more independently as they can effectively find solutions to their problems by searching for solutions online without being restricted to asking a teacher who could potentially be busy with other students, improving not only the independence of students, but also the overall workflow in a classroom.

When compared to normal computers, Chromebook also offer several benefits within the educational sector. As opposed to Windows or Apple products, Chromebooks do not require any system updates because of their cloud-based operating system, removing any possible issues related to being locked out of one's device during a system update. This cloud-based aspect also means that users are able to access all their information through 'the cloud'.

Chromebook users are able to access their Google documents and applications through any device as long as they are logged in, be it another Chromebook, Windows device, or a mobile phone. These advantages were specifically highlighted by the teachers in this study who had prior experience from either earlier teaching or their own education from Windows computers shutting down and restricting access to one's documents.

While chromebooks offer plenty of advantages within an educational setting, they also offer several advantages in their program and design themselves. These advantages consist of hardware and software related designs, such as long battery life, user friendliness, low maintenance, fast boot-up times, with the biggest advantage laying within its affordability.

The results of this study in terms of advantages are mostly in line with prior research, with the main difference being the evolution of the digital platforms which overhauls several of the digital processes to make them even more efficient and addition of new websites and tool for certain activities and tasks that were not available a few years ago. As seen in most prior studies related to Chromebooks in education, such as Ngyuen (2023) and Wieking (2016), the main advantages are related to efficiency through increased writing speed and removal of certain physical elements as well as increased engagement and motivation in students. Teacher and student responses showed that the increase in efficiency is visible in not only English lessons, but in education in general, however, the increased motivation and engagement, while visible, was shown to be lower in this study than implied in prior literature. Studies such as Wieking (2016) and Alanazi (2013) highlighted a major increase in student learning motivation. The students in this study however reported otherwise, while 45% stated that Chromebooks increases their overall motivation to learn English, almost 50% of the student claimed to be less motivated when learning English through Chromebooks as opposed to traditional methods.

These results show a clear difference between the responses of the present study and prior literature. This difference could originate from the long-term use of computers and Chromebooks in education. When Chromebooks and computers were first introduced, their presence themselves were considered variety and a new aspect of education, however as years passed, computers are no longer a new addition in education, but rather a necessity incorporated into every classroom and lesson, which could lead to Chromebooks no longer being a source of motivation through variety, but rather have opposing effect. A majority of student responses claimed to prefer traditional methods being incorporated into classes instead of solely digitally based lesson, which provides a solid basis for this theory, which is further

strengthened through the teachers within this study who claimed that student motivation and engagement stemmed from variety in their lesson plans, not from Chromebooks themselves. This variety could of course be in the form of not only physical and traditional methods, but also variety in digital tools and applications.

Overall, Chromebooks has several beneficial effects on education through its potential for varied lessons which can heighten motivation, increased engagement, and increase efficiency. They also have the capability to simplify several processes of planning and conducting lessons by removing limitations and offering availability to online resources. Their advantages also include factors such as their affordability and user-friendly design. Their overall functions possess the ability greatly enhance learning output and learner efficiency if they are utilized correctly.

#### **4.4 Limitations of Chromebooks**

While there are several advantages included in the use of Chromebooks, their usage also includes some limitations and drawbacks. Acknowledging the potential downsides of Chromebooks will locate potential issues, allowing their users to attempt to reduce or remove limitations for a more seamless and efficient experience. By locating both advantages and limitations, teachers are able to develop lesson plans backed by the knowledge of where Chromebooks excel and where they might pose restrictions and reduce the drawbacks.

When discussing limitations of Chromebooks, the limitations can be divided into two categories, limitations retaining to the device themselves, and limitations caused by the device in education. As for the device's innate limitations, the first issue would be its dependency on an internet connection. Without a connection to the WI-FI, Chromebooks lose access to their applications and stored data, given its operative system, Google OS, is cloud-based, which also means that the offline functionality of a Chromebook is heavily limited. The internet connectivity was an issue raised by one of the teachers in this study, however, she still believed that the benefits provided through the cloud-based storage and ChromeOS such as the lack of system updates outweighed the Wi-Fi dependance issue of the Chromebooks.

Furthermore, Google OS is an operative system of its own, meaning its incompatible with software that is either Windows or IOS based. As Chromebooks are designed to be cloud-based and operate almost exclusively on Google's applications and systems, they

require lower-end hardware, making the device affordable. This, however, also means that the device is incapable of running software that requires more resources.

While Chromebooks in themselves have some innate limitations, most of them are negated when applied in an educational setting. Google's applications are sufficient for educational purposes, and modern schools are also equipped with stable WI-FI connections. Demanding software is also not a necessity in education, meaning the device on its own does not pose any major limitations for education if the educators are aware of their limitations. Both students and teachers within this study was asked if they had ever encountered a situation where Chromebooks posed any limitations or incompatibilities, to which neither students nor teachers had faced any issues that was caused by Chromebooks specifically.

When it comes to limitations within the integration of Chromebooks in the classroom there are some main issues that are actively discussed in both prior studies and in the present study's research. Chromebooks have become a tool that is present in nearly every lesson and every task, which has created a deep reliance. Students are used to work digitally, and teachers are used to design lessons for compatible with Chromebooks where all information, assessments, lesson plans, and the like are shared on their device. By relying so heavily on Chromebooks in their every task, performing tasks or conducting lessons without them becomes distant and complicated.

Chromebooks are introduced to students at a very early stage in modern school today as opposed to earlier years, as a result, we are still not certain what the results of this long-term reliance on a specific device might result in, not to mention the heavy dependence on digital assets all together. Working by hand and reading physical books are becoming increasingly rare, to the point where teachers within this study observed students' writing skills to take a significant turn for the worse when writing by hand. This suggests that the long-term use of digital devices and heavy reliance on their presence in education may need further research to understand if their presence is as useful as they are perceived to be, or if it as some point becomes a liability.

Earlier studies such as Alanazi (2013) and Wieking (2016) investigated whether Chromebooks had the potential to increase students' writing skills and learning motivation. These studies discovered a trend where students would gain heightened motivation for learning and increased writing skills through the use of Chromebooks, however, the participants of this study claimed that the motivation did not necessarily increase, some even claimed that their motivation would decrease when working with Chromebooks. Teachers



also claimed to observe students' writing skills would decline when writing by hand. It is important to note that teachers also reported an increase in writing skills when writing digitally, which could indicate that the removal of digital factors such as spelling checks could be the cause of the decline when writing by hand. However, these results still imply that the ever-changing digital educational environment, through the continuous use and reliance on digital devices had impacted the earlier perceived motivational effects, causing them to diminish, while certain academic skills could become too reliant on digital tools, resulting in a decline once they are absent.

As lessons are performed on Chromebooks and their access to any relevant information is locked behind both access to their device and an internet connection, the loss of either will have a large impact on the students' ability to learn. According to the interview results of the present study, students who either forgot their device at home or forgot to charge their Chromebooks was a common occurrence, an occurrence that effectively locked the students out of the lesson at hand. The lessons are designed to be performed on Chromebooks for students working on Chromebooks, making it a challenge to account for the possibility of students who were suddenly locked out of their device for various reasons. Possible solutions would be to keep back-up chargers and devices in each classroom to ensure that all students would be able to access their domain.

The most common, and biggest drawback of Chromebooks are distractions, and the amount of time students spend on off-task activities. As stated by one of the interview subjects, demotivated students who are actively in search of distractions will always manage to distract themselves, be it with a pencil or a paper clip. Chromebooks however, while offering access to the vast resources online, also offer the vast distractions available online, such as games, movies, and series. These are activities most students indulge in at home for entertainment, activities they are now able to perform during school hours through their Chromebooks. As a result, the distractions offered by Chromebooks are more tempting than those available through traditional methods, which could lead to a larger number of students giving in to the temptations easier rather than working on school related tasks.

Students performing off-task activities has become a large discussion topic in regard to one-to-one computing initiatives as teachers are observing an increasing amount of students distracting themselves for an increased amount of time during their school hours. According to the results of the present study, a substantial number of students admitted to spending several minutes on off-task activities each English lesson, a pattern that was confirmed by

teachers' observations, a pattern they observed were present not only in English lessons, but throughout all subject where Chromebooks were present.

As the amount of distracted students increase and the average time they spend on said distractions increase, less time is spent on developing their academic skill, which can lead to multiple negative outcomes. By facing several distracted students every class, educators themselves will have to spend increased amounts of time and effort on these students, removing their focus from education and reducing the educators' availability for the students who are working diligently on their given tasks.

Another negative side effect of these distraction is the potential divide in students' academic abilities. According to the present research, 45% claimed to spend 0-5 minutes, 38% spent 5-10 minutes, 6% 10-20 minutes, and 10% 20 minutes on off-task activities or more every lesson. With 45% spending close to no time on off-task activities, with 15% spending 10+ minutes every lesson, the divide in their academic skill over time will become split, with the former students having a higher overall performance than the latter, which will not only make lesson planning and adapted learning harder to account for by the educators, but will have a large impact on the students' future opportunities and grades.

It is clear that Chromebooks has several limitations that could be detrimental to students' education in some way or another, with distractions posing the biggest threat. However, there seems to be no solution as of yet to counter them. Some teacher voiced their opinions on consequences being too mild, resulting in students ignoring teachers when caught playing video games as the consequences was less inconvenient than exiting the game. The most 'effective' solution was said to be confiscation of their device, however, this would lead to the student losing access to their documents and 'classroom' which holds all their information and tasks, resulting in the student not being able to work regardless of playing video games or not. Another solution the teachers mentioned would be to block certain websites that are irrelevant to education and only provide distractions, such as snapchat, Crazygamez, and Netflix. However, this solution has been proved to only last for a few days before students either discover ways to maneuver around the block or find new websites containing new distractions. Blocking websites also contain elements of privacy concerns regarding monitoring students' online activities to block relevant websites.

Finding a solution to these limitations have been attempted ever since the implementation of computers in education, however, it is yet to be discovered. Students within lower secondary schools are not mature enough to understand the consequences of

their choices to neglect their education, and by the time they realize it will be too late. The consequences for students who are not following school rules are also becoming increasingly softer, removing some of the authority educators can wield to correct the distracted students, diminishing the authority to the point where teachers experience students who refuse to listen and keeps playing video games even when confronted.

The absence of effective solutions for limitations as disruptive to students' education as these distractions may indicate deficiencies in procedures for managing distracting websites or in handling students who repeatedly violate school rules. It also suggests that the framework supporting the integration of computers into education may have been lacking and is yet to be complete.

In conclusion, while some of the limitations connected to the use of Chromebooks may be minor, some challenges have the potential to largely impact students' education for the worse. Distractions are claiming more and more time as time progresses without any solutions, yet the advantages seem to outweigh these limitations given they are still such a large part of modern education.

#### **4.5 Summary**

To summarize, the discussion chapter has mentioned the importance of teacher competence and its necessity for utilizing Chromebooks to their full potential. Digital teaching competence is especially important for retaining students' motivation and engagement through variety, reducing the chances of students straying from their tasks and moving to disruptive websites. This chapter has also discussed the advantages and disadvantages of Chromebooks in education through analyzing the student and teacher responses alongside prior studies. Through this discussion, some important topics were explored, the current procedures for education teachers within digital teaching competence seem lacking when looking at the current digital state of education, necessitating a need to create a solid foundation that ensures teachers are given the necessary competencies. Another important topic is the presence of the many distractions brought about by computers and the lack of procedures to remove or reduce their influence on students.

## 5. Conclusion

### 5.1 Main findings

The present study was conducted to investigate teachers' and students' utilization and perceptions of the value of Chromebooks in lower secondary grade EFL classrooms in Norway. A mixed methods approach was employed to gather the necessary data from teachers and students to address the study's purpose. Three teachers were interviewed through a semi structured interview process along with a student questionnaire that accumulated a total of 131 responses.

The results of the study showed that Chromebooks, in terms of student and teacher utilization, serve as a multifunctional educational tool that is extensively used by both teachers and students within lower secondary English lessons. Teachers integrate Chromebooks into various aspects throughout their teaching practice, utilizing the multitude of tools, applications, and online features they provide to enhance efficiency and availability alongside a vast platform of differing methods for language learning to provide students with variety in their education. Students on the other hand use Chromebooks as their primary workspace through activities such as taking notes, information retrieval or research, task completion, and data storage, which contribute to enhancing their independence through individual work and availability. Chromebooks have overall become an indispensable part of lower secondary education in Norway, enhancing, and streamlining several aspects of language learning and education in general for both teachers and students.

Results also showed that both teachers and students acknowledge Chromebooks' potential in enhancing language learning, engagement, variety, and overall efficiency in, but not limited to English lessons. Teachers expressed their appreciation for the many opportunities and methods to choose from to create a multitude of different lesson plans and increase variety and motivation. Teachers also observed an increase in student efficiency in terms of writing and conducting their own research through online tools and databases, an observation that was confirmed by students themselves who claimed to have gained increased efficiency and proficiency with Chromebooks and their grammar tools. Students also expressed their desire and preference of executing tasks and activities digitally rather than traditionally. Though there were many benefits, teachers also raised the issue of Chromebooks increasing the number of available distractions, which was further confirmed as the students reported

spending several minutes of each lesson on off-task activities. Another issue that was discussed was the importance of teachers acquiring the necessary competence to utilize Chromebooks to realize their full potential, yet there were no procedures in place to acquire these competencies in their teacher education or through their workplace.

Through the research conducted in this study the issues of teacher competence and student distractions were highly visible. The results uncovered the necessity of acquiring digital teaching competence, but also the lack of training procedures for teachers to acquire them. A lack of measures to deal with certain situations that could cause students to be distracted was also discovered; teachers lack the authority to give the students any meaningful penalties which seemingly led to students ignoring teachers' directions or not even attempting to hide their off-task activities from the teacher's view.

## **5.2 Methodological improvements**

The methodological approaches in this study were conducted in accordance with the allotted timeframe, making it hard to conduct research over a long period of time or conduct interviews with a large number of participants. The main improvement would be to increase the amount and quality the collected information. For the teacher interviews, conducting more interviews would have been beneficial to ensure the generalization of the gathered information instead of relying on three participants. The student material was sufficient in amount, 131 responses, however, conducting some observations, interviews or group interviews could have been beneficial for an attempt to explore the deeper opinions and perceptions they hold for Chromebooks as opposed to the limited amount of nuanced data a questionnaire can gather.

That said, any of the mentioned additions would require substantial additional time, which was not available for this study. Further methodological approaches would also necessitate the need for more ethical considerations such as additional consent and informative forms for both students and their guardians that would lead to even more time being redirected from the analysis and writing of the research to the preparation and collection process.

### 5.3 Future research

While the landscape of educational technology continues to evolve, the need for further research on Chromebooks and other educational technology remains. To gain a deeper understanding of the impact technology poses on modern education further research is needed. Building upon the results of this study, there are multiple areas in need of further research.

Digital teaching competence has been shown to be an important factor in one-to-one computing, yet the lack of training procedures is a concern. A possible direction for future research would be to invest the specific competencies needed, how teachers are expected to acquire said competence, and what the school administration is doing to address the missing competence.

Another research direction would be to investigate the different distractions provided by Chromebooks or computers in general and what motivates students to choose off-task activities over their given assignments alongside research on possible solutions to remove or reduce the amount of time spent on off-task activities.

Lastly, the educational framework seems to have integrated technology assuming it would be beneficial to teaching and learning efficiency and streamlining some of the educational processes. However, there seems to be a lack of supporting foundations underneath the digital integration and a lack of research on the long-term effects this integration could have. Researching what kind of precautions and systems are underlying the ‘digital revolution’ within education and whether the integration was hastily conducted would be an interesting research topic.

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## Appendices

### Appendix 1; Interview guide

Intervjuene vil mer eller mindre følge en struktur med forhåndsbestemte spørsmål, samtidig som det skal være tid or rom for å stille oppfølgingsspørsmål. Intervjuene holdes for å samle informasjon om lærerens bruk og oppfatning av Chromebooks i engelsk undervisning.

#### Spørsmål:

##### Introduksjon:

1. Hvor lenge har du jobbet som engelsklærer?
2. Hvor lenge har du brukt Chromebooks i engelsktimene dine?
3. Hva synes du om all teknologien som er tatt i bruk i dag, både i og utenfor skolen?
4. Hva er dine personlige meninger om bruk av Chromebooks i undervisningen? (*Positiv, negativ, hvorfor?*)
5. Har du fått opplæring og eller en profesjonell gjennomgang av bruk av Chromebooks eller generell brukt teknologi som blir brukt i klasserommet?
6. Holder du deg oppdatert på nye funksjoner og oppdateringer relatert til Chromebooks og eller annen utdanningsteknologi?
7. Oppfordrer ledelsen lærere til å bruke Chromebooks eller annen teknologi i timene sine? (*Hvordan?*)

##### Integrasjon av Chromebooks:

8. Hvordan påvirker bruken av Chromebooks planlegging av timene dine?
  - Planlegger du timer som krever Chromebooks på samme vis som timer der Chromebooks ikke brukes?
9. Hvordan påvirker Chromebooks utførelsen av timene dine?
  - Hvordan vil en time med Chromebooks se ut i forhold til en time uten?
10. Kan du gi konkrete eksempler på aktiviteter eller oppgaver der Chromebooks brukes?

##### Opplevde fordeler:

11. Fra ditt perspektiv, hva er de viktigste fordelene ved å bruke Chromebooks i engelskundervisningen?
12. Opplever du at Chromebooks bidrar til økt engasjement og deltagelse fra studentene? (*Positivt/negativt?*)

13. Har du lagt merke til fremgang eller forbedringer i studentenes ferdigheter eller evner som du tror kan være knyttet til bruken av Chromebooks?

#### **Utfordringer og begrensninger:**

14. Har du støtt på noen utfordringer eller begrensninger ved å bruk av Chromebooks i undervisningen, hvilke?

- Hvis ja; Hvordan håndterer du problemer knyttet til tekniske vanskeligheter eller forstyrrelser under timene? *(Dette kan være alt fra: Tekniske problemer, Elever som spiller, Elever som utnytter forskjellige Chromebooks funksjoner, Elever som forstyrrer hverandre digitalt, osv)*

15. Opplever du at elevene har forskjellige ferdighetsnivåer når det kommer til bruk og navigering av Chromebooks?

- Hvis ja; På hvilke måter?
- Hva tror du dette skyldes? *(Tilgjengelighet av teknologi hjemme? Mangel på opplæring?)*

#### **Chromebooks i Engelskundervisning:**

16. Opplever du at Chromebooks påvirker måten du underviser Engelsk på?

17. Mener du at Chromebooks kan bidra til å fremme elevenes engelsk ferdigheter?

- Hvorfor?
- Eksempler

18. Har du noen konkrete eksempler på hvordan du kan bruke Chromebooks for å styrke språkferdigheter?

19. Har du noen spesielle Chromebook verktøy du ofte bruker/ønsker å bruke for å fremme engelskferdigheter?

20. Ser du noen forskjell på hvordan elevene lærer engelsk gjennom chromebooks i motsetning til læring i bøker/tradisjonell skole?

- Hvis ja; På hvilke områder ser du forskjell?
- Hvorfor tror du disse forskjellene oppstår?
- Hvordan tar/kan du ta hensyn til disse forskjellene i planlegging og gjennomføring av timene dine?

**Studentinteraksjon:**

21. Hvordan arbeider/bruker studentene typisk med Chromebooks under engelsktimene?
- Hvordan håndterer elevene Chromebooks?
  - Gjennomfører de oppgaver slik som de skal uten tull?
  - Klarer elevene å finne frem til siden og oppgavene de skal uten å sløse tid?
22. Har du lagt merke til noen endringer i studentenes samarbeidsmønstre og kommunikasjon med hverandre etter at de har brukt Chromebooks?

**Pedagogisk innvirkning og opplæring:**

23. Opplever du at bruken av Chromebooks har påvirket dine undervisningsmetoder?

**Studenttilbakemelding:**

24. Har du samlet inn tilbakemelding eller fått tilbakemelding fra elever om deres meninger og erfaringer med Chromebooks?
- Hvis ja; Hvilken type tilbakemelding har du fått, og hva sier elevene?

**Chromebooks fremtid:**

25. Hvordan ser du for deg at Chromebooks rolle vil utvikle seg fremover i forhold til engelsk undervisning?

## **Appendix 2; Questionnaire questions**

Jeg ønsker å utforske hva ungdommer på 8-10 trinn synes og tenker om bruken av Chromebooks i engelskundervisning. Spørreundersøkelsen er anonym. Takk for at du deltar!

### **Seksjon 1: Generell informasjon**

- 1 Ditt kjønn:
  - Gutt
  - Jente
  - Ønsker ikke å oppgi
  - Annet
- 2 Hvilket trinn går du på?
  - 8. Trinn
  - 9. Trinn
  - 10. Trinn

### **Seksjon 2: Bruk av Chromebook**

- 1 Hvor lenge har du brukt Chromebooks i engelsktimene?
  - Mindre enn ett år
  - 1-2 år
  - 2-3 år
  - Mer enn 3 år
- 2 Hvor ofte bruker du Chromebook i engelsktimene?
  - Sjelden
  - Noen ganger
  - Ofte
  - Alltid
- 3 Hvilke av disse engelskferdighetene øver du på med hjelp fra Chromebook?  
(Flervalg)
  - Skrijving
  - Lytte til opptak/video
  - Lesing
  - Snakking
  - Grammatikk
  - Ordforråd

- 4 Hvilke av disse digitale ferdighetene øver du på når du bruker Chromebook?  
(Flervalg)
- Søke etter informasjon
  - Finne bilder / Videoer
  - Bruke digitale verktøy og programmer (google slides, regneark, osv.)
- 5 Når du bruker chromebook i engelsktimene jobber du oftest;
- Alene
  - To og to / Gruppevis
  - En blanding av begge
- 6 Hvor enkelt synes du det er å bruke Chromebook? 1 = Veldig vanskelig, 4 = Veldig enkelt.
- 1 Veldig vanskelig
  - 2 Litt vanskelig
  - 3 Litt enkelt
  - 4 Veldig Enkelt
- 7 Hvor ofte møter du på problemer med å holde fokus på skolearbeid når du bruker Chromebook i engelsktimene?
- Ofte
  - Noen ganger
  - Sjelden
  - Aldri
- 8 Når du bruker Chromebook i engelsktimene, hvor mye tid bruker du på aktiviteter som ikke er skolerelatert? (Spill, Youtube, osv.)
- 0 minutter
  - 5-10 minutter
  - 10-20 minutter
  - 20+ minutter

### **Seksjon 3: Fordeler og ulemper**

- 1 Opplever du at Chromebook gjør det lettere å fullføre oppgaver og aktiviteter i engelsktimene?
- Ja
  - Nei
- 2 Opplever du at det er enklere å jobbe i grupper/to og to når dere bruker Chromebook?

Ja

Nei

Jeg bruker kun Chromebook når jeg jobber alene

- 3 Opplever du at Chromebook gjør det enklere å finne/få tilgang til nødvendig/ny informasjon og ressurser i engelsktimene?

Ja

Nei

- 4 Har du noen gang opplevd tekniske problemer med Chromebook under engelskundervisningen?

Ja

Nei

- 5 Opplever du at det er situasjoner der Chromebook begrenser deg eller gjør oppgaver mer kompliserte enn de trenger å være? Hvilke situasjoner?

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#### **Seksjon 4: Preferanser og alternativer**

- 1 Disse aktivitetene kan gjøres både med eller uten Chromebook, hvordan ønsker du vanligvis å utføre disse aktivitetene?

- a) Skrive / Jobbe med oppgaver

Chromebook

Uten Chromebook

- b) Samarbeidsoppgaver

Med Chromebook

Uten Chromebook

- c) Lete etter informasjon / Kilder

Med Chromebook

Uten Chromebook

- d) Lese

Med Chromebook

Uten Chromebook

- 2 Hvilken type undervisning liker du best?

Undervisning med og i bøker

Undervisning med Chromebook



## Undervisning med en blanding av både Chromebook og skolebøker

### Seksjon 5: Tilfredshet og motivasjon

- 1 Hvor tilfreds er du med bruk av Chromebooks i din engelsklæring på en skala fra 1-4?

1 = veldig misfornøyd, 4 = Veldig fornøyd.

1 Veldig misfornøyd

2 Litt misfornøyd

3 Litt fornøyd

4 Veldig fornøyd

- 2 Føler du deg mer motivert for å lære engelsk når du bruker Chromebook enn når du bruker skolebøker?

Mer motivert

Like motivert

Mindre motivert

### Seksjon 6: Tilleggs kommentarer

- 1 Hvis det er noen andre kommentarer du ønsker å komme med angående bruken av Chromebooks i engelsktimene, vennligst del dem i feltet under.

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