The means to the ends of education. Technology in the new core curriculum for basic education of Finland

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1 Introduction

The use of technology is one of the most discussed issues in modern schooling. The use of technology in the classroom, whether it be computers to look up detailed information on the internet or smartphones to play mathematics-based games, has led to much debate and directly conflicting perspectives.

This study will look at the new core curriculum for basic education of Finland, published in 2014 and effective starting in 2016. The study will try to discover how the goals of the curriculum correlate with its guidelines where the use of technology in education is concerned. In addition, the study will look at reasons given in the curriculum for the use of technology in education. Finally, the study will also attempt to compare guidelines set for different stages of basic education, i.e. for example those concerning 1st to 2nd grade and those concerning 3rd to 6th grade. In this study, I will also try to look at how the curriculum explains the need for the use of technology in education, i.e. the reasons behind the influx of technology in the 21st century classroom.

This study is relevant because at the time of writing, the new curriculum has been in effect for less than a year, so its integration can be considered to still be a work in progress. Furthermore, the new curriculum is the first new national curriculum since 2004, meaning that advancements in technology and other fields over an entire decade are considered. It can be said that general use of technology has changed substantially in everyday life during that period and this has had its effects on education as well. The new curriculum can hence be considered an update on the scope of involvement that technology should have in education according to the Finnish National Board of Education (Opetushallitus).

One important matter for consideration here is the role of technology: On one hand, it can be treated as a tool or a means in trying to achieve something else. On the other hand, it can be treated as a goal, an end, and other factors are altered to adhere to this goal. In other words, this is the question of whether technology has an intrinsic or an extrinsic value. In contemporary education, this becomes relevant in the use of educational technology when the reasons behind its application are placed under consideration: Is the use of technology in education based on how it benefits education and its ends, or is technology used only because it is considered important, becoming the end instead of the means in the process?
This study will attempt to answer the following questions: How is the use of technology in education explained in the curriculum and what reasons are given for its application? Also, how do the goals presented in the curriculum correlate with the stipulations therein? And how are age differences among pupils taken into account in these regulations?
2 Background

In this section, I discuss the current status of educational technology and its use in schools, as well as present some established arguments regarding the use of technology in schooling.

2.1 Current educational use of technology

The increase of technology in the classroom has not only been under much discussion among teachers and more generally within the society, but it has also become increasingly present in political discussions, and digital competence has been named one of eight key competences of lifelong learning by the European Union (Eichhorn, Eickelmann Erstad, 2015, p. 647). It has thus become something that is not only an element that is visible in schooling, but also an essential part of schooling as a result of its ongoing integration. The educational technology used in schools at present can be divided into two subcategories: technology applied to education and technology created for education. The difference here is that the first type refers to technology which is used widely and which most people of a particular society should be familiar with, and which is used for educational purposes, though that is not its original purpose. An example of this might be the use of tablet computers in schools. The other type refers to technology which has been designed to be used in education or similar fields, and so its use is more restricted to education. An example of this might be the interactive whiteboard. This is not to say that this type of technology would be exclusive to educational use, but educational use is what these technologies have been designed for, and so enhancing education has been their purpose. It should be noted also that while the word technology is often used to mean digital devices, it has a broader meaning which can be applied to not only 21st and 20th century machines, but also older inventions and tools which are taken for granted in contemporary society. However, in this thesis, it is mostly confined to its 21st century context.

When discussing the educational use of technology, the term information and communications technology (ICT) is used. While the use of the term is not restricted to education, it is used extensively in discussions pertaining to educational technology. Another term which is often employed in discussing modern education is multiliteracy, which means examining and understanding information as presented through several different kinds of media. The national curriculum defines multiliteracy as follows:
Multiliteracy is the competence to interpret, produce and make a value judgement across a variety of different texts, which will help the pupils to understand diverse modes of cultural communication and to build their personal identity. Multiliteracy is based on a broad definition of text. In this context, text refers to knowledge presented by systems of verbal, visual, auditive, numeric and kinaesthetic symbols and their combinations. For example, text may be interpreted and produced in a written, spoken, printed, audiovisual or digital form. *(National Core Curriculum, 2016, p. 23)*

With the emergence of different media platforms in the 21st century, multiliteracy can be said to have become increasingly important in recent years and to continue this increase in significance as the 21st century progresses.

In Finnish classrooms, ICT is mostly used in searching for information on the internet, making slideshow presentations and in showing pupils material from the internet to for example illustrate a topic which is being studied—in fact, computers and other devices are mostly used for exchanging and presenting information, not in actual teaching *(Finnish National Board of Education, 2011, p. 10)*. ICT is also used in written tasks and interactive exercises *(Sallasmaa et al., 2011, p. 102)*. According to the Finnish Ministry of Education *(2010)*, while ICT use in education has been invested in, approaches to education have not changed sufficiently to take advantage of this, and while ICT is used daily in some schools, other schools have been slow to adopt educational technology *(p. 8)*.

Despite the support for the use of technology in education, it is the teacher who ultimately decides how much and in what ways technology is used in education, and so a teacher’s abilities and attitudes regarding educational technology are the main factors in the use of technology in a classroom *(Kumpulainen & Lipponen, 2010, p. 12)*. The national curriculum hence mostly acts as a guide and not a set of rules where the use of technology is concerned. *(Kumpulainen & Lipponen, 2010)* also state that teachers in Finland often use ICT for methods which support the individual studying of their pupils, but only little for studying that is collaborative or based on problem solving.

Where the use of digital technologies in schools is concerned, not only are there differences between schools and teachers, but the differences within a single school can be substantial as well. According to one study, the approaches of teachers to the use of technology in education vary significantly, and so teaching materials should be designed accordingly, and not in ways that would embrace uniformity. *(Ilomäki, 2012, pp. 7-8)*
2.2 Perspectives for and against the use of technology in education

The attitudes teachers have had towards the use of technology in schooling have typically been diverse: there are those who support the idea of consistent adoption of technology into education, as well as those who do not wish to adopt new technology at all.

Selwyn states that since at least the 1970s, education systems have come under constant criticism in, for example, political circles for underachieving, and the use of technology in education has simultaneously been touted as a quick fix for these problems. In addition, this tenet has a cyclical nature, and has been very consistent throughout the past few decades, with the main change in the discussion being the technological developments in question, for example social media in the late 2000s. (Selwyn, 2011b, pp. 10-12) Some of the criticism regarding the actual use of technology in schooling has been directed at the notion of the use of ICT resulting in a decline of cognitive abilities, i.e. that people rely on the easy accessibility and effectiveness of technology to the detriment of their mental prowess (Selwyn, 2011, p. 13). Also, this kind of criticism has not only been directed at the use of technology in education, but the status of technology in the modern society as well.

When reasons for the application of technology in schooling are considered, one typical response is the need to familiarise pupils with the technology that they will be needing after they have graduated and found a job (Selwyn, 2011a, pp. 23-24). Indeed, such devices as tablet computers have become increasingly common in most jobs, and it would hardly be outlandish to say that someone who has recently graduated from for example a university but does not know how to use one might sometimes be considered underqualified. Meanwhile, this raises the question of what is the role of school and what is its purpose: should all employment-related issues be scrutinised in the school system? However, it is worth pointing out that these devices are not only used in contemporary working life, but also when dealing with everyday matters. In junction, the continuous, recent increase in their use has also meant that knowing how to use said devices is no longer considered solely the realm of people who constantly use them in their work, but everyone else as well, and this is another argument siding with the increase of technology in education which has become dominant in the modern age (Selwyn, 2011a, p. 24).
The other common response is that there is a need for teaching to remain contemporary and modern, and therefore it is imperative to provide pupils with the newest technological gadgets available (Selwyn, 2011a, p. 23). However, this would also mean that considering the pace at which new devices are developed and popularised, it would be necessary to present the schools and the pupils with new devices periodically, for example every five years. This would not only mean that the pupils would constantly need to get used to new devices soon after learning how to handle the previous ones, but it also means that teachers need to be trained to use these devices, meaning financial expenses and time away from other duties, as well as constant large-scale expenses for the schools. The main critique here is usually reserved for focus. There may sometimes be a call for further consideration around the question of whether all of this is truly relevant and essential (Selwyn, 2011b, p. 12), especially considering the previously mentioned potential issues which are not temporary, but resurface every time there is another attempt to modernise schooling, as the current pace of technological advancements renders long-term plans meaningless. This also concerns the question of what is truly important in schooling, i.e. the role of knowledge and how that will change in the future.

Postman (1996) argues that people tend to treat technology much in the same ways as they treat gods (gods as symbols, not gods as entities):

…at some point it becomes far from asinine to speak of the God of Technology—in the sense that people believe technology works, that they rely on it, that it makes promises, that they are bereft when denied access to it, that they are delighted when they are in its presence, that for most people it works in mysterious ways, that they condemn people who speak against it, that they stand in awe of it, and that, in the born-again mode, they will alter their lifestyles, their schedules, their habits, and their relationships to accommodate it. If this be not a form of religious belief, what is? (Postman, 1996, p. 38)

This pinpoints the general concern of how technology is not only always present as a passive factor, but also a constant focus of attention in the modern times. It should perhaps also be noted that Postman wrote the above quote in 1996, before the more recent increase of dependency and focus on technology. Nevertheless, this matter of people devoting their attention to technology can be concerned a case of something—in this case, technology—originally being treated as having extrinsic value, but becoming something which is treated intrinsically. Because technology is so omnipresent in the modern society, there is a risk of this sort of a scenario happening, and education is also potentially under the influence of such ways of thinking.
Selwyn (2011a) states that fears regarding modern implementation of technology into education can largely be considered reflections of more general societal concerns, whereas technology as an element of learning theories is based rather on assumptions than research (p. 84). Attempts at studying what kind of an effect technology actually has on learning have been problematic, as it is hardly possible to scrutinise technology and education without the interference of social and cultural factors. Furthermore, studies which have managed to do this to some degree have had mixed results. (Selwyn, 2011a, pp. 84-85) For example, Barrera-Osorio and Linden (2009) present several studies that have been conducted to find out if technology is beneficial to education by itself, and the results of these studies vary: some are positive, others are mixed and some negative, but there is no correlation or interrelated consistency among these studies (pp. 3-4). While many studies have been conducted to try to find out if technology truly is beneficial to education, there are some problems which are common among such studies, with the most typical problem being that calculating how technology actually affects learning while eliminating all other factors involved is very difficult to actually accomplish. Often the most difficult questions when starting to structure these studies are those pertaining to the setting up of the study.

Potential reasons for the use of technology in education have included reasons based on the nature of technology as a medium, including its cost-efficiency and convenience as opposed to those of more traditional mediums, such as books (Selwyn, 2011a, p. 92). Technology has also been thought to decrease the amount of social inequality in education, as it is thought to improve the level of inclusivity in education. This is based on the hypothesis of technology acting as a tool which provides people who have disadvantages a means through which to reach the same basic level as people who do not have these disadvantages. (Selwyn, 2011a, pp. 93-94) However, social inequality exists in the realm of technology use as well in the form of people of different financial statuses having different levels of access to technological equipment; this is called the ‘digital divide’ (Loveless, 2003, pp. 81-82) and it is another challenge for schools in the use of ICT and in considering if pupils should bring their own devices or if schools will have to provide them with for example computers. As for the scope of the term ICT, it can be said to mean every kind of technological equipment which relies on the transmitting of information, for example computers and mobile phones.

It has also been said that the world we live in has changed and continues to change so drastically that every level of the educational systems must change during the course of a decade. This would
also mean that schools must continue to change in order to provide pupils with the tools necessary to conduct their lives in the 21st century. (Niemi & Multisilta, 2014, p. 10). The use of technology in schooling has also been supported by the idea that it enables teachers to use approaches which would otherwise not be possible, and thus pupils learn new things which they could otherwise not have learned, as learning these things is so closely attached to technology (Niemi & Multisilta, 2014, p. 12).

2.3 Perspectives on the applicability of technology in education

The national core curriculum is built around the idea that pupils are seen as active participants of the learning process (National Core Curriculum, 2016, p. 17), and here it is relevant to examine some contemporary learning theories which relate to the regulations presented in the curriculum. As pupils are active participants of the learning process, the learning theories considered will also on some level have to be based around the idea of the learner being an active participant in the learning process, and not just a receiver of information. There are three educational theories which are particularly relevant in this study: the constructivist learning theory, the sociocultural learning theory and the ecological learning theory.

The constructivist theory is built around the idea that when acquiring knowledge, people do not merely receive information, but their pre-existing knowledge moulds their understanding of their newly acquired knowledge (Driver, 1995, p. 386). The main idea in constructivism is that learners do not simply receive information as they are taught something, but the information they acquire assimilates to their preceding knowledge, and so pupils have a very active role in the learning process (Gergen, 1995, p. 18-19). According to Selwyn (2011a), the idea of learning through constructing an individual understanding was the main proponent for the enthusiasm behind computer-based learning in the 1980s and 1990s (p. 73). As for the role of technology from a constructivist perspective, technology is a useful tool for extending a learner’s exploration and for helping him construct the knowledge he acquires whilst acting as a substitution for real-world settings and as a platform of knowledge which can be moulded in accordance with the learner’s needs (Selwyn, 2011a, p. 74). In constructivist thinking, learning is essentially dependent on reflection, self-regulation and abstraction (von Glasersfeld, 1995, p. 14).

Another relevant theory of development is the sociocultural theory, which is largely based on Lev Vygotsky’s ideas. The sociocultural theory is built around the idea that individuals are reliant on
tools, which can be physical or symbolic, and these tools enable people to alter the world around themselves and to communicate with each other and with the world. With the passing of time, tools tend to change, and so each generation sees each tool differently from the previous ones. The tools are then altered to suit the purposes of the individuals and the communities. Additionally, the manner in which people act is dependent on social and cultural factors. (Lantolf, 2000, pp. 1-8) In this context, technology can be considered another tool which alters the world of the individuals and which the individuals then alter in turn. Another important aspect of this theory is the zone of proximal development (ZPD), which means the contrast between the mental potential of an individual when working together with someone or something else as opposed to when he is acting by himself (Lantolf, 2000, p. 17). As implied, the element which aids the individual in his task does not have to be a person, and can well be a physical tool. In the modern society, technological equipment can assume the role of this tool, and this can be seen in 21st century schooling as well. According to Selwyn (2011a), the sociocultural approach is often at the centre of the application of technology in education; here, the role of the environment in which pupils live becomes significant (p. 76). Technology is seen as a key tool in both gaining access to information and in enabling the individual to communicate in new, broader ways outside of their educational environments (Selwyn, 2011a, p. 77). In this sociocultural approach, education is first and foremost a social process which is dependent on the culture which surrounds the learners, meaning that realistic contexts and activities are used to authenticate learning (Selwyn, 2011a, p. 78).

Another learning theory, the ecological learning theory, emphasises the interaction between the individual and different systems around them. Van Lier states that from the ecological perspective, “the learner is immersed in an environment full of potential meanings. These meanings become available gradually as the learner acts and interacts within and with this environment.” Additionally, learning is “the development of increasingly effective ways of dealing with the world and its meanings.” (Van Lier, 2000, p. 246). In language learning, the ecological approach concerns relations and connections, not objects or singular ideas (van Lier, 2000, p. 251). The theory is based around the idea that the individual is moulded by different systems, which are essentially elements of his environment.

The use of educational technologies is relevant here as well. When used for the purposes of education in the classroom, “digital technologies are used to reinforce face-to-face instruction, individual student learning, educator professional development, distance learning, and many other educational activities” (“Observing the users”, 2007, p. 87).
3 Materials and Methodology

The Finnish National Board of Education releases a new national curriculum every ten years, with the curriculum released two years before it becomes active. The recent curriculums were released in 1994, 2004 and 2014 and became active in 1996, 2006 and 2016 respectively. The Finnish Basic Education act states that the core curriculum contains the goals and contents of general education as decreed by the National Board of Education (Basic Education Act, 2003).

The National Board of Education has decreed that with the introduction of the new curriculum, schools and other educational institutions must create their curriculums and adhere to the regulations presented in the national curriculum. Schools are not allowed to divert from the schedule of the introduction of the curriculum or the stipulations therein. (National Core Curriculum, 2016, pp. 3-4) The role of the core curriculum is to provide local institutions with the general means and ends of education, and to provide a basis upon which local curriculums are built on.

This study is based on a content analysis of the new curriculum of general education. The data in the curriculum that is used here is chosen according to how relevant it is as regards the research questions of the thesis. This data is then analysed qualitatively. According to Neuendorf, “content analysis may be briefly defined as the systematic, objective, quantitative analysis of message characteristics” (2002, p. 1). In addition, part of this study is dedicated to contrasting the differences within the curriculum among the regulations for different pupil age groups, and that part of the study will assume a comparative approach. The specifications for teaching specific subjects will not be taken into consideration in answering the research questions and are therefore exempt from this thesis. As such, this study will only focus on the general, non-specific sections of the curriculum.
4 Results and analysis

In this section, I examine the curriculum and proceed with the analysis. In section 4.1, I examine the regulations within the parts of the core curriculum which are not age-specific and can thus be applied to all pupils. I use these regulations to form an overview of the status of technology in the curriculum and to discuss questions pertaining to the role of technology, its relation to the idea of intrinsic and extrinsic values and its applications. In section 4.2, I consider the age-specific sections of the core curriculum and compare the differences in regulations for different age groups.

4.1 Status of technology

The first issue I look at in this analysis concerns the reasoning behind using technology in basic education. This is elementary in judging whether technology is seen in the curriculum as an intrinsic or extrinsic value, as the purposes for its use largely define this judgement. However, it is not only the matter of intrinsic versus extrinsic that is relevant here, but also the extrinsic qualities of technology in education, i.e. the reasons and applications behind its use.

Regarding the general relationship between people and technology, it is stated in the curriculum that the ways in which people develop and use technology as well as how they make decisions about it is based on their values (National Core Curriculum, p. 17). It can hence be said that according to this statement, the role of technology in the lives of people is in fact their decision. Of course, there is a distinction to be made here between individuals and communities: an individual may choose to avoid technology when possible, but the individual is simultaneously dependent on the role which the society assigns to technology.

Additionally, people “have a responsibility to steer technology into a direction that safeguards the future of humans and the environment” (National Core Curriculum, p. 17). It is emphasised here that the use of technology—along with its relevance in education—is based on the idea that technology is a potentially volatile element in our daily lives, and everyone should be taught to handle it in a way that it is the user who control the output of the use of technology, and this is accomplished through considering matters of choice and value with the pupils. The reason, then, behind this application of technology in education, is to help pupils understand it and use it in ways that are beneficial to society in general. Additionally, calling this a matter of ‘safeguarding’ would
imply that this approach is based on preservation. The matter of steering technology into a direction which would protect the future of humans and the environment should be considered an enormous responsibility, and perhaps it is to some degree beyond the confines of basic education. Even so, this purpose of protecting sustainable development heeds the idea that technology should be moulded to make this possible. Furthermore, it is stated in the curriculum that “In basic education, the pupils examine the conflicting aspects of our modes of consumption and production in terms of a sustainable future, and seek and jointly put to practice solutions that improve our way of living over the long term” (p. 17). Hence, pupils are effectively expected to contribute to the discussion of improving the status of sustainable development. As technology is supposed to be steered in the direction of protecting people and the environment, it could be argued that technology becomes a simple tool which is used to find answers to the global problems pertaining to, for example, dangers to the environment. In this area, technology is certainly presented as a means to achieve solutions to very broad problems.

Technology is, however, not only an instrument which is used to discover ways to save the planet and its species, as its daily presence in the lives of modern people is a matter under scrutiny as well. While it is mentioned to be an element which can have a grand effect on society in general, technology is also seen as an integral part of day-to-day life and the individual’s familiarity with it as essential:

The pupils need basic information about technology and its advancement and its impact on various areas of life and their environment. They also need advice in sensible technological choices. In instruction, the versatility of technology is examined, and the pupils are guided to understand its operating principles and cost formation. The pupils are also guided in using technology responsibly and invited to consider ethical questions related to it. (National Core Curriculum, 2016, p. 23)

Here, technology skills are presented as something everyone should be familiar with, and education’s role is to provide pupils with these skills which are considered to be essential in the modern world. This corresponds with the socio-cultural perspective presented in section 2.3. It is also recommended that pupils develop a critical approach as regards technology and its use. At the same time, not only are the pupils’ abilities in using technology emphasised, but their understanding of the way technology works, i.e. its processes. The influence which technology has on the pupils’ lives and their societies is also considered important, and this can lead to a more holistic perspective on the part of the pupils in their consideration of the role of technology as well as its interwoven relationships with other systems.
As stated in section 2.2, demands and realities of modern working life have been one reason behind the increased presence of technology in schooling. It is stated in the curriculum that “working life, occupations and the nature of work are changing as a consequence of such drivers as technological advancement and globalisation of the economy” (National Core Curriculum, 2016, p. 24). In this fragment, the use of technology in schooling is explained as being a matter of adapting to the demands of modern working life, correlating with some of the expectations concerning the use of technology in education. However, if school is considered to take such a direct approach in preparing pupils for their future jobs, it could be argued that this should not be limited to the use of ICT, but school should do even more to prepare people for working life, raising the question of the extent to which school should prepare pupils, and whether the purpose of the educational system is in fact to prepare pupils for everything they might face in their working life.

Skills related to the use of ICT have also become increasingly important, and are often seen as civic skills which all citizens should be familiar with. The Finnish ministry of education has named a set group of skills which are to be considered civic skills. These civic skills of the modern age include, but are not limited to, “critical thinking, problem solving, working collaboratively and in networks and being able to use information technology (Ministry of education, 2010, p. 4). The curriculum considers these new civic skills as well; it is stated in the curriculum that the ability to use ICT is not only an important civic skill, but also significant as part of multiliteracy, and where schools are concerned, it is said to be “an object and a tool of learning” (National Core Curriculum, 2016, p. 24). Defining ICT as a civic skill underlines its importance in modern society, and ICT competence is thus seen as essential. As before, the role of ICT as a learning tool is emphasised. ICT is also mentioned to be important as part of multiliteracy, and it can be said that as the 21st century media relies largely on digital devices as a platform for spreading information, the role of ICT as a tool for gathering information becomes increasingly significant not only in working life, but also in society in general. As for the scope of ICT in school, it is stated in the curriculum that it is ensured in basic education that every pupil is able to improve their ICT competence, and ICT is “methodically exploited in all grades of basic education, in different subjects and multidisciplinary learning modules, and in other school work” (National Core Curriculum, 2016, p. 24). This essentially means that ICT is used across the entire school system and the education system also attempts to ensure that there is no inequity among pupils in their access to ICT. This can be problematic, since the degree to which schools have access to ICT and to which it is used varies between schools and geographical areas.
The curriculum also emphasises that when using ICT in learning, the pupils should be active and have opportunities to use their creativity and find ways to work and learn which are suitable for them (National Core Curriculum, 2016, p. 24). Sociocultural and constructivist viewpoints are relevant here, as the emphasis is on the pupils’ individual attributes and aspirations as well as on finding ways to use technology which are valuable to the pupils themselves. In addition, the pupils’ choices matter as well: activity is encouraged and pupils should themselves figure out how they could best use ICT to learn. It is also stated in the curriculum that through the diverse and appropriate use of ICT, the possibilities of the pupils for developing their working approaches and networking skills are expanded, and through this, their capabilities for independent, interactive and critical acquisition and processing as well as the creative production of information is enhanced (National Core Curriculum, 2016, p, 32). Again, the pupils’ perspectives and potential opportunities are pointed out as the reasons behind the use of ICT, and ICT is considered a useful tool for helping the pupils to improve their media literacy. However, the use of ICT is not restricted to mere understanding and processing of data, but also applied to creative work, perhaps in part by juxtaposing processing and producing information.

It is also stated in the curriculum that ICT is used to “promote interaction and the use of multiple senses and channels” in project work (National Core Curriculum, 2016, p. 29). This has to do with the diverse applicability of technology, and with the proposition that pupils take a wider approach to studying than simply looking up information and using it in a specific way, emphasising a perspective where technology effectively acts a mediator and is mostly the platform used for enhancing and presenting the work.

On considering the applications of ICT and its relation to other factors in the classroom, two elements of contemporary education are relevant in this context: learning environments and learning to learn. Both of these elements have been altered considerably through the introduction of technology into education. As a term, learning environments can sometimes even be restricted to the different application of ICT in the classroom. According to the curriculum, ICT is a key part of versatile learning environments and it can help reinforce pupils’ participation and skills in communal work, as well as support their personal learning paths (National Core Curriculum, 2016, p. 31). There has been a shift in the use of learning environments in the 21\textsuperscript{st} century, and as ICT is here considered a key part of these environments, it is likely that technology will become more present not only in classrooms, but also in extracurricular activities as well as other areas of schools.
As mentioned, another matter open to discussion in modern schooling is the question of learning to learn, which is related to the theory of constructivism. It is stated in the core curriculum that part of the improvement of learning-to-learn skills is based on the possibility of using technological and other tools in learning. The scope of the use of said tools is said to depend on the age of the pupils. *(National Core Curriculum, 2016, p. 22)* Learning-to-learn skills dictate how pupils take care of their own studying, including researching for information, and it can be said that the role of technology has increased significantly in this area in recent years.

In answering the question about the role of technology in the curriculum, it was discovered that technology is seen as a key tool in shaping the 21st century human and to help him acquire skills which are considered important in the present and especially the future of our modern society. These skills include for example multiliteracy and ICT competence, and are considered essential in both personal and working life. The role of technology is also to help shape pupils in a way that they would exhibit some attributes which are considered favourable, for example a willingness to contribute to sustainable development and a critical way of thinking.

### 4.2 Differences between age groups

It is also relevant to look at the differences between the use of technology for different age groups in basic education. It can be said that in the 1990s, children were sometimes protected from the potentially harmful effects that technology might have on them; this was particularly present in discussions pertaining to the use of video games. However, now, in the late 2010s, it is not uncommon for a child to be acquainted with technology from a very early age, and to own digital devices and use them on a daily basis at the age of three or four. Therefore, the differences between age groups in the use of ICT in education would act as an indicator for the contemporary attitudes towards technology in the realm of education.

First, it would be relevant to examine the differences in the role of technology between the age groups. This matter can be divided into two subtopics: the general roles of technology and how the use of technology is approached in schools, and these subtopics do overlap with each other.

Per the curriculum, the general roles of ICT are quite diverse: in grades 1-2, pupils, with the help of their teacher, observe everyday technology and its importance in everyday life and learn to use technological devices safely while also learning about the related etiquette *(National Core
Curriculum, 2016, pp. 106-107). This continues in grades 3-6, but the range of these actions is widened and there are some additional elements involved. These include observing the influence of technological development on ideas of life and different types of environments, reflecting on ethical questions pertaining to technology and its use and pupils being guided to take responsibility for their communication, including familiarising themselves with basic copyright principles (National Core Curriculum, 2016, p.166). Per these regulations, the approach used in grades 1-2 is mostly descriptive, and pupils are for the most part expected to merely learn the basics of using technological devices. Other than that, pupils are expected to learn how to behave properly and manage digital devices. During grades 3-6, pupils are steered towards a more critical approach, where they not only use technology but also question its role in the society. The effects technology has on the world are also looked at more broadly. As pupils are also expected to know basic principles of copyright, they also adopt a more mature role in the way they work, and do not only concern themselves with the information in the work they do, but also with the dos and don’ts involved in the use and circulation of information. As pupils reach grades 7-9, the degree of the previous regulations and expectations is once again broadened further, with pupils also expected to take a more active role in moulding technology to suit their needs. Pupils are at that stage instructed to understand basic operating principles of technology and how to protect themselves from security risks and data loss (National Core Curriculum, 2016, pp. 303-304). Pupils are hence also taught to take the necessary steps in preserving and protecting their work, establishing them as constant users of ICT. Learning to understand operating principles of technology can of course help pupils grasp how their devices actually work and thus enable them to improve their efficiency.

As a continuation of being acquainted with copyright laws during grades 3-6, pupils also learn of the potential repercussions of irresponsible and illegal activities (National Core Curriculum, 2016, p. 304). This approach emphasises the legal issues that can be involved with ICT use. It can be said that modern advances in digital technology, and in particular the immense availability of information, have considerably increased the chances of individuals violating copyright matters without realising that they have done so, and it can certainly be considered an easy error for young people to make.

Social networks have also become increasingly popular in the 2000s and the 2010s, and while the relationship between technology and society is observed in the use of ICT in education as previously mentioned, social networking is entirely dependent on ICT, and also has a role in the curriculum. While it is not part of the schooling of 1-2 graders, during grades 3-6, pupils are
provided with opportunities for networking and communicating with people from different parts of the world in language studies (*National Core Curriculum*, 2016, p. 136). Communicating internationally has been present in school before, often in the form of sending letters to pen pals in schools in other countries, but the use of ICT creates an entirely different array of possibilities in worldwide communication in scope, medium and speed.

During grades 7-9, networks become increasingly available and relevant to pupils. It is also discussed in the curriculum how social networks can be used to enhance school work in enabling pupils to experience how cooperation and interaction benefit learning and creativity (*National Core Curriculum*, 2016, p. 304). Pupils are also guided to find suitable communication channels and styles for different users and they can use ICT in global interaction and learn to perceive its significance, potential and risks in the global world (*National Core Curriculum*, 2016, p. 304). Through this means, it is possible for schools to influence pupils in how they perceive social networks, and also to develop an approach regarding social networks which might help pupils avoid their potential downsides.

The other subtopic mentioned earlier was the question of the ways in which technology is approached in schools, i.e. the manifestations of ICT. As per the curriculum, technology is present in schooling from a very early point: During grades 1-2, pupils practice basic ICT skills and learn to use them in their studies as well as learn about different applications and uses of ICT in their surroundings and the importance of ICT in daily life (*National Core Curriculum*, 2016, p. 107). This basic presence of ICT can be considered a sort of an introduction to the world of technology, as its use is kept to a basic level and the role and scope of ICT in the society are discussed. During grades 3-6, the amount of ICT increases, and pupils practise using devices, software and services while learning their key principles of use and operation (*National Core Curriculum*, 2016, p. 107). It can be said that the difference between grades 1-2 and 3-6 is a case of the pupils moving from the role of an observer and receiver of information to an active user, all the while also trying to acquaint themselves with the functions of the machines.

The use of ICT in looking up information is also discussed in the curriculum, and changes progressively through the age groups. For instance, during grades 1-2, pupils are guided to use search engines and try different tools as well as encouraged to use ICT to realise their ideas for their assignments both independently and by collaborating with other pupils (*National Core Curriculum*, 2016, p. 107). Looking up information is therefore at a basic level during this stage and pupils are
merely introduced to the concept of searching for information. During grades 3-6, this is amended through a more versatile use of information sources and pupils are also guided in comparing the appropriateness of the information they find (National Core Curriculum, 2016, p. 167). At this point, pupils are introduced to the concept of critical reception of information, and this continues during grades 7-9, with the diverse use of databases and search engines commended (National Core Curriculum, 2016).

The final factor which is discussed here is the use of different devices in schooling. During grades 1-2, there is no significant effort to use digital devices; as mentioned earlier, pupils are familiarised with basic ICT use, while the ICT skills they have acquired before and outside primary education are exploited to help their learning (National Core Curriculum, 2016, p. 107). In other words, use of ICT at this point is dependent on how present ICT is in the pupils’ lives outside of school. During grades 3-6, however, as per the curriculum, pupils learn to use different devices, software and services to improve their understanding of the logic behind their use and operation (National Core Curriculum, 2016, p. 167). Though pupils’ access to technological devices is more restricted during earlier stages of schooling, during this stage they are able to try to understand their use more actively. Also, the emphasis of this instruction of use is on understanding the logic of use and operation, so focus is largely on helping pupils to simply be able to take these devices into everyday use. Additionally, pupils produce and process texts using different tools and learn about working with image, sound, video and animation while they are encouraged to also use ICT to implement their ideas (National Core Curriculum, 2016, p. 167). They also try programming and through it learn to understand how decisions made by people affect the way technology works (National Core Curriculum, 2016, p. 167). This fragment indicates that pupils are not only taught to use technology, but also to understand its relation with people and its use as a tool at a higher level than would previously have been expected of primary level education. Pupils are also once again encouraged to use ICT to suit their own needs and to work on projects which the pupils themselves find of interest.

As before, moving to grades 7-9 equates to a broadened application of prior approaches. It is stated in the curriculum that the use of ICT is an integral part of learning through which pupils are prepared to use ICT in their later studies and working life (National Core Curriculum, 2016, p. 304). Here ICT is a skill for everyone to use in their future, and this application is largely dependent on the world outside school. Pupils are also guided in the selection of devices which are appropriate for specific tasks and deepen their use of devices, software and services as well as practise
programming as part of their studies (*National Core Curriculum*, p. 304). The abilities of the pupils in using technological devices are thus deepened so that they could better judge how to use digital devices to solve specific problems.

Specific use of devices in education is hence left quite open, but at the same time ICT is present in education from the first grade. The differences between age groups are typically inclusive; each stage exhibits the tasks involved in the previous stage(s), but the scope of each task is broadened and some new tasks are usually added as well. The pupils’ understanding of the world they leave in and the responsibilities they can be expected to have an effect of their own on the differences, which is quite clear in the matter of copyright, for example. In addition, as pupils advance in the educational system, they assume an increasingly subjective role and each becomes less of a receiver of information and more of an editor and thus given more control.
5 Discussion

One of the key questions in this study was the question of how intrinsically or how extrinsically technology is treated in the curriculum. It can be said that in the curriculum, the use of technology in education is largely explained as being an essential tool in helping people acquire skills which are considered important in the 21st century society. Another question that was considered concerned the reasons behind the apparently ubiquitous presence of technology in the 21st century classroom.

This was, for the most part, explained as a case of present use of technology preparing pupils for a future world of essential digitalisation. One question which I mentioned in this thesis concerned the role of school: To what degree should school be a centre of preparation for occupations? This is most relevant in the context of basic education—vocational schools can be expected to focus solely on providing the right tools for employment—basic education, however, might have been considered a foundation for everything else, an institution where such fundamental skills as writing, reading and counting have usually been learned. The relevant difference between these skills and ICT competence is that people might not use them consistently, but if we are to trust the new curriculum, then ICT competence is required everywhere. People are different, however; some arrive at school on their first day already knowing how to read or write or draw. Even so, there are others who do need guidance in order to learn these skills, and it might not be outlandish to claim that the differences between these individuals could be down to how much they use or need these skills. After all, considering the relatively minor role that ICT had in education in the 2000s and before, relatively many people have been able to grasp the fundamentals of digital competence.

Therefore, the following question might be relevant: How much of the weight of expectations regarding digital competence should rest on basic education? We could also consider the amount of time a modern fourteen-year-old spends in front of digital screens and contrast that with the time he spends doing other things. Is it, then, necessary or even useful to add to that screen time at school, which is—or at least was—for some people the sole refuge from techno fuss? This study looked at the question of intrinsic and extrinsic values. If we apply technology perpetually without first thinking of a reason, it is intrinsic. If we only apply technology where we have deduced it would be useful, it is extrinsic. Hence, my final question is: Do we choose to be users or do we choose to be thinkers? This question is beyond the scope of this thesis, but even though there were plenty of explanations for the educational use of technology in the curriculum, this question was merely diverted and not answered.
References:


