What are the implications of educational technology for the public values embedded in education?

An exploratory research on the role of educational technology in Dutch primary education

Master Thesis Public Administration (15 ECTS)
Leiden University
Faculty of Governance and Global Affairs
Specialization: Economics and Governance
Capstone: Digital Governance

Shirley Bruijnzeel (s2637901)
s.bruijnzeel@umail.leidenuniv.nl
Supervisor: Dr. Ing. A.J. Klievink

Date of Submission: 07.10.2020
Word Count: 20497

Universiteit Leiden
The Netherlands

Acknowledgments

This thesis represents the final phase of the master's programme in public administration, and with that a conclusion of a year in which I had the opportunity to deepen my scientific knowledge and explore new areas of expertise.

I would like to devote a specific word of thanks to my thesis supervisor prof dr. ir. Bram Klievink. Thank you for supporting and guiding me, when needed. Furthermore, I would like to thank you for your patience during this trajectory. Your positive attitude and ideas helped me to stay motivated.

Also, I would like to thank the second reader for taking the time to read and review this work. The co-readers who helped me with their feedback and have pointed to biases in my own writing also deserve a word of thanks.

Last but certainly not least, I am thankful for everyone in my personal life for the support and encouragement during the writing of this thesis.

Shirley Bruijnzeel

The Hague, October 2020

Table of Contents

Abstract

Within this explorative research, it is addressed whether educational technology has implications for the public values that are embedded in the Dutch education sector. A review of the existing literature reveals that scant attention has been paid to the adverse effects of digitization and the use of educational (platform) technology in the classrooms of Dutch primary education. Some authors have pointed out that important educational values such as equality of opportunity, professional autonomy, of the teacher, and education as a free and independent space, are at stake as education technology is increasingly used. In order to explore what EdTech means for these values, semi-structured interviews were conducted with teachers who are working in the primary education sector. The analysis of the interview data reveals how digital education technology is deployed in the classroom and how this impacts the aforementioned values. The interview data revealed that teachers assess EdTech from an instrumental point of view, which implies that they focus primarily on the positive aspects of EdTech. The negative aspects of educational technology are scarcely recognized. However, the findings of this research show that there are adverse effects of EdTech. The public domain of education is increasingly private due to the increased use of educational technology. This has an impact on how education is organized and on how public values are safeguarded in a public-private playing field.

Keywords: *Digitization, EdTech, Public Values, Platformization, Googlification, Professional Autonomy, Equity, Free Development, Public-Private playing field, Data-Driven education, Institutional void, digital sovereignty*

1.Introduction

This research has sought to address whether the increased deployment of educational technology affects important public values that are embedded in Dutch primary education. Specifically, this research explores how educational platform technology is deployed in the classrooms of primary schools and what that implies for the values of equality of educational opportunity, professional autonomy of the teacher and the free development of students. In this introductory chapter, the problem definition that motivates this research is outlined. Subsequently, the research question and the research objective are discussed, as well as the academic and social relevance of this study. Finally, this chapter will be closed with a brief outline of the contents of this thesis.

1.1. Problem Definition

Technological innovation over the past two decades has altered the educational landscape. Advances in information and communication technology have precipitated a renaissance in education technology (EdTech) (Escueta et al., 2017). In the past decade, there has been excitement around the potential for technology to transform education (Williamson, 2017). As a result of this development, core functions of schools such as teaching, learning, administration and evaluation are outsourced to (commercial) providers of education technology (Har Carmel, 2016). In the coming years, emerging fields like machine learning, big data and artificial intelligence will most likely compound the influence of these technologies in education even further (Kool et al., 2017). Educational platform technology is increasingly used in Dutch education, and in several ways, digital technology makes education more attractive and efficient (Williamson, 2017). Tablets, interactive whiteboards and digital platforms are today taken for granted as an important aspect of (primary) education (Kester et al., 2018). The promise of EdTech platforms is that they allow for tailor-made education in the form of personalized learning (Khine, 2019).

Major Dutch newspaper De Volkskrant, reported in November 2019 that it was estimated that nearly 70 per cent of the Dutch primary schools were using Google hardware and software. Google's market share in the primary education sector increased with approximately 30 per cent in the period from 2016 to 2019 (Bouma & van der Klift, 2018). The New York Times already raised its concerns in 2017 and referred to this development as 'The Googlification of the classroom'. Bits of Freedom, a digital rights organization in the Netherlands has expressed concerns about Google's rise in education. The reason for concern is that Google has often made promises that were not fulfilled when it comes down to the user data protection (Bouma & van der Klift, 2019). Other technology giants like Microsoft and Apple have also gained a considerable digital foothold in the Dutch educational landscape. Furthermore, it is estimated that distance learning as a result of the COVID-19 pandemic caused a duplication of the use of Google and Microsoft software and hardware for education (Rémie & Sedee, 2020). Online services offered by large technology companies such as Apple, Google and Microsoft are increasingly connected with the digital learning environment.

According to José van Dijck, professor in media and digital society, this is an example of the 'platformization of education' (Pijpers & van Elk, 2018). One of the main concerns is that these platforms are steering and shaping education to such an extent that public values become under pressure (van Dijck et al., 2018; Pijpers et al., 2020). For instance, Williamson (2017) argued that EdTech platforms are integrated with pedagogical and cognitive models, and are, therefore, responsible for the organization of education. A research report by Kennisnet, a Dutch organization dedicated to IT innovation in education, concluded that important public values such as privacy, equality of opportunity, inclusiveness, free development and professional autonomy of the teacher are at stake as primary schools are increasingly relying on EdTech. It is important that these public values are guaranteed in the public-private playing field. Critics have expressed doubts with respect to the latter as the public space is becoming increasingly private with the emergence of largely commercial technology companies (e.g. Bok, 2019, van Dijck et al., 2018, Pijpers et al., 2020; van Trigt, 2020)

In the Kennisnet report, it was furthermore stated that teachers, schools and government are oftentimes not recognizing the downsides and the ethical implications of the deployment of EdTech in the classroom (Pijpers et al., 2020). The emergence of technology in education is met with optimism by teachers, policymakers and researchers (Onderwijsraad, 2017; Pijpers et al., 2020). In this light, van Dijck et al. (2018), have pointed out that an instrumental vision on digitization is represented by the Dutch schools and the government as they continuously advocate that the education sector should be further digitized. Within the instrumental vision, there is primarily attention for the positive impacts of EdTech platforms. The instrumental vision barely recognizes the adverse effects of platforms (van Dijck et al., 2018). In the Dutch context, the limited conducted research has demonstrated that the use of EdTech platforms has small positive impacts on student motivation and performance (Faber & Visscher, 2016; Molenaar et al., 2016). However, there seems to be a gap in the research since almost no research is found that focuses on the adverse effects of educational technology (Pijpers et al., 2020). In the past years, there is an increasing level of awareness about the use of EdTech platforms in education (Onderwijsraad, 2017). A growing but limited body of literature points to the adverse effects of digitization of education and platformization that goes along with it (van Dijck & Poell, 2018, Pijpers et al., 2020). One point of scholarly concern is that educational institutions are increasingly depending on only a few, external (commercial) EdTech platforms (van Dijck et al., 2018). Kennisnet has warned that, in the future, the government and the educational institutions may lose control over the protection of public values when EdTech platforms are becoming too powerful. The question is thus whether public values in education can be sufficiently safeguarded in public-private playing field. According to Kennisnet, urgent attention is required to the public values of equality of educational opportunity, professional autonomy of teachers and the free development of children (Pijpers et al., 2020). From this results the following research question:

What are the implications of educational technology for the public values embedded in education?

In order to address the research question, this explorative research seeks to find out how education technology affects the public values of professional autonomy, equality of opportunity and free development in education. Through semi-structured interviews with primary school teachers, this study gains insights into how educational technology is deployed in the classroom, and how it in turn, affects the guarantee of the aforementioned public values.

1.2. Relevance

Societal Relevance

Education is a public good and concerns everyone in society. The Dutch education sector is built on public values, however, as commercial EdTech providers are increasingly gaining foothold the risk comes along that important educational values are undermined (Bok, 2019, van Dijck et al., 2018). It is the question how educational values can be safeguarded in the public-private playing field. As a result of decentralization, it is up to Dutch primary schools themselves to consider which (EdTech) parties they cooperate with (Kloprogge, 2008, Slob, 2020). This may lead to differences between schools in terms of how education is shaped and raises the question whether the government has a sufficiently clear view on the developments that are unfolding. What if the teacher loses autonomy because the algorithm of an adaptive learning application allegedly makes faster and better decisions (O'Neil, 2016)? What if the extent to which EdTech is used has consequences for learning outcomes and equality of educational opportunity? What does EdTech mean in the 'age of surveillance capitalism' (Watters, 2019)? Are students obstructed in their free development as teachers are able to monitor them in real-time? This research attempts to address these questions. It is important to be critical towards the use of educational technology and consider the ethical implications. Most scholarship and political attention has been paid towards the privacy side of EdTech. Since data-driven policymaking and efficiency are increasingly important in contemporary times, it is no surprise that the large datamining that EdTech platforms facilitate is embraced by the government and policymakers. Scholarship is mainly centered around the impacts on student performance and motivation. Hitherto, less attention has been paid to other adverse effects of educational technology (Pijpers, 2020). Another way in which this thesis is socially relevant, is that it charters the experience of professionals; the teachers who work with educational technology. This offers a unique insight into how EdTech is deployed in practice, and how teachers view the development of digitization and data-driven education.

Academic relevance

As noted, previous research in the Dutch educational setting has focused primarily on the impact of EdTech platforms on learning outcomes and motivation. Researchers from the University of Twente and the Radboud University found small but positive effects of adaptive learning platforms on student

performance and motivation (Faber & Visscher, 2016; Kester et al., 2018; Molenaar et al., 2016). Though, there are only a few publications that concern the impact of EdTech (platforms) on public values. The limited extant literature shows how particular platforms like MOOC and Coursera are undermining public values in academic education (van Dijck et al., 2016; van Dijck & Poell, 2018). However, almost no investigative research is found with respect to the ethical implications of the use of EdTech on important public values that are embedded in the Dutch primary education sector (Pijpers et al., 2020). This research, therefore, is of academic relevance since it addresses an underexplored subject of study.

1.3. Thesis Structure

This chapter has addressed the motives and the central question of this research. In the following chapter 2, a theoretical framework and the key concepts central to this research are presented. Chapter 3 outlines the methodology and research design and provides a justification for this. In chapter 4, the central concepts are operationalized and analyzed in the light of the formulated research question. Finally, the research question will be answered in the concluding chapter. This chapter will end with a reflection on the research and implications for further research and policy through a discussion.

2.Theoretical Framework

As this research seeks to explore how education technology affects public values, it is necessary to clarify what these concepts mean and what is known on the relationship in order to develop the research design. Furthermore, from the theoretical background, the definition of the key concepts is inferred. In the first two paragraphs it is explained how and why educational technology is used in the classroom. Furthermore, the stated advantages and disadvantages will be discussed. The third paragraph explains how the use of new advanced technology that makes use of big data and algorithms raises social and ethical questions that touch on public values. The fact that most providers of educational technology are large commercial technology companies raises extra concern. Next, paragraph four puts forward reasons why educational technology is met with such great optimism in the light of an instrumental vision. The fifth paragraph discusses what the implications of digital education technology are for the specific public values of equality of opportunity, professional autonomy and education as a free space for personal development are discussed. Finally, the last paragraph summarizes the theory chapter with an overview of the key concepts used in this research and a conceptual model to guide the research.

2.1. Educational Technology in the classroom

Big data, algorithms, machine learning, data mining and artificial intelligence have become some of the most significant developments of the past decade (Mayer-Schönberger, & Cukier, 2013; Kool et al., 2017). These developments are nowadays firmly embedded in society and are increasingly becoming a part of the educational landscape too (Williamson, 2017). Digital learning tools and social media have permeated everyday life in schools. Traditional learning methods are more often replaced by e-textbooks and virtual learning environments with applications for language and math (Bouma & van der Klift, 2019). The digitization of education is in full swing and the use of educational platform technology (EdTech) in Dutch primary education is increasingly widespread (Bouma & van der Klift, 2019; Rémie & Sedee, 2020). EdTech can be defined as the combined use of information technology software (applications), hardware, and educational theory and practice to facilitate learning (Robinson et al., 2007). In this research, the term EdTech is used to refer to the digital education platforms that are used in primary education combined with the hardware where they run on such as laptops and tablets. The main reason to deploy EdTech in the classroom is to improve learning outcomes and to adapt education to individual needs (Zeide, 2017). The latter “tailormade” education is known as personalized learning.

EdTech platforms can be understood as online programmable architectures that facilitate and steer interaction between teachers and students (van Dijck & Poell, 2018; Escueta et al., 2017). Via platforms data is gathered, processed and adapted in order to create value (van Dijck et al., 2018). Similar to how social media platforms like Facebook and Twitter are coding social interaction such as ‘friending’ and ‘liking’ play a role in selecting algorithms, EdTech platforms have developed systems

where education and learning activities are coded into quantitative data (van Dijck et al., 2018). The advent of big data and algorithms has made it possible to collect large data-streams of students in (near) real-time (West et al., 2016; Williamson, 2017). Almost every mouse click of the individual student can be monitored and analyzed. EdTech platforms offer schools a wide variety of (big) data mining technologies that log information about how students learn, progress and engage thanks to algorithms and big data (Polonetsky & Jerome, 2014; Selwyn, 2015). Large amounts of data points are generated as students engage with virtual learning environments through EdTech platforms. This in turn, can be used by teachers for evaluation or to support decision-making (Zeide, 2017). Data output from adaptive EdTech platforms can serve as an 'early warning system' in the sense that struggling students can be identified quickly. It can also serve as a predictor of the future progress of students (Williamson, 2017).

Adaptive means that the learning platform adapts assignments to the level and pace of the student (Haerlemans, 2018). So, on the basis of the students' answer and pace, the adaptive system or the algorithm determines whether the student gets another assignment (Pijpers et al., 2020). As such, EdTech platforms have become an important tool to support teachers (Williamson, 2017). Other frequently stated advantages of EdTech are increased efficiency and cost-effectiveness (Khine, 2019). The field of EdTech has been described as a persisting initiative that seeks to bring together learners, teachers and technical resources in an efficient way (Mangal, 2009). In this light, EdTech platforms are predominantly viewed as a positive development that improves education (Har Carmel, 2016). In practice, most schools incorporate EdTech platforms to facilitate 'blended' learning which includes online and physical components (Zeide, 2017).

2.1.2. Digital landscape in primary education

Although no precise data are available about the use of EdTech in Dutch primary education, there is some data that suggests what the digital landscape looks like. According to estimates, the Dutch EdTech market is dominated by Apple, Google and Microsoft, but smaller companies are also gaining a considerable foothold (Bouma & van der Klift, 2019; Dignan, 2018; Rémie & Sedee, 2020). Popular (adaptive) learning platforms are ProWise Google Classroom, Snappet and CloudWise Online Learning (COOL) (Pijpers et al., 2020). These platforms mostly run on hardware from Microsoft, Google and Apple (Pijpers, 2020). Although Snappet provides its own tablets, its adaptive learning platform is downloadable on other devices as well (Snappet, 2019). In 2019, it was estimated that 70 per cent of the Dutch primary schools were using Chromebooks equipped with the Google Suite for education (Bouma & van der Klift, 2019). Google offers relatively cheap hardware in combination with software such as Gmail, a Classroom platform, and other applications that can be downloaded in the app store. Microsoft offers comparable services with Microsoft for Education (Bok, 2019). The influence of Apple is reflected by the emergence of Steve Jobs Schools and the use of iPads as a device; however, this has not been a great success yet (Rohmensen 2017). By offering services according to a freemium model, commercial technology companies create client loyalty by making

children familiar to their services at a young age. In this way, these companies attempt to make them dependent on their products and services so that they become 'lifelong' users. By offering part of the services for free, it is attractive for schools to take advantage of these products and services (Bok, 2019)

2.2. Disadvantages to EdTech

As noted, EdTech has several advantages such as efficiency and personalized learning. The government and policymakers are also proponents of incorporating technology into educational curricula (Shacklock, 2016). The large numbers of data generated by EdTech platforms form an important input for governing at distance (Ball, 2009). In the literature, however, the use of educational technology is increasingly examined (e.g. Har Carmel, 2016; Pijpers et al., 2020; Selwyn, 2015; van Dijck & Poell, 2018; Zeide, 2017). From the literature, it follows that the underlying workings of platforms are often hidden and usually not made available to the public. The operation of platforms is often hidden behind codes and algorithms that have a black-box nature (Pasquale, 2015). It is therefore virtually impossible to verify how an algorithm comes to a decision. In most circumstances, the schools are not the owners of the platforms that they deploy in the classroom, and thus do not exactly know on which criteria the algorithms are based (Pijpers et al., 2020). Furthermore, it is argued that schools often have limited digital capacity and expertise in general, and do not have the knowledge about the computational thinking behind the platform (van Bruggen et al., 2016). Algorithms are preprogrammed by software engineers and may reflect particular norms and values about education. Moreover, algorithms may, for example, determine what makes a 'good' and a 'bad student' or may decide which skills are important and which are not (Kool et al., 2017). As such, outcomes may rely on biased data that reflect certain inequalities and inconsistencies. Williamson, 2017). In this respect, Williamson (2017) speaks of a 'governance turn' where important values and insights are hidden in algorithms make decisions. Williamson, therefore, argues that software engineers and programmers are becoming the new education managers (Williamson, 2017).

Another problem is that large commercial EdTech providers have a profit motive with a business model that thrives on the collection of data (van Dijck et al., 2018). Each transaction and interaction that occurs on the platform cannot only be followed by the teacher but also by the platform owner. Such information holds commercial value outside the school context apart from educational purposes (Har Carmel, 2016). For example, data can be sold to advertisers and other interested third parties such as future employers (Verdoodt & Lievens, 2017). The business model of Google, for example, is primarily based on advertising and making money with personal data in order anticipate behavior (Singer, 2017). Given this, one could argue that it is somehow economically interesting for Google to acquire a large position on the market for digital education tools. Furthermore, some authors argue that the fact that the EdTech market is largely dominated by only a handful of large commercial companies that do not precisely reveal how their platform operates, raises the question whether these

platforms are shaping and steering education to such an extent that it puts public values at stake (van Dijck et al., 2018; Pijpers et al., 2020). With commercial EdTech companies entering the schools, the public-private playing field of education becomes increasingly private. Van Dijck et al. (2018) question whether the government has an adequate view of this given that a great degree of decision-making power on education is devolved to the school boards. This means that each school gives its own interpretation to the definition of partnerships with providers of learning material (Kloprogge, 2008). According to Kloprogge (2008), the latter makes it difficult for the government to gain insight into the quality of the total education system and, therefore, makes it more complicated to manage an effective education policy. Lingard (2011) argues that as a result of the governance turn in education, numbers and statistics gained prominence (Lingard, 2011). Evidence-based and data-driven policy making are seen as an important strategy for governing education at a distance (Ball, 2009). Since EdTech platforms can generate enormous amounts of detailed student data, it can be understood that the digitization and datafication facilitated by EdTech is encouraged by the central government and policymakers. Due to the devolvement of power to school managements, there are greater differences and more competition between schools (Grek et al., 2013). With respect to the latter, schools are also free to determine their own digital education policies (Slob, 2020) which may even lead to greater differences between schools. In light of what is discussed earlier, the decisions of the school board concerning the use of EdTech also reflects a decision into how public values are promoted and safeguarded in the public-private playing field (van Dijck et al., 2018). In other words, the decision of the school to deploy EdTech from a large commercial US-based tech company or from a not-for profit local foundation can affect how public values are guaranteed and promoted (Van Dijck et al., 2018). This gives rise to the question whether the government should revise its role and whether there should be a clear policy worked out with respect to the procurement and decisions concerning the use of EdTech.

2.3. Control over Public Values and developments in EdTech

In recent years, a series of publications have been released that emphasize in particular how the use of big data and algorithms affects public values (Kool et al., 2017; Meijer et al., 2019; van Dijck et al., 2018). Examples of this include the use of algorithms to assess social benefits (Eubanks, 2018) or to judge the risk of recidivism (Angwin et al., 2016), and the use of computational models for the evaluation of teachers (O'Neil, 2016). Eubanks (2018) showed that the use of algorithms in the social domain in the United States can reinforce inequality, Angwin et al (2016) demonstrated that algorithmic risk assessment of recidivism can have a racist orientation, and the work of O'Neil (2016) showed that the use algorithms and data analysis resulted in an unfair assessment of teachers.

According to Meijer et al. (2019), such publications have underscored the need to put responsible handling of algorithms and data analysis on the agenda in The Netherlands in order to protect public values. Although digitization has been going on for a couple of decades, researchers of

the Rathenau institute have argued that the information society has entered a new phase as a result of a new digitization wave which leads to increased pressure on public values (Kool et al., 2017). The debate surrounding digitization is not only about internet and new means of communications, but increasingly about the use of digital technologies such as big data, algorithms, and artificial intelligence. According to Kool et al. (2018), this broadening also raises social and ethical questions that touch on public values. The new wave of digitization is characterized broadly by the following fields of technology: digital platforms, big data, algorithms, robotics, biometrics, artificial intelligence, virtual reality, augmented reality, persuasive technology and the Internet of Things. As noted, these developments are also visible in EdTech (Escueta et al., 2017). In the light of these developments, societal and ethical questions arise that closely relate to public values such as privacy, (cyber)security, autonomy, equity, inclusiveness and control over technology (van Dijck et al., 2018). A study conducted by van Dijck and Poell (2018) found that digital platforms impact the organization of society and in particular on how public values are determined and promoted. These authors argue that public values and interests that have hitherto been organized by government bodies or that are protected by rules and legislation are interpreted differently by (globally) operating platforms. According to van Dijck and Poell (2018), platforms redefine education as a public good.

In the book *The Platform Society* van Dijck et al. (2018) explained how platforms can disrupt entire sectors. Uber and Airbnb are exemplary platforms that have emerged so rapid that they managed to interfere with sectors (van Dijck et al., 2018). This can be explained by the fact that institutions are often too slow to come up with a policy response to these developments. Digital innovation often develops faster than existing law, regulation and other enforceable means can keep up with. This development may lead to a metaphorical institutional void, which raises questions about the changing practices, rules, responsibilities and strategies to deal with this void (van Bueren & Klievink, 2017). Invented by Hajer (2003), the concept of an institutional void is not novel. According to Hajer (2003), an institutional void indicates acting in an 'empty space': a space without clear, generally accepted rules and norms for political action and policy formation. Institutional void refers to the absence of institutions. North's definition of institutions as *Rules of the Game* is frequently used in different professional disciplines (van Bueren & Klievink; North, 1990). In the absence of institutions or rules of the game, actors are given free play and get the opportunity to bend standards according to their own strategy and needs (van Bueren & Klievink, 2017; van Dijck et al., 2018). Van Bueren & Klievink (2017) demonstrated that the concept of an institutional void is also relevant to understanding socio-technological innovations and challenges. When it comes down to technology and digitization, the government generally does not have sufficient knowledge or oversight of technological developments. It usually concerns new, knowledge-intensive developments about which insufficient knowledge exists. The institutional embedding is often largely lacking, while developments can have a profound impact on society (van Bueren & Klievink, 2017). With the arrival of large data companies' governments are confronted with the disruption of entire sectors. To take Uber and Airbnb back as an

example, Airbnb circumvented the rules of the game for the hospitality sector in several countries by not needing to pay tourist tax (van Dijck et al., 2018). Uber, for instance, manages to pay tax and social security contributions. Uber, Airbnb and other data companies have been brought before the court due to disputes about security, quality, unfair competition and security. The rules of the game were not clearly defined. As an example, Airbnb circumvented the rules of the game for the hospitality sector in several countries by not needing to pay tourist tax (van Dijck et al., 2018). Uber, for instance, does not pay tax and social security contributions.

As mentioned previously, large data companies are also interfering in the educational (technology) landscape. In the United States, for example, there have been several lawsuits against Google in the educational context. In response to a lawsuit in 2016, Google admitted that it mined data from its G Suite for Education environment. In response to another lawsuit, Google admitted that it scanned student emails for advertising purposes (Kurshan, 2017). The German state of Hessen prohibited the use of Microsoft and Google because they were operating in a legal grey zone, and were acting rather opaquely (Pijpers et al., 2020). A so-called 'data protection impact assessment' from the Dutch government in 2019, showed that Microsoft's Office Apps were collecting more data than it was stated in its own terms and conditions (Rijksoverheid, 2019b).

Zeide (2017) argued that the prosect of preserving student records runs counter to the political rhetoric that the past should not unduly limit future opportunities. This raises the question whether student data records should not be expunged just like former juvenile criminal records and bankruptcy procedures. The latter exemplifies an institutional void that can have an impact of the future of children and society. In light of the General Data Protection Regulation (GDPR) of the European Union, the Privacy Covenant for (digital) education resources came into force in 2018 (Privacy Covenant, 2020). The covenant contains agreements concerning the handling of personal data and the use of digital education resources during testing. Within this context, it is also forbidden to create personalized user profiles and that student names are pseudonymized (Privacy Covenant, 2020). However, at the time of writing, two years since the covenant is into force, some of the major players in the Dutch EdTech market have not yet put their signature under the covenant. Among others, Google, Apple and Microsoft have not yet signed the Privacy Covenant (Pijpers et al., 2020; Privacy Covenant, 2020). As a result, it is almost entirely impossible to get an insight into how these companies gather data and for what purpose this data is used (van Dijck et al., 2018). Moreover, it cannot be excluded that the American government or hackers can get access to the personal data of students, which is also in contravention with the Dutch interpretation of the GDPR (AVG) (Pijpers et al., 2020). So, there is a clear gap between the rules of the game and the effectivity to deal with those parties who have not signed the Privacy Covenant for (digital) learning resources. It is the question whether those parties who have not consented to the covenant should not be banned from interfering in the classrooms. In this respect, the government should consider playing a more central role in the formulation of the rules for school managements with respect to decisions concerning the deployment

of EdTech (van Dijck et al., 2018). Moreover, for the individual school managements it is virtually impossible to confront large technology companies with their actions. According to Pijpers et al. (2020), it is also unrealistic to expect that schools can find EdTech that is fully in line with the values they want to promote.

2.3.1. The public domain of education

Education is considered as a public good and public values form the cornerstone of the Dutch education system (Bok, 2019). Dutch education is traditionally part of the public sector in which the government and its institutions largely determine the structure and organization. When it comes to accreditation, curriculum and valorized diplomas, education is largely governed through a national system, which is regulated and validated by government institutions and subject to democratic control (van Dijck & Poell, 2018). Dutch education has institutionalized public values as the sector is historically subsidized by the government (van Dijck et al., 2018). Important public values on which Dutch education builds are, for example, accessibility, equity, inclusiveness and Bildung or self-development. According to Bok (2019), it is the role of education to protect and maintain these values. As noted, in order to protect these values, education has to compete with commercial technology companies that want to increase their market shares without worrying about values (Har Carmel, 2016). According to Kool et al. (2018), a proactive attitude of the private sector towards safeguarding public values is still missing. This leads to the concern whether the state and the public sector of education loses its control over the protection of public values (Bok, 2019). Values are not automatically embedded in algorithms and revenue models of commercial EdTech providers (van Dijck et al., 2018).

2.3.2. The clash of public and private values

The book *Education and the crisis of public values* (Giroux, 2012) describes how public education in the United States as a democratic public sphere has been under siege. Giroux (2012) explains this by the shift away from democratic public values and the ensuing move toward a market-driven mode of education (Giroux, 2012). While education in the United States has traditionally been much more commercial and privately organized, education in the Netherlands and the rest of Europe is still primarily concentrated in the public sector and for the most part funded through general means (van Dijck et al., 2018). However, the free (public) space of education in Europe is increasingly intertwined with the economic space due to commercialization, privatization and the introduction of EdTech platforms (van Dijck et al., 2018; Pijpers et al., 2020). Critics have started to warn that public values where Dutch education is built on are being undermined since the introduction of digital platforms and other online tools in the classroom (van Dijck et al., 2018; Pijpers et al., 2020). Educational values, after all, are not automatically anchored in the business models of platforms that are owned by commercial parties. Van Dijck et al. (2018) view this as a clash between corporate values and the values of the school as a public institution. Big EdTech providers like Google, Microsoft and Apple

which have their origins in the United States reflect different values, more oriented at the market principle (van Dijck et al., 2018; van Trigt, 2020). Furthermore, it is argued that the software engineers of (large) commercial companies tend to think of education in terms of efficiency. This is reflected in the EdTech platforms since they largely focus on quantifiable skills, such as performance and technical skills. Along with that, commercial companies bring along their own vision on education (Remie & Sedee 2020; Selwyn, 2015). However, the Dutch schools as public institutions historically emphasize the importance of self-development and critical thinking (van Dijck et al., 2018). The viewpoint of the education sector is that not everything that can be counted, also counts, however, this is at stake with the emergence of EdTech. It is also logical to think that commercial EdTech providers have an interest in focusing on quantifiable skills since it allows for mining more data that holds market value. Although EdTech companies have stated that within the context of education student data is not used for advertising or data profiling, it is not clear what is done with the data outside the classroom. Especially, since some of the providers have not consented to the Privacy Covenant (Pijpers & van Est, 2018). Data may be used against students later in life as some students will eventually grow up to be influential public figures (Verdoodt & Lievens, 2017). Besides, it is not excluded that data that is gathered within the school environment can be connected to gathered data streams in leisure time (Pijpers & van Elk, 2018). As an example, when children are using the same Google account and device at home as they do at school is it is not clear whether data streams can be connected to non-educational services such as YouTube and Google Search. As touched upon earlier, mistakes and inconsistencies captured by EdTech platforms in the past may jeopardize future opportunities (Verdoodt & Lievens, 2017; Zeide, 2017). Especially when students have no insight or influence on the digital traces they leave. This touches on public values such as privacy, equal opportunity and free development (Har Carmel, 2016; Pijpers et al., 2020). In the next sections, this will be discussed more thoroughly. A final point of concern worth noting is that there are little to no public alternatives that counterbalance the powerful EdTech giants, while this is important to maintain and promote public values (van Trigt, 2020). The government could decide to develop EdTech platforms with considerably less money, but this may be considered as a costly alternative to the platforms provided by the large technology companies on a freemium basis (Pijpers et al., 2020).

2.4. An instrumental vision on EdTech

Education technology so far has mostly been met with an optimistic view by teachers, scholars and the government (Pijpers et al., 2020). Advocates of EdTech platforms envision the future of education allowing for greater efficiency, cost-reduction, and child-centered, personalized education (Har Carmel, 2016; van Dijck et al., 2018). Technology can take over many small tasks from the teacher from checking homework to doing class administration. Instruction mediated by technology allegedly improves the teachers' assistance since a real-time overview of what is going on is provided so that it can be easily identified when support is needed (Williamson, 2017). The advantages of educational

technology seem to outweigh the disadvantages (Rijksoverheid, 2019a; Onderwijsraad, 2017). The government has also stated in the Digitization agenda (Rijksoverheid, 2019a) that it wants to improve the quality of Dutch education with the use of EdTech (Kool et al., 2018). The optimism may be explained by the fact that previous research in the Dutch context has primarily looked at the impact of technology on student motivation and learning outcomes (Faber & Visscher, 2016; Molenaar et al., 2016), rather than at the potential negative impact on education and the public values embedded in it (Pijpers et al., 2020; Selwyn & Facer, 2016). Following this, van Dijck et al. (2018) argue that the (Ed)Tech optimism can be explained by the predominance of an instrumental vision by the government and the education sector. Within this vision, there is primarily attention for the positive effects of digital technology. That platforms steer and shape education to a significant extent, is hardly recognized within the instrumental vision (van Dijck et al., 2018; Pijpers et al., 2020). However, Williamson argues that EdTech platforms are integrated with pedagogical and cognitive models and are, therefore, co-responsible for the organization of education (Williamson, 2017).

Although, there is general optimism, the adverse impact of the use of educative platform technology is increasingly recognized (Onderwijsraad, 2017; Selwyn, 2015;). the Rathenau institute has noted a shift in focus from the government. First attention was mainly paid to the impact of digitization and technology on the society, whereas since 2018 there is more attention paid to specific sectors (Kool et al., 2017; Kool et al., 2018). It has been clear for a while that privacy and security are not always taken seriously as important values by platform owners (Bouma & van der Klift, 2019; NVOR, 2017; Young, 2015). The measures taken so far are mainly concerning privacy (Pijpers et al., 2020). However, other important public values such as equity, inclusiveness and professional autonomy of teachers have not yet received much attention (Pijpers et al., 2020)

2.5. Educational values at stake

It is important to look at the underlying values that EdTech carries. According to Pijpers et al. (2020), Dutch primary schools are not holding enough ethical conversations about this subject. Pijpers et al. (2020) argued that efficiency and personalized learning does not necessarily improve education since important values may be lost. The following major public values are at stake and require urgent attention: professional autonomy, equality of (educational) opportunity and education as a free and independent space (Pijpers et al., 2020). Professional autonomy may be affected as a result of the shifting balance between human and machine which may lead to a division between teacher and student. Second, equality of opportunities may be affected by algorithmic bias, but may also lead to other ways of exclusion, for example, when not every student has access to a device. Lastly, education as free and independent space for development can be harmed as the school becomes under pressure as a public space as commercial EdTech providers are increasingly interfering in how education is shaped (Pijpers et al., 2020).

Professional Autonomy

The arrival of EdTech platforms in the classroom changes the contact between teacher and student. Adaptive learning software enables technology mediated instruction and with the presence of interactive whiteboards the teacher becomes less visible (Pijpers et al. 2020). Due to computational power, EdTech platforms can increasingly (out)perform human actions. As mentioned earlier, pedagogical models and learning material are integrated into the platform architecture, and are in this way co-responsible for the organization of education (Williamson, 2017). When the decisions over the learning process of students are left to technology or when the teacher has less freedom to decide how lessons take place, their professional autonomy reduces (Pijpers et al. 2020).

Professional autonomy has to do with the degree of freedom to act independently in the choice of learning material and in the design of lessons. With respect to this, the perception of the teacher is important (Pijpers et al., 2020). In a review study on the literature on professional autonomy, Parker (2015) argued that autonomy can be generally considered as the capacity to exert control. Pitt (2010) outlined that, autonomy is a 'vexed, complicated and contradictory concept within contemporary philosophy and social theory. According to Reich (2002), autonomy is not a natural quality, but it is rather something that is learnt, and partly dependent upon the intrinsic capabilities and motivation of the individual. Parker (2015) stressed that it is important to take into account that teacher autonomy is a constantly evolving concept (Pearson & Moomaw, 2005), especially given the rapid reforms in education (Parker, 2015). An examination of the literature revealed that teacher autonomy is the subject of much writing. It follows logically from this that there are several conceptualizations of professional autonomy (Parker, 2015).

Despite the multiplicity of conceptualizations, there is general unanimity that teachers should have autonomy (Pearson & Moomaw, 2005; Wilson, 1993). MacBeath's (2012) model of professional teacher autonomy is one of the most commonly used whereby workers retain control over activities and theoretical knowledge (Parker, 2015). Although there is no definitive measure of autonomy, Pearson and Hall (1993) have emphasized the relative significance of teachers' perceptions. These authors argued that teacher's autonomy is the perception that teachers have concerning whether they control themselves and their work environment (Parker, 2015; Pearson & Hall, 1993).

Earlier studies demonstrated that the common link that appears in the examination of teacher motivation, job satisfaction, and empowerment, is teacher autonomy (Brunetti, 2001; Klecker, 1998; Pearson & Moomaw, 2005). Previous research also found that teacher autonomy was among the working conditions associated with higher teacher satisfaction and motivation (Baker & Perie, 1997). The results of a study by Pearson and Moomaw (2005) showed that autonomy does not differ across the teaching level. The general autonomy factor in teaching is consistent with the need for teachers to have control over their work environment and to have on-the-job decision-making authority, especially if they are to stay committed to the profession (Pearson & Moomaw, 2005). One key factor is curriculum autonomy, particularly in having the authority when making decisions concerning the

selection of activities, materials and instructional planning and sequencing. Authority in teaching can be defined as "the extent to which teachers influence school decisions concerned with key educational issues and the degree of individual autonomy exercised by teachers over planning and teaching within the classroom." (Parker, 2015; Pearson & Moomaw, 2005). The authority of teachers to make decisions is one of the key components of teacher professionalism (Ingersoll, 1997; Ingersoll & Collins, 2017). Pearson and Moomaw (2005) measured professionalism by items that inquired into teachers' perceptions of recognition for high performance, openness and accessibility of the administration, and found that general teacher autonomy is strongly related to professionalism.

The conceptual definition of professional autonomy that follows from the above can be defined as "the empowerment of teachers as professionals so that like other professionals, they have the freedom to prescribe the best treatment for their students I.e.., having authority; and the freedom to do such". (Pearson & Moomaw, 2005). This is also the definition of professional autonomy that will be used for this research. This adopted definition fits in with how professional autonomy is described in the Kennisnet report, namely 'a teacher has a considerable degree of freedom in pedagogical and didactic action in the choice of learning materials, and determining how and when he will test this' (Pijpers et al., 2020) Some authors have argued that the professional autonomy of teachers can be affected by education technology (e.g. Bradbury & Roberts-Holmes, 2018; van Dijck et al., 2018; 2018; Pijpers et al., 2020; Kool et al; 2017). Whether the professional autonomy of the teachers decreases has also to do with their understanding of technology, according to Pijpers et al. (2020). When teachers make use of adaptive learning technologies it is important that they are aware of the tasks that are taken over so that their professional autonomy is maintained. By conducting a series of interviews with English primary school teachers, Bradbury and Roberts-Holmes (2018) explored that digitization affects the identity of teachers. The authors found that the datafication of education is associated with a lack of confidence in the teacher as a professional. Furthermore, Bradbury and Roberts-Holmes (2018) argued that teachers increasingly view themselves as data collectors instead of teachers since EdTech platforms generate large numbers of personalized data where human-beings are not capable of. However, Pijpers et al. (2020) have argued that the professional autonomy of teachers can also be positively affected by educational technology. They state that the professional autonomy can increase when the teachers experience more freedom to operate in accordance with their own insights as a result of the support of EdTech.

Equality of Educational Opportunity

Educational Technology offers a range of possibilities that unfortunately are not available to everyone. Not every child reaps the benefits of the possibilities that EdTech offers. According to Cator (2015) this creates a digital divide and inequality in education. Equality of opportunity in education is one of the fundamental public values and has inspired decades of research on school effects, on the impact of socioeconomic status on performance, and on racial and ethnic disparities in achievement (Gamoran & Long, 2007). According to the annual report of the Dutch Inspectorate of Education (2020), the most common factors contributing to the inequality of opportunity in education, are the differences between education, income and the family background of the parents (Onderwijsinspectie, 2020). Different definitions of equality of educational opportunity can be found in the literature, though they constitute similar conditions (Gamoran & Long, 2007; Wise 1969). This research takes the definition put forward by Sleicher and Zoido (2016) who define the equality of educational opportunities for all as "*giving every student the same chances to succeed, creating the right conditions for all students regardless of socioeconomic background, gender, or origin".*

As previously mentioned, EdTech platforms offer advantages such as personalized and adaptive learning. Moreover, research has found small positive effects of adaptive learning technology on student performance and motivation (Faber & Visscher, 2016; Molenaar et al., 2016). However, the question that arises when it comes down to EdTech, is whether all students have equal access to these possibilities. And does this development contribute to more equality? On the one hand, it is argued that EdTech contributes to equality in different ways. It has eased communication which allows everyone (including the weaker students) to participate. Lines of communication have become shorter between teachers, students, and parents (Pijpers et al., 2020). Nevertheless, there are growing concerns about a digital divide between those who reap the fruits from educational technology and those who do not. Research shows time and again that the digital divide is mainly due to social background (Schouwenberg, 2018). Schouwenberg (2018) argued that a lack of digital skills creates differences in societal opportunities. Studies have demonstrated that the less educated and those with a migration background benefit less from technological innovations and thus become disadvantaged, and so do their children (Schouwenberg, 2018, Kennisnet, 2017). Karen Cator, CEO of the American educational knowledge Institute *Digital Promise,* stressed that today education plays a crucial role in closing this digital divide. After childhood, a digital disadvantage is often not made up (Cator, 2015). Cator (2015) furthermore stressed that the US government barely interferes in order to close the digital gap. As outlined in the previous paragraph, the situation is similar in The Netherlands since decisions concerning digital educational policy are largely devolved (Pijpers, 2020). According to Pijpers et al. (2020), the digital divide in the Netherlands is twofold. First, it concerns the extent to which students have access to applications of digital technology. This concerns whether the parents have the

accessibility and financial means to finance internet and devices, and the applications of EdTech that the school offers. Today, almost all Dutch households have access to these resources. However, the extent to which educational technology is used varies per school which may also affect equal opportunity since some children will have a digital advantage over others (van Trigt, 2020). The second digital divide concerns the use of devices during leisure time (Pijpers et al., 2020). According to the Dutch Social and Cultural Planning Office (2016), differences arise quickly between students whose parents purchase devices with learning apps and make their children familiar with the internet, and those students who do not get these opportunities (SCP, 2016).

Education as a free space for development

The data-driven education that is facilitated by EdTech platforms enables the following of almost every mouse click of students in (near) real-time. According to Pijpers et al. (2020) data-driven education and the digital monitoring that comes along with EdTech platforms can have an impact on the free development of students. As a result of digital monitoring, students may feel less free to experiment and make mistakes during practicing since they feel the pressure of being watched. The rise of large commercial technology companies in the educational field forms another threat to the free development. With these companies entering the school building, the free space of education is increasingly intertwined with the economic space.

Many pedagogues, educators and other thinkers argue that the function of school should not depend on the state, economy, church and other social domains (Pijpers et al., 2020). The latter is what refers to education as a free and independent space wherein educational values and goals should be central. The famous philosopher Hannah Arendt described education as a space where students can learn and practice to independently act and make choices without the presence of direct influence (De Gruijter & Klauw, 2018; Arendt, 1958). However, the school as a free and independent space has been under pressure almost ever since schools are existing since they are dependent on commercial publishers of learning materials, the state and other parties. However, Pijpers et al. (2020) argue that with digital learning materials new parties enter the school that influence the free and independent space. The online services of technology companies are increasingly connected with the digital learning environments of the schools. The largest technology companies have developed flourishing ecosystems wherein smaller providers such as educative content creators and app developers can make easily use. In doing so, large numbers of (user) data which could be potentially used for commercial purposes.

As outlined before, it is not clear to which extent and for what purpose technology companies are gathering data about students. However, given that some of the large companies have not signed the privacy covenant it remains difficult to track down what is happening with the data (Pijpers et al., 2020). It is, therefore, not surprising that this is being looked at critically as those companies have oftentimes been accused of being too big to care (Dartford, 2020). With respect to the latter, the Dutch

data protection authority (2014) stated that children's learning outcomes are sensitive data to which, moreover, conclusions can be drawn with consequences for later social life. The impacts of tracking, profiling, data distribution and commercial targeting may be lasting, and impede the free development. Particularly when children are merely seen as consumers or data products, this data can be used to manipulate behavior and may be sold to third parties in further education, employment or other purposes (Autoriteit Persoonsgegevens, 2014). In this light, the Dutch Education Council (2017) emphasized that digitization should not lead to a threat that the learning environment where children are allowed to place themselves in a vulnerable or rebellion position without being confronted with it later in life (Onderwijsraad, 2017).)

According to Pijpers et al. (2020), the drawback of adaptive learning is that free practice is not possible anymore when students are continuously monitored and detailed profiles of them are created. In the pre-digital era students practiced on scrap-paper which was subsequently thrown away. With adaptive software, however, student practice makes up the fuel for personalized learning. Based on the student's answer, the algorithm of the adaptive system determines whether the student can move on to a higher level or not. As a consequence, every single task becomes a test where students need to perform on. Each small task leads to a detailed profile and evaluation of the student (Pijpers et al., 2020). Whereas teachers do the same in the physical classroom, technology-mediated education capture the students' experiments and errors during practice (Zeide, 2017). Such errors and inconsistencies from the past may put future opportunities of children at stake since these are captured. Due to the open nature of block chain technology such data can become permanent public records (Zeide, 2017). Students' early mistakes, for example, can be saved for later examination and collected for new algorithmic inferences (Zeide, 2017).

Students may act different because they know someone is watching, which further impacts freedom, personal development and the free space to practice and experiment (Pijpers et al., 2020). Furthermore, always being online, available and being monitored is increasingly becoming the norm which also impairs the freedom of children. According to Pijpers et al. (2020) schools impose and reinforce this norm with the increased use of EdTech. Due to advanced technology and communication, education is less tied to a specific time and place. Some students have always access to online learning environments. This raises the question of whether the leisure time of children is filled in too much by the school and the EdTech it deploys. For example, when students can continue to practice outside school hours, they can feel the pressure to do so. Consequently, the question arises whether EdTech in a certain way restricts the leisure time of students, which also impacts free development (Pijpers et al., 2020).

2.6. Summary Theoretical Chapter

This chapter has described the theoretical foundation of this research. The developments and the consequences of the increased use of educational technology are discussed. While EdTech offers solutions that seem to positively reinforce certain values, simultaneously educational technology shapes and steers education in an invisible manner, where important values that are traditionally embedded in education become undermined. To find out whether the values professional autonomy, equity, and free development are under siege, it is important to investigate how teachers respond and deal with EdTech. Their input is essential in order to assess whether and to what extent EdTech has an impact on the public values that are embedded in education.

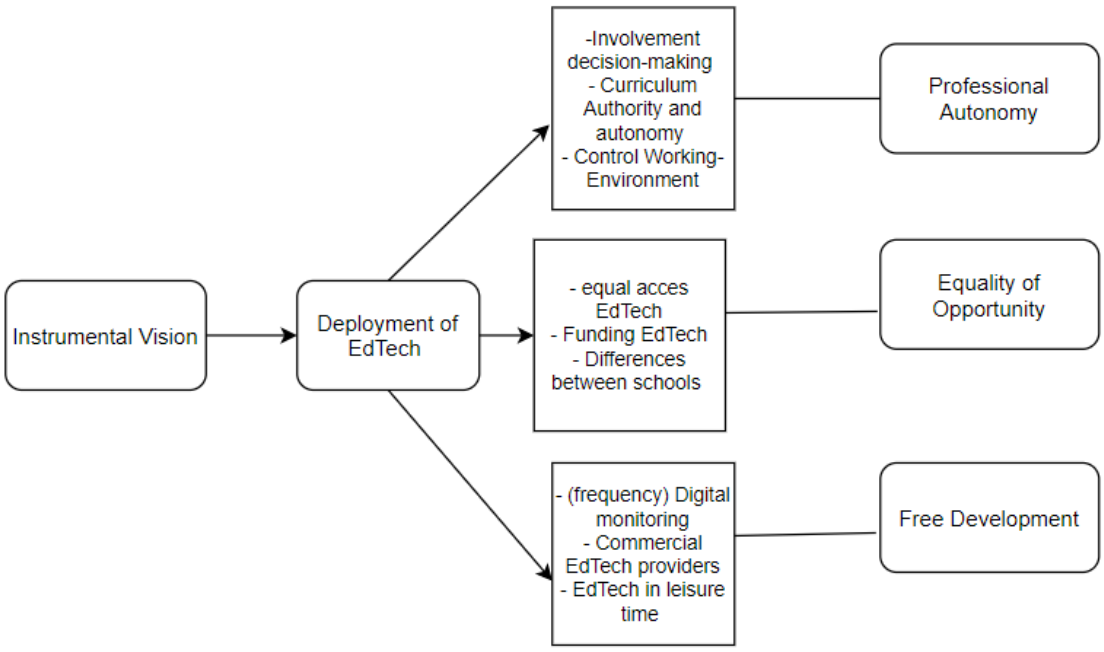
The table below gives an overview of the key concepts that are discussed in this chapter.

Table 1

Key Concept	Definition
Educational Technology (EdTech)	The combined use of information technology software (applications), hardware, and educational theory and practice to facilitate learning (Robinson et al., 2007)
EdTech Platforms	Online programmabe architectures that facilitate and steer interaction between teachers and students (van Dijck et al., 2018)
Instrumental Vision	The view that digital platforms are primarily perceived as a tool to improve education (van Dijck et al., 2018)
Professional Autonomy	The empowerment of teachers as professionals so that like other professionals, they have the freedom to prescribe the best treatment for their students i.e.., having authority; and the freedom to do such (Pearson & Moomaw, 2005)
Equality of Educational Opportunity	Giving every student the same chances to succeed, creating the right conditions for all students regardless of socioeconomic background, gender, or origin (Sleicher & Zoido, 2016)
Education as a Free Space	The space where students can learn and practice to independently act and make choices without the presence of direct influence (Arendt, 1958)

Conceptual Model

The conceptual model below gives direction to this research. The conceptual model provides a network of the linked key concepts outlined above. An instrumental vision on education technology of teachers and school principals may explain the choices and teachers' experiences with respect to the use of educational platform technology. To what extent, how and which platforms are deployed gives an idea of whether the values of professional autonomy, equality of opportunity and education as a free and independent space are at stake. The squared boxes show the key factors that influence the aforementioned values.



3. Methodology

3.1. Introduction and Research Design

This research aims to provide insight into the way in which educational technology is used in Dutch primary education, and what that means for the public values of professional autonomy, equality of opportunity and free development. In order to find this out, the experiences and opinions of teachers form an important input. To find out what teachers think, experience, know and believe about EdTech, it has been necessary to enter into dialogue. The perceptions of teachers and those working with EdTech is of significance since this perspective is not discussed in earlier literature. Therefore, primary school teachers and teacher ICT coordinators were interviewed. The reason to choose for interviews instead of surveys is that statements can be discussed in more detail and can be nuanced. The interviewee can also explain himself and the researcher can explain the question. With surveys, there is a greater likelihood that socially acceptable answers are given or that the answers are not exhaustive enough (Boeije & Bleijenbergh, 2019).

3.2. Method

A qualitative method was used for the analysis because this research aims to interpret meaning through the eyes of the interviewee. The choice for exploratory research is based on the fact that there is still little research on this subject. The answer to the research question thus rests partly on the experiences, beliefs and ideas of teachers. Underlying thoughts and perspectives can be more easily uncovered through qualitative methods as the interview can involve implicit intentions that can be noticed by the interviewer.

3.3. Reliability & Validity

The outcome of the research should represent as adequately as possible the social reality. Traditional criteria to assess objectivity of the research are validity and reliability (Boeije & Bleijenbergh, 2019: 153). Reliability points to the precision of the data collection. Reliable methods ensure that the research will have the same outcomes when it is reproduced as long as the unit of measurement remains the same. Validity means that what is intended to be measured is actually measured. The flexibility of semi-structured interviews, however, makes it difficult to reproduce the research. It is not to be expected that another researcher will use the exact same topic list (Boeije & Bleijenbergh, 2019: 155). Another threat is that the respondents are anonymized, which makes it complicated to verify and control the analysis. Furthermore, analyzing the interviews may involve subjective judgements of the interviewer. The issue of subjectivity is tackled by the use of a topic list that structures the interviews. Furthermore, it is attempted to address subjectivity by avoiding suggestive questions. In order to account for this, key themes are included in the questionnaire in order to identify patterns and narratives (Boeije & Bleijenbergh, 2019: 156). Another threat to validity and reliability is the fact that the interviews were conducted in Dutch. In the translation from English to Dutch, some text fragments may be interpretated different from what the respondent meant to say. In order to minimize this, the transcripts are carefully translated.

3.4. Operationalization

This paragraph operationalizes the key concepts from the theory chapter into indicators. These indicators are also to be found back in the conceptual model. By doing this, the key concepts can be converted into practically usable definitions and indicators (Toshkov, 2016). These indicators were used to formulate the interview questions. The table below shows the key concepts, definition and indicators.

Key Concept	Definition	Indicator
Educational Technology (EdTech)	The combined use of information technology software (applications), hardware, and educational theory and practice to facilitate learning (Robinson et al., 2007)	• Deployment of EdTech in the classroom • Purpose of EdTech • Decisions with respect to EdTech
EdTech Platforms	Online programmable architectures that facilitate and steer interaction between teachers and students (van Dijck et al., 2018)	• Platforms used in the classroom • The courses for which platforms are used
Instrumental Vision	The view that digital platforms are primarily perceived as a tool to improve education (van Dijck et al., 2018)	• Respondent makes positive remarks about digitization • Experience with platforms • The respondent is a 'digital native'
Professional Autonomy	The empowerment of teachers as professionals so that like other professionals, they have the freedom to prescribe the best treatment for their students i.e.., having authority; and the freedom to do such (Pearson & Moomaw, 2005)	• Decision-making about the use of EdTech platforms (curriculum autonomy, control over the working environment) • Experiences loss of autonomy/ authority due to datafication • Evaluation based on dashboard outcomes
Equality of Educational Opportunity	Giving every student the same chances to succeed, creating the right conditions for all students regardless of socioeconomic background, gender, or origin (Sleicher & Zoido, 2016)	• Hardware and software funded o (or on loan) by the school / parents / • Ability to fund EdTech or the extent to which it is used • Differences between schools concerning deployment of EdTech
Education as a Free Space	The space where students can learn and practice to independently act and make choices without the presence of direct influence (Arendt, 1958)	• Frequency of digital monitoring • Provider of EdTech (US/EU, commercial vs. not for profit) • Use outside the classroom (i.e. homework)

3.5. Process

In order to charter the key concepts, semi-structured interviews were conducted with 8 respondents who teach in Dutch primary education. Among the respondents were also 2 teacher ICT coordinators. By interviewing teachers who work at different primary schools, this research aims to show how educational technology is used in different schools. Semi-structured interviews allow the respondents to answer questions in the way they want to, and leaves room for the respondent to tell something from their own experience (Boeije & Bleijenbergh, 2019: 154). Given the scope of the research, it was decided to first hold a round of 8 interviews. After the sixth interview, in-depth insight was obtained, and sufficient data was available to answer the research question. Ultimately, eight interviews were held in order to increase the level of saturation. The data from the interviews were first made clear by means of open coding. Subsequently, categories and subcodes were extracted that were processed into main themes. The interviews are partly structured on the basis of a topic list (Appendix C). Given the circumstances of the corona crisis, some of the respondents were not comfortable with a face-to-face interview. As a result, the interviews were held in different forms. It was asked whether the respondent preferred an online or offline interview. As a result, four interviews were held over the phone and four interviews were held face-to-face, either at the teacher's home or at the primary school where they were working. The interviews took place in the month of September. Each interview was recorded with the consent of the respondent. This made it possible to accurately transcribe the interviews and allowed to stay as close as possible to the statements made by the respondents. The length of the interviews varied from 22 minutes to 46 minutes. Before and after the interviews informal conversations were held, which led to some interesting conversations. The difference in approach potentially brings a threat to the validity of the data as the physical presence of the researcher at the interview can influence the answers of the respondents. To account for this, effort was put into making the respondents feel at ease so that they felt free to share their experiences.

Respondents

The characteristics of the interviewees are diverse when it comes down to age, experience, school type, grade of teaching and geography (Appendix E). The respondents are teachers in the provinces of Zuid-Holland, Zeeland and Gelderland. Some of them are teaching in the large cities, others are teaching in small towns and villages. As regards school types, respondents work at Public, Catholic and Christian primary schools. In order to gain a picture of how education technology is used throughout primary schools, the respondents capture all grades. Among the respondents were a kindergarten teacher (grade 1 and 2), one teacher of a combination group of grades 4, 5 and 6, another teacher in both grade 6 and 8, one teacher of grade 6, and 4 teachers of grade 7. Among the respondents, two teachers were also ICT coordinator of their school. The respondents fall into the age category 26-57 and are all female. For the recruitment of the respondents, an introduction poster with an invitation to participate was sent (Appendix D). It was not that easy to find teachers willing to

participate in this study. This may be because in general there is "research fatigue" in education (Van-Efferen-Wiersma et al., 2017). The respondents were approached differently. First, emails were sent to school management. After only getting three replies after one-week, other mediums were used for the recruitment. Through Facebook groups for primary school teachers and via a personal call to action through social media outlets, enough participants were found.

Interviews and Questionnaire

The interviews are recorded with recording software on a mobile phone after the respondents had agreed to the informed consent conditions. For the face-to-face interviews, an informed consent form was signed (Appendix B). In the case of the phone interviews, informed consent was either signed or recorded and agreed to. The questions posed resulted from the theory discussed in chapter 2. The questionnaire that partly structured the interview is included in the appendix (C). The topics list guided the interview in a way that all relevant subjects were touched upon. It happened with some regularity that questions that were further on the questionnaire were already (partially) dealt with. Not all the questions were posed in the same order, because the questions were adapted to the conversation. The question was sometimes formulated differently depending on the interlocutor and the situation. Some themes were considered a bit longer and space was offered for the interviewee to finish his or her story. At the end of the interview, the question was asked whether there were still things undiscussed and whether the teacher wanted to add something else.

Processing the results

After the interviews were conducted, they were transcribed and coded for analytic purposes. Important or distinctive comments and quotations are included in the analysis chapter. Names of the schools, respondents, students, locations and institutions are omitted in order to ensure privacy. The transcripts (Appendix F) that followed from the interviews were analyzed through the process of coding. The software program MAXQDA was helpful for the coding of the transcripts. The first step of the process was to analyze the transcripts with an open mind. Initially, 432 labels were assigned to the text fragments. These labels were then divided into main codes and subcodes. At this stage of *open coding*, are not yet selected based on their relevance (Boeije & Bleijenberg, 2009. The next step of the analysis was *axial coding.* In this process, codes were reformulated, merged and clustered. For example, the main code *Digital Competence* was matched with subcodes *Age difference, ICT support, interest in digital tools, stress, rapid changes in technology.* The purpose of this process of axial coding is to explore the relevant and less relevant components of the data. During the axial coding process, codes were significantly reduced. In this way, more hierarchy is brought into the data which makes it easier to analyze (Boeije & Bleijenberg, 2009). The final step involved *selective coding*, by which all relevant data are brought together and structured. The most important categories where then compared and divided into central themes which form the guiding thread of the analysis. The central themes that

are (1) Deployment of EdTech at schools; (2) Teacher's Experience; (3) The relationship with professional autonomy; (4) and (5) the relationship with equity and (6) the relationship with free development.

4. Analysis

4.1. Deployment of EdTech

Before addressing the impact of educational technology on public values, it is useful to get a clearer picture of how educational technology is used in the classrooms of primary education. The interview data reveals that the learning environments are indeed increasingly equipped with educational technology. The use of hardware such as Chromebooks and tablets, but also digital learning platforms like Snappet and ProWise are increasingly integrating into the classrooms of the respondents. From the interview data it becomes clear that all of the respondents use EdTech to support their teaching. This is primarily in the form of blended learning where online and in-person instruction is combined (Williamson, 2017). In that regard, the online-offline balance seems to be found important for the respondents. Looking at the deployment of hardware, interactive whiteboards and traditional computers are present at all the schools where the respondents work at. When it comes to other devices, Snappet tablets and Chromebooks are most frequently referred to. Chromebook laptops seem to be available at all the schools where the interviewees work. This corresponds with the estimates that indicate that Google is one of the biggest leaders in the Dutch EdTech market for primary education (Bouma & van der Klift, 2019). A majority of the respondents remarks that Snappet tablets and Chromebooks are both used at the school they work at. Snappet tablets are mostly used in the middle grades (grade 4, 5 and 6). In the upper grades (grade 7 and 8), Chromebook laptops seem to be more common to use in order to prepare the students for high school. In the schools were the respondents work at, most upper grade students still continue to work with Snappet in the upper grades as the Snappet adaptive learning platform is supported by the Chromebooks as well. As regards administration and implementation, most of the schools are digitized. Respondents casually mention that they are using student tracking- and administration systems, and apps to communicate with parents. The interview data suggests that core functions such as teaching, learning, administration and evaluation today are partly outsourced to providers of educational technology. Concerning the use of online learning material and learning platforms, a majority of the schools where the interviewees work combine the use of online (adaptive) learning material from publishers of learning methods with separate adaptive learning platforms such as Snappet and ProWise. It becomes evident that Snappet is a permanent component of the subjects of math and language in a majority of the schools were the interviewees are employed. Other adaptive learning platforms that were mentioned were *Squla, Basispoort, ProWise (Taalzee, Rekentuin), Gynzy* and *Plannex.* Some teachers also support their

lessons with apps like *DuoLingo, Gynzy, ClassDojo, Mentimeter* and *Kahoot.* It is notable that the extent to which adaptive learning platforms are used is varying between schools. This depends on the teaching level as well as the subject and the preference of the teacher, but there also seem to be differences across the same grades. Given that three of the interviewed teachers are teaching in grade 7 [interview 2, 3, 5], their answers differed slightly. One teacher indicates that her class works with adaptive learning software for 3 to 4 hours a day, while others indicated to work with it for minimally 1 hour, and maximum 1,5 hours, respectively. Though this is only to illustrate a difference; it is not the intention to generalize. There are also other remarkable differences between the schools. Some of the schools where the respondent work decided to use adaptive software from one single provider for all the subjects, such as Snappet, while other schools combine different adaptive learning methods from different EdTech providers. One respondent even remarks that all the teachers in her school worked together to design their own adaptive learning method. When it comes to testing, a majority of the respondents stated that they used adaptive learning platforms to examine students. However, it is not the case that it replaces offline testing.

4.2. First-hand experiences

Based on the interview data, the first-hand experiences of the respondents with EdTech are briefly discussed in this section. It is relevant to map out the respondents' vision and experience with the use of digital technology since this can influence how they look at their professional autonomy and equity and free development in relation to EdTech.

From the conversations, the impression follows that all the respondents are enthusiastic about the use of EdTech in the classroom. In line with what van Dijck et al. (2018) suggested, the interview data reveals that the respondents primarily view EdTech as a means to improve education. From this follows that the interviewed teachers judge EdTech from an instrumental point of view, which implies that they focus primarily on the positive aspects of EdTech (van Dijck et al., 2018). The negative aspects of educational technology are barely recognized among the respondents. It also appears that the interviewees do not seem to identify that learning platforms are shaping and steering education into a certain direction. This will be illustrated in the quoted text fragments that follow in this analysis. Despite the fact that a part of the respondents has not always worked with digital learning resources during their career, and some of them being 'digital immigrants', they state that they have relatively few problems in dealing with EdTech. However, it is noticeable from the conversations with the interviewees that there are differences in the age of teachers when it comes down to dealing with educational technology. A majority of the respondents indicates that the developments and the integral changes in EdTech are so rapid that it is sometimes hard to keep up. Some of the respondents are reporting difficulties with this, especially concerning the older generation of teachers:

[1] [1] *"Digital competence is important. I do notice that older teachers have difficulties with this. Sometimes they really have to get used to it, because it all goes at a rapid [emphasis] pace."* Another respondent adds: [2] *"I also have a few colleagues who are already in their sixties and then you notice a difference. I am already approaching 50 myself, but they are 10 years older and then you just notice that they have tensions [slightly concerned]. Like 'how do I do this? [stressful tone] ', I have that too, but I get over it a bit easier."*

Two of the respondents who are older than forty, admit that they struggle sometimes themselves after the question was asked whether they enjoyed working with digital learning resources:

[3] *"I like working with digital learning resources, but I notice that I have a huge backlog of digital resources and what you can do with them. When I look at teachers who are ten - twenty years younger, they really know a lot more. I grew up and also graduated with pen, paper and typewriter. In the beginning it was really difficult."*

[4] *"Yes, I often have to ask for explanations for certain things. I notice that something changes quite often over time. We recently switched from one student tracking system to another. Then you have finally mastered one system and then you switch to the other, so then I have to follow another course of that. That comes with an app that you also have to master [short sighs]. It all goes pretty fast, from one thing to another [slightly stressed]."*

The above quotations can be linked to a loss in professional autonomy. When teachers have to ask help constantly from others in order to perform their lessons, this touches on their professional autonomy since they are less independent as a result of the use of EdTech (Pearson & Moomaw, 2005). As Pijpers et al. (2020) have argued professional autonomy also reduces when teachers do not have a good understanding of technology. Feelings of stress and anxiety may furthermore adversely affect professional autonomy. When these feelings gain the upper hand, teachers can lose their motivation. In light of what Reich (2002) stated, autonomy is partly dependent upon the capabilities and intrinsic motivation. As a result, stress and anxiety can also have an adverse impact on professional autonomy.

4.2.1. Teachers' perceptions of personalized learning

As mentioned in the theoretical chapter, previous research has primarily paid attention to the positive impacts of adaptive learning platforms. Technology-mediated instruction through adaptive learning platforms is primarily viewed by the respondents as a positive development that improves education. The respondents view adaptive software as a supportive tool rather than a tool that replaces them. Child-centered education, efficiency and better overview of the classroom are frequently mentioned during the interviews: [6] *"I like to know where the students are. When my dashboard shows that a child*

[1] The numbers in square brackets indicate from which interview the quotation comes from

has only completed two assignments after half an hour – you can ring the bell in advance. When you work with traditional textbooks you just cannot see that. Only when you walk past, but then you are continuously walking in circles. But giving real-time extended instruction was difficult at the time." These advantages are also mentioned by Williamson (2017) and Khine (2019) as the main reasons to incorporate education technology into the curriculum.

Overall, it can be observed that the respondents are positive about the use of EdTech in the classroom. First of all, it is identified that there is common agreement among respondents that EdTech increases efficiency. A large part of the respondents emphasize that educational technology reduces their workload. Especially, adaptive learning software reduces the time to revise student's (home)work. Furthermore, due to digital monitoring it is easier to identify individual needs of the students. The adaptive learning software is used as an early warning system and gives more insights into the individual learning process, which facilitates a child-centered approach: [2] "*It simply takes far less time. We can really see a lot, like what they find difficult, what they do wrong, how long it takes to complete an assignment."* Another respondent adds: [3] "*You see a lot more at the front. By following the dashboard, you can see where you need to modify your instruction. You can go deeper into the instruction and the analysis. Checking answers took hours with notebooks and all those rows. That part has disappeared because you follow it live."*

Among the respondents there is a general belief that adaptive learning technology platforms influences student motivation in a positive way. Learning by playing that is facilitated by adaptive learning appears to be a motivational factor for the students. One of the respondents states the following about the adaptive learning software of Snappet: [6] *"I notice that the children are more motivated. If you start working with a language book, you can hear them sigh everywhere. When we switch to Snappet, it always goes a bit better and they find it also easier and clearer."*

With respect to student motivation, some respondents point towards the added value for the weak students and others underscore the value addition for the plus student. The one respondent emphasizes that adaptive learning methods enriches the learning experience of the brightest student, whereas the other respondent emphasizes how it improves the motivation of the weaker student. However, there is general agreement among the respondents that adaptive learning platforms enrich the learning experience for all students. The following quotation captures this belief quite well: [7] *"Everyone can work towards the same goals, but it is at the child's own level. So, whether you are strong or weak, it is all about growing. That you show that even if I am a bit weaker, I can also extract the finite verb from a sentence, but at my own level."*

The abovementioned examples reflect that EdTech platforms can contribute to equal opportunity in the sense that every student can work towards the same goals, but at a different pace.

Despite that research has shown that personalized learning contributes to better learning outcomes (Faber & Visscher, 2016; Molenaar et al, 2016), the respondents do not (yet) have noticed that working with adaptive software improves the learning outcomes per se. Some of the questioned

teachers indicate that they cannot judge this properly yet because they only started working with adaptive learning methods recently. A number of respondents emphasizes, however, that the brightest students are extra challenged by adaptive learning. As a result, they may achieve a higher target level than without adaptive learning. One of the respondents mentions, for example, that Snappet's algorithm can take the student as far as a high-school level mathematics. In this sense, it can be argued that adaptive learning contributes to better learning outcomes since the student may not be exposed to this subject matter when adaptive learning is not used.

4.2.2. Criticism with respect to public values

Although overall a positive attitude towards adaptive learning platforms is found, the respondents do have raised some points of criticism that also relate to professional autonomy, equity and free development. Concerning professional autonomy, some respondents bring up the instruction videos that are provided by adaptive learning platforms. Some of the respondents acknowledge that these videos sometimes make them lazy. One respondent comment that she finds this regrettable: [6] *"You have to be vigilant that you do some additional work yourself. It should not be that you just let the students watch instruction videos. That is not wat you call teaching."* Due to the distance-learning period, a majority of the schools where the respondents teach decided to use the instruction videos that come with the Snappet learning platform. One respondent described the situation: [6] *"During home schooling, the instruction videos were placed on the Snappet home account, so that students could watch the video and make the lesson. At that point I thought, well, now I really do not have to do anything anymore. I actually found that a bit disappointing, because that is not what you studied for and that is not your profession".*
The above quotation suggests a loss in professional autonomy since the teacher has no control over the theoretical knowledge and instructional planning (Parker, 2015).

Concerning equity, some teachers note that teachers remain essential despite the use of adaptive learning and all the standard instruction videos. A number of students are still critically dependent on the instruction from the teacher. One of the respondents who works at school in a disadvantaged neighborhood tells that distance-learning has been a drama: [8] *"Some children have just done almost nothing during that period. Then they do not understand at all and do not know how to log in, and their parents have no idea either that was really a drama."* This is also a result of socio-economic differences. In this sense, not every student is given the same chances to succeed regardless of their socioeconomic background (Schleicher & Zoido, 2016).

With reference to free development, a few respondents remark that some students sometimes want to go too far too soon when working with Snappet. The risk with that is that students are rushing and are afraid to get behind: [6] *"Some students see it as a competition to be the fastest. Which is of course wrong, it is about solving the assignment correctly*." A majority of the respondents displays the dashboard with individual progress on the whiteboard so that students can see where they are compared to their classmates. In light of what Pijpers et al. (2020) argue this impacts the free development of children since they are behaving differently as a result of digital monitoring.

Furthermore, free practice can be undermined for students who feel the pressure of lagging behind. Additionally, another respondent tells that the students sometimes think too easily that they have already finished their Snappet assignments. In process of time, she and her duo colleague realized that when one mistake is made, students need to compensate this with five correct answers [5, Pos. 53]. This raises the question whether it is clear enough for teachers how Snappet relates to learning standards. Although the interview data does not present enough evidence, this could be an example of how platforms are shaping in steering education by setting educational standards (van Dijck et al., 2018; Pijpers, 2020).

Another interesting point of criticism worth nothing is that one of the respondents explains how her school decided to design their own adaptive learning method. She and her coworkers noticed that interpunction was a very important component of the central exam, but the team realized this was overlooked in the adaptive learning method for language. The respondent remarks [3]*" In the language app, for example, a period and a comma were asked and if that was correct, they immediately switched to direct and indirect speech."* This provides a fine example of how algorithms can contain design flaws and may reflect certain inconsistencies. This text fragments shows how it can be dangerous to rely on adaptive learning software. It furthermore exemplifies how EdTech platforms can organize education by challenging educational standards. The previous quotation shows how adaptive platforms can determine what skill is important and what skill is less important (Kool et al., 2017). Moreover, this quotation demonstrates that teachers still matter and that it is important to be critical towards algorithmic assessment (Williamson, 2017). The fragment also reflects professional autonomy since the teachers have an influence in the selection of activities and learning material (Parker, 2015).

Despite these points of criticism, none of the respondents call the use of adaptive learning platforms into question. The idea that pedagogical and didactical models are integrated into EdTech platforms does not seem to be present among the respondents (Williamson, 2017). It is barely recognized or noted that EdTech is shaping and steering education into a certain direction (van Dijck et al., 2018). The interview data suggest that EdTech platforms are perceived as a means to improve education rather than a tool to disrupt education. As discussed above, the respondents mainly emphasize increased efficiency, student motivation, performance, child-centered learning, and more control over the learning environment. All in all, it can be said that from this follows that the respondents have an instrumental vision towards adaptive learning technology (van Dijck et al., 2018).

4.3. Relationship EdTech and public values

The previous paragraphs have largely described how EdTech is deployed, used and viewed by teachers. This paragraph moves on and attempts explore the relationship between digitization and the values professional autonomy, equality of educational opportunity, and the free development of students more detailed.

4.3.1. EdTech and Professional Autonomy

In order to find out whether respondents experience a change in their professional autonomy as a result of the increasing digitization, several questions were asked with respect to their perceptions of key factors of professional autonomy (Pearson & Moomaw, 2005).

Changing teacher-student relationship

First of all, it becomes evident from the interviews that the teachers see their role towards the student changing due to the increased use of EdTech. The respondents see the teacher-student relationship changing in three ways. First, more than half of the interviewees see that children have more responsibilities of their own. Second and related to the first change, the manner of instruction changes. Third, the roles are sometimes reversed due to the digital competences of the student. According to some respondents, the greater responsibility of children has to do with personal target levels that are integrated into the adaptive learning platforms. This personal target level turns students into the 'owner' of their own learning process. The students themselves are able to follow their own progress, and they can see which learning objectives are completed and which part needs more practice. Students can also request targets from their teacher. As such, more responsibility rests with the student. One respondent says the following about this: [1] *"I still matter as a teacher, but ehm digital resources greatly enrich your lesson and ensure that students themselves remain engaged. The emphasis is more on where the child is, where does the child want to go. As a teacher I sometimes make things clear or give them a push. It is the children who are now taking more responsibility themselves. The children can also request a learning objective with me. Sometimes you also get children who say 'Hey teacher, I would like to learn to tell the time' then I can add that to the app."*

Due to technology-mediated instruction, the respondents indicate to have more time for instruction, analysis and evaluations. The interviewees do not perceive technology-mediated instruction as a loss of professional autonomy. They rather see it as a tool that supports their instruction and evaluation: [3] "*Your instruction is different. You look more at what should I offer and what am I going to offer them. You are much deeper into the instruction and the analysis. That piece of checking has disappeared because you follow it live. You look a lot more of we have to go here. In the upper years, the children now also take more responsibility themselves."* Real-time monitoring allows for better instruction as it becomes immediately visible when a student needs help. Therefore, the professionalism and analytical skills of the teacher may be even more important. Contrary to what Bradbury and Roberts-Holmes (2018)

found in England, the respondents neither see the emergence of EdTech as a lack of confidence in their professionalism, nor do they view themselves merely as data collectors. One respondent furthermore notes that responsibility in the form of 'ownership' (i.e. students are the owner of their own learning process) is important in the society where we live in:

[6] *"We are working intensively on 'ownership' at our school. That the child also becomes aware of its own abilities and setting goals. As in what do you need to get to 60 per cent when you are at 40 per cent now. Do you need extra help? When are you going to ask for that? After class or during class, or do you continue working during the break. It is important that the child becomes more aware of this, especially in this society in which we live."*

The third change in the teacher-student relationship has primarily to do with digital competence. Some of the respondents mention that the roles are sometimes reversed when it comes to dealing with digital learning resources and digital skills: [2] "*You sometimes find out that those children really know more digitally than we do. The truth of the matter is that my students just help me out. I actually like that because you can show that you as a teacher do not know everything."*

This is not viewed as a negative development in itself. It is more a question of digital competence of the teachers and getting familiar with new applications of EdTech. The Google environment, for example, has an integrated chat function where students can chat with each other: [2] *"In Google Classroom, the students can send all kinds of comments to each other and when we notice that we go to ICT to see if we can stop that. Those kids figured things out so quickly. As an older teacher, I sometimes lag behind, and I am like 'oh yes that is also possible?' [laughs]."* It is not the case or not perceived by the interviewed teachers that students are taking over the role of the teachers, however, it is important to be vigilant and to possess digital skills as a teacher in order to retain control, and thereby their professional autonomy.

Involvement Decision-making

As shown in the theoretical chapter, having authority when making decisions concerning the selection of learning activities, materials and instructional planning is one of the key factors of professional autonomy (Pearson & Moomaw, 2005). Concerning decision-making, it was asked whether the respondents are involved in the decision-making about EdTech, and if so, they feel sufficiently involved. There is some involvement in the decision-making process, except for one respondent. In most cases, the teachers discuss with the ICT department and the school management about the deployment of EdTech. In other cases, the teacher has at least a say in how the school budget and the government subsidies should be spent. In the end, the responsibility for the procurement of digital learning resources lies with the school management. Nevertheless, all respondents state that they feel sufficiently involved within the decision-making process and are generally satisfied with the digital education policy at the school they work at. Furthermore, the respondents note that they are of the opinion that they have the space and freedom to shape their lessons. Even though in most schools there are guidelines for the use of educational technology, the teachers can decide when and how they make use of educational technology. In view of the above, the following quotations describe the teachers'

freedom to use educational technology in the classroom: [5] "*We as teachers may decide for ourselves whether the digital learning resources are used for the instruction, but during processing this is necessary to be able to demonstrate the results and progress*." Another respondent says: [1] "*Each course has its own digital whiteboard environment, and you are also free to use YouTube and ProWise. We are very concerned with how this fit within the identity of the school. If we use these resources, the child must learn something from them."* It follows from the conversations with the respondents that they are free to determine how they use educational technology as long as it fits with educational purposes. In this respect, the respondent can still exercise a degree of individual autonomy over planning and sequencing.

Curriculum Autonomy and Control

With respect to curriculum autonomy (Pearson & Moomaw, 2005), several questions were asked about the freedom and control over the design of lessons. In this context, it was also asked whether the teacher could add their own material to virtual learning environments. Adaptive learning platform Snappet which is used most frequently among the respondents, is equipped with a fixed set of learning materials. However, some respondents indicate that they sometimes deviate from Snappet: [5] "*Snappet comes with a fixed package of exercise material. When I come across a digital assignment, I sometimes add it to the Google learning environment."* From this it becomes clear that teachers still enjoy a degree of curriculum autonomy despite the use of EdTech. The teachers still maintain a considerable degree in the choice of learning materials, and are also still able to exert control over their work environment (Parker, 2015; Pearson & Moomaw, 2005). In this light, another respondent adds the following [6] "*Sometimes you also have to stand above the method and think about what you are going to use or whether that is realistic. Sometimes you have to offer it differently or on a different level."* The example of the school that designed its own adaptive learning method which is discussed in paragraph 4.2.2. [3] furthermore demonstrates that teachers continue to have the authority in making decisions concerning the selection of activities and learning materials and instructional planning and sequencing (Pearson & Moomaw, 2005).

Sub conclusion Professional Autonomy

Even though the respondents see a clear change in their role in relation to the students due to the emergence of EdTech platforms, they do not see this as a threat to their professional autonomy. On the contrary, the respondents see a range of new possibilities to improve their instruction and supervision. As a result, the questioned teachers feel that their role becomes even more important. The emergence of EdTech is not viewed by the respondents as a lack of confidence in them as professionals. Looking at the key factors of professional autonomy, the respondents express that they still have the room to shape and design their lessons according to their own preference despite the increased use of EdTech. The respondents have also indicated that they feel sufficiently involved into the decisions made with respect to EdTech in their school. However, this does not mean that EdTech is not influencing

professional autonomy as a public value. There have been a few examples where it was shown how adaptive learning platforms can shape and steer education by determining which skill is import and which skill is not. Furthermore, the fact that a few respondents indicate that they or their colleagues have difficulties with- and suffer from stress due to the use of digital technology, the professional autonomy is at stake. It is therefore of crucial importance to be critical with regard to the use of EdTech, so that the professional autonomy of teachers is not underestimated and undermined.

4.3.2. EdTech and Equal Opportunity

As mentioned in the theoretical chapter, a lack of digital skills creates differences in social opportunities (Schouwenberg, 2018). Carol (2015) has stressed the importance of education in closing the digital divide, because research has demonstrated that education plays a crucial role in closing the gap. In order to gain insight into whether the use of EdTech impacts equal opportunity, several questions were asked with respect to the deployment and availability of hardware and software, and to what extent it is used. It was also asked whether the students have their own device and how that is funded. Furthermore, the question was posed whether the respondent thinks if EdTech has an impact on equal opportunity.

Equal Access to EdTech

Access to digital technology can contribute to equality of educational opportunity as long as the access is also equal. Even though that in all the schools where the interviewees work EdTech is available, there are notable differences in terms of availability and the extent it is used. This different access to EdTech can have adverse consequences for the equality of opportunity given that digital technology can enrich the learning process (Pijpers et al., 2020). As a result, some children can get a large backlog compared to other children. Since research has demonstrated that adaptive learning has positive effects (Faber & Visscher, 2016; Molenaar et al., 2016) on all students, it can contribute to equal opportunities. However, when there is no equal access the use of adaptive learning can lead to a digital divide (Pijpers et al., 2020). Furthermore, some students will have a bigger advantage in high school when it comes to digital skills than others. Considering that Carol (2015) argued that digital disadvantages are often not made up after childhood, differences in the use of EdTech across schools can have negative consequences for equal opportunities. As previously mentioned, differences in the deployment of EdTech are first of all dependent on the school budget and the decisions that the school makes. Differences are also dependent on the grade, subject and teachers' preferences. The example illustrated in paragraph 4.1, however, demonstrated that the hours that students are working with EdTech per day also varies within the same grades.

It has become clear from the interview data that a focus on digital skills and working with a laptop starts primarily in the upper grades of group 7 and 8. However, it emerges from the interviews that there are differences across the board. At one school the upper grade students get their own laptop

and at other schools they do not. In the cases where students do not get their own device, the device is shared with another grade. One respondent, for example, indicates that 120 Chromebook laptops are shared among 400 children throughout the school [2, Pos. 58], whereas a few other respondents note that from grade 4 onwards each student has its own device to work with adaptive learning platforms [1, Pos. 25; 7, Pos. 6; 3, Pos. 24; 5, Pos 14]. In one case, the respondent states that the students in her school do not use adaptive learning with a personal device until the upper grades. In the other grades, the students of her school have only a few devices at their disposal [8, Pos. 16].

As regards funding, all respondents indicate that the devices are provided by the schools, so in that sense there is equal access to EdTech within the school. Parents or guardians do not have to contribute to this unless the device breaks down due to the fault of their child.

Another difference between schools that is observed from the interview data, is that while in some schools EdTech is still in its infancy, other schools are already familiar with it for quite some time. A number of respondents mentions that EdTech only started to gain momentum in their school due to the school closings as a result of forced distance-learning COVID-19 lockdown. Furthermore, it appears from the conversations that some respondents do not yet know how to judge or form an opinion on their experience with EdTech platforms because they have worked with it for a relatively short time.

The following quotation captures what is illustrated above:

[7] "*Yes, I just think that there is sometimes a divide between schools. Looking at this school, iPads have been a regular feature for years. I sometimes hear from friends who are also teachers that they are really not that far yet when it comes to digitization. I think that some schools really only were forced to take that step because of Corona. I certainly think there is a head start in that sense with certain students. Especially, when children go to secondary school with digital skills "in the backpack", that gives an advantage. Only then do I also think of that they pick it up so quickly today.*

It becomes evident from the interview data, that the period of home-schooling has highlighted some inequalities concerning the use of EdTech. As mentioned earlier, a few respondents noted that distance-learning has revealed that the instruction of the teacher is essential. Another respondent says in a slightly frustrated tone that even though the school that she works at is a school with children from parents who have a higher education than average, that all the laptops available at her school were loaned out: *"Despite the fact that we have a lot of students from quite wealthy parents at school, we still loaned 120 of those Chromebooks in Corona time. That is quite a lot for a school with 400 children (astonished, frustrated)."* Another respondent adds *[4]* "*There were really still families who said, 'but we have nothing'. Then they could get a Chromebook on loan."*

With regards to socioeconomic status, most of the teachers do see a difference when it comes down to digital skills of students. However, a majority of the respondents nuances this as parents with a higher education or more financial means will always be able to better support their children with their schoolwork by having either the human capital to assist them or by having the money to spend on

tutoring. One of the respondents says the following about this [7] "*I think that you have to deal with major differences anyway, not only in the field of digital knowledge. Most of our students have access to homework assistance or parents who can help. Often all means are available, your own room, your own device, a good internet connection, etcetera. If children already receive a lot from home, they also take this to school and pull other children up. And yes, that can also be on a digital level of course."*

One respondent who works at a Christian primary school [1], says that a proportion of the children in her school come from strictly reformed families. As a matter of principle, some of these families do not have television and restrict the use of internet. One the one hand, the respondent sees a difference in digital skills, on the other she notes that the gap is getting smaller over time as the students get used to the devices.

Concerning the use of EdTech during leisure time, teachers cannot really know whether the students' parents invest in devices with learning apps. With one exception, the respondents denote that the students only take the devices home during sickness and other rare events such as a lockdown. A proportion of the respondents is of the opinion that practice at home creates a distorted picture. As one respondent comments: [5] *"The devices stay at school. This is a very conscious decision; we do not look at what they are doing outside school hours. It would give a distorted picture if one student is practicing at home all evening, while the other only works half an hour. By example, then suddenly the level of one student skyrockets while they would be at the same level in the class."* In addition, there is also the risk that someone else, but the student is making the exercises, which also reflects an inequality. Despite that in most cases the devices stay in the school, the respondents remark that the children do get the login details to work at home. However, it is mentioned that this is not encouraged. It is clear from the foregoing, that it is difficult to say anything about the use of EdTech in leisure time. What is clear, though, is that here as well differences are observed between schools.

Finally, it is asked how teachers look at EdTech with respect to equal opportunity by posing the question whether they think EdTech influences equality of opportunity. This is differently perceived among the various respondents. Only one respondent states to not have an opinion on this. One part of the respondents emphasizes in the answer that EdTech contributes to equity, while another part suggests thinking that too but emphasizes the differences between schools concerning the use and availability of EdTech. The respondents who emphasize that EdTech contributes to equality stress the opportunities that adaptive learning offers to the individual student: *[5] "I believe that everyone can work on the same goals, but at the own level of the child. So, whether you are strong or weak, it is about improvement. Therefore, I undoubtedly think that there are equal opportunities."* Another respondent says: [6] *"Not in our school at least, we can identify at a few glances which child needs extra support and which child needs extra challenge."* A similarity in the answers of the other part of the respondents is that they think that EdTech plays a vital role in 21st century skills, and that differences in the use of EdTech between schools may lead to inequities: [1] *"Well, I think all schools will have to join the bandwagon at some point. One school is really different from another." High schools soon indicate that*

you have to pay attention here or there or they see a digital gap." Another respondent adds: *"You have to go with the flow. The children need to have some foundation before they go to high school, otherwise they just lag behind."*

Sub conclusion

Even though EdTech can offer chances and can contribute to equal educational opportunities, this paragraph has showed that EdTech can also be counter-productive to equality. From the interview data it emerged that within the schools there is equal access to EdTech within the schools where the interviewees work. Devices are funded by the school and parents do not have to contribute to this. However, there are notable differences in the availability and use of EdTech across the schools' where the interviewees work. Some students get their own device, while others have to share with others depending on their school's digital education policy. Some respondents indicated that EdTech has been an integral part of the school they work at for a long time, whereas other respondents indicated that they were still getting familiar with features of educational technology. Such differences can further reinforce the digital divide.

4.3.3. Free Development

As a result of adaptive learning, children can be constantly followed in their learning process. In the theoretical chapter it was discussed how this can impact the free development of students. According to some authors, free practice is hampered when students are continuously monitored and detailed profiles are created of them (Pijpers et al., 2020; Verdoodt & Lievens, 2017). Another concern that is related to it is when large commercial technology companies may be always watching, and (personalized) profiles are created for advertising or other commercial purposes (Har Carmel, 2016; van Dijck et al., 2018).

From the interview data it emerges that Google and Snappet are large players in the EdTech landscape. Concerns over these companies are justified since both companies have gone beyond the law in the educational context. Snappet was put in a bad light in 2014 by the Dutch Data Protection Authority after having processed personal student data illegally. The company was furthermore accused of lacking transparency on the processing of student data and of insufficiently protecting data against unlawful processing of third parties (Autoriteit Persoonsgegevens, 2014; CBP, 2015). In the US, there have also been some lawsuits against Google about educational data mining and collecting data for advertising (Kurshan, 2017). Snappet is the platform that is most frequently mentioned when it comes to digital monitoring for the core subjects of mathematics and language. The respondents indicate that they are able to real-time follow the pace, level, and number of tasks completed for each individual student. For the other courses, the respondents indicate to use adaptive learning and student tracking as well but this is provided by the publishers of digital learning methods. Digital monitoring is furthermore used for testing, but offline testing is in the most cases still leading. All respondents that use adaptive learning platforms, state that the students are obliged to use scrap paper during both

practice and testing. As such, the teachers can still see how students derive at their answers. In that sense, students are still free to experiment. However, some respondents note that some students experience stress and anxiety because of digital monitoring. In the majority of the cases, the respondents note that this has to do with the getting used to it phase: *[5] "If they no longer receive the feedback from Snappet, they will suddenly become stressed. Also, with new students when they work with it for the first time. They think that is also quite intense, that they think oh okay, the teacher really sees everything. For most it has become normal."*

A few respondents provided an anecdote on how children react to digital monitoring:

[4] *"Yes, they understand very well that they are being followed. Those children who work with Snappet understand this very well. They know that the teacher knows exactly what they are doing. They also get a picture of whether they are doing this right or wrong a green or a red dot. The one child is passionate about it as in "yes a green ball"! There are also those who really get stressed out of that. It is a bit about the child's personality. With a very sensitive child who is easily afraid of failure, Snappet can actually backfire."*

[1] "*It is the case that they often feel caught out. This morning I had a student who had about three red dots behind each other. So, then I said "darling, go and correct your mistakes" [high intonation]. Then she really looked at me so terrified. I said yes, I just saw it. It's okay if you make a mistake, but you haven't corrected it. It often is. If it doesn't work, they can check the box with the question mark so I can help. This student hadn't done that, and of course said she would improve it soon. But then you actually know that this will not happen again next time. The children do not feel attacked, but they are shocked by oh no, the teacher saw that."*

[5] *"It is mainly with testing. So, I had a test last month and they will no longer receive feedback. A girl who always does very well and who nonchalantly makes tests, was suddenly super stressed. Because she no longer saw whether she was doing well or not. Thus, she was really like, miss why can't we check together [surprised tone]."*

The aforementioned fragments do suggest that some students act differently because they know that they are aware that the teacher is constantly watching. It also becomes clear that students know that each task is assessed (Pijpers, 2020). In addition, respondents remark that students can feel the pressure to do better due to the competitive element that is incorporated in adaptive learning systems. However, this can be nuanced, because it is also that adaptive learning platforms makes students free to learn at their own pace. Some respondents note that during the lessons with Snappet, the teachers' dashboard with an overview of all students' progress is shared with the children on the Digi board. Another part of the respondents stresses that they prefer not to show this.

Despite the fact that some children express anxiety and stress due to the use of adaptive learning software, the respondents do not express that they view this as an adverse development. The

respondents are of the opinion that adaptive learning and digital monitoring belongs to contemporary time. As earlier discussed, the respondents judge adaptive learning according to an instrumental vision. Even after posing more in depth-questions concerning privacy, it seems that the respondents are not seeing any harmful consequences of digital monitoring. It may also be suggested that the respondents are blinded by an instrumental vision on EdTech and are just not aware of the adverse effects. This is supported by the following text fragments when asked whether they saw negative sides to digital monitoring: [3] *"No, not at all. In the past, when you got your notebook back and saw all those red stripes, that's no different"* Another respondent answered: [2] *"No, I think it fits in the society we live in, we can follow everyone. In that respect, everybody goes along with that."* It was a little confounding that none of the respondents have expressed their concerns over the privacy aspect or Google's influence.

With respect to the use of EdTech in the leisure time, a majority of the respondents has noted that they do not encourage taking the devices home. Contrary to what Pijpers et al. (2020) say, the respondents do not reinforce the norm to be always online by letting the students having access to education anywhere, anytime. Most of the respondents indicate that it is a deliberate choice of their school to decide that the devices are not meant to be taken home. The same applies to the hours that devices are used within the class, most teachers stress the importance of the online-offline balance in education. Even though in some cases the students have login data to work at home, the teachers emphasize in this respect that this is discouraged. At least from the series of interviews held, and taking out of consideration distance-learning, it is not identified that schools and EdTech platforms are interfering in the leisure time too much.

Sub conclusion

All in all, it can be said that the use of EdTech and the digital monitoring that comes along with impairs the free development of students. While one could argue that adaptive learning environments create a space to experiment and make mistakes at one's own pace without taking into account what other students do, digital monitoring throws a spanner in the works. With adaptive learning methods every single task that a student carries out can be monitored in real-time. Since the students are aware that the teacher and sometimes fellow classmates can watch every step they take, they change their behavior. It is identified from the interviews that some students are rushing and stressing as a result of digital monitoring. The idea is not present with respondents that their students think that someone else but the teachers or classmates is watching them, however, it cannot be ruled out that this is the case. With Google and Snappet, the free space is intertwined with the economic space. Especially, since Google has not signed the privacy agreement for EdTech it is virtually impossible to know whether the student data may be used for commercial purposes. It is reassuring that with exception of one school where the respondents work, devices are not taken home in normal circumstances.

5. Conclusion

In this final chapter, the central question of this research is addressed. Subsequently, a critical reflection is made which discusses, among others, the contributions and limitations. Lastly, implications for future research will be provided in the discussion paragraph.

5.1. Addressing the research question

By conducting eight semi-structured interviews, this explorative research has observed a number of major findings. In doing so, there has been a focus on addressing the research question *"What is the implication of Educational Technology for the public values embedded in the Dutch education sector?"*. More specifically, it is explored how the safeguarding of the public values of professional autonomy, equity and free development under pressure as a result of the increased deployment of EdTech in the classroom. This research has learned that educational technology can be a double-edged sword. On the one, hand EdTech can reinforce public values and, on the other hand, EdTech can undermine public values. However, the findings from the interviews indicate that EdTech does more harm than good with respect to the examined values. First of all, the safeguarding of these values is becoming increasingly difficult in a public-private playing field as commercial providers of EdTech are entering the virtual learning environments.

The interview data reflects that Google is indeed a large player on the Dutch EdTech market. With commercial technology companies like Google entering the school buildings, the public and independent space of education is increasingly intertwined with the economic space. In essence, this means further privatization of traditional public tasks. The question arises whether commercial technology companies have an interest in the promotion of public values since they are often accused of being too big to care. Despite this, there seems to be insufficient awareness from the government and the educational institutions themselves. This could be explained by the idea that these actors embrace an instrumental vision on digital technology (van Dijck et al., 2018). Another explanation could be that as a result of the rapid developments and innovations in EdTech- which is also confirmed by the respondents- the institutions of the school and government are too slow to come up with a policy response which can lead to an institutional void (van Bueren & Klievink, 2017; Hajer, 2003). It emerged from the interviews that the interviewed teachers primarily view EdTech as a means to increase efficiency and to improve instruction and learning outcomes. The idea that educational technology has a negative side or that it steers education into a certain direction seems to be absent among the respondents. From this follows that the respondents are bearers of an instrumental vision wherein there is primarily an eye for the positive aspects of EdTech (van Dijck & Poell, 2018). However, in contrast to the latter, the analysis presented in this research shows that EdTech can steer education, and that it (invisibly) affects the public values of professional autonomy, equity and free development. With respect to professional autonomy, the majority of the respondents recognizes that their relationship vis-à-vis the students changes due to the increased use of educational technology.

However, the respondents do not perceive this as a loss of autonomy. A large part of the respondents is of the opinion that technology-mediated instruction facilitated by EdTech gives them more time for individual instruction, analysis and evaluation. The perception of the respondents is that their role still matters and may be even more important since they can provide more personalized education. However, this does not mean that EdTech platforms are organizing education. The examples in the analysis of how adaptive learning platforms can determine which skill is important and which skill is not, shows how decisions over the learning process can be taken over by technology (Pijpers et al., 2020). Furthermore, it emerged from the conversations that some respondents experience stress due to the use of digital technology, which affects professional autonomy as well. In addition, some respondents indicated to have difficulties with the use of technology. This can also invisibly affect professional autonomy since it is likely that the computational thinking behind EdTech is not understood. (Pijpers et al., 2020).

The value of equal opportunity is similarly affected by EdTech. As outlined, EdTech can offer a range of opportunities and research has shown that it has positive effects on motivation and learning outcomes (Faber & Visscher, 2016; Molenaar et al., 2016). However, when not every child has the same access to the possibilities that EdTech offers it can be counterproductive and reinforce inequities (Schouwenberg, 2018). Given that school boards are free to determine the extent to which EdTech is deployed, large differences can arise between students' digital skills. The interview data showed that there are noticeable differences between accessibility and how EdTech is used in the schools where the respondents are employed. There are also differences observed in terms of availability, accessibility, and use of EdTech between the schools where the respondents work at. From the interview data it became furthermore evident that there are considerable differences in terms of how long EdTech has been part of the curriculum. Some respondents noted that EdTech applications where relatively new in their school, while other respondents were familiar with EdTech for a longer period of time. All these differences can lead to large differences in digital skills. In this digitized world, this may not only put children at disadvantage in high school but also for the rest of their life (Carol, 2015).

Lastly, from the analysis follows that the value of free development is also affected by the deployment of EdTech. It is identified that children can change their behavior because they are aware that the teacher is watching. From the interviews it emerged that some students are acting hastily or stressed, which limits their freedom to experiment and make mistakes (Pijpers et al, 2020). The presence of Google and Snappet within the learning environments of the schools where the respondents work also poses a threat to free development since both companies have previously violated the rules when it comes to educational data mining (CBP, 2015; Kurshan, 2017). Especially the fact that Google has not signed the Privacy Covenant raises concerns about whether student data is sufficiently protected. This can put a strain on the free development since children may not be able to freely practice anymore without that having any consequences later in their life (Pijpers et al., 2020).

5.2. Discussion and Limitations

The knowledge and scholarship surrounding the impact of education technology on the Dutch primary education sector is limited. By carrying out this explorative research, greater insight is acquired into how educational technology influences the specific values of professional autonomy, equality of opportunity and free development. Due to the size and scope of this research only eight interviews were conducted. In further research, a larger number and variety of respondents over a wider geographical area could be interviewed in order to get a more accurate picture. Another suggestion for further research is to look at the implications of digital technology and platforms for public values in higher and academic education. A limitation of this research is that due to the qualitative nature, no generalizing conclusions can be drawn from this research. Nevertheless, this research is valuable and hopefully it will encourage further debate, critical reflection and more thorough research.

The research provides a unique glimpse into in the choices and deployment of educational technology in the Dutch primary schools. The data reveal that the deployment of educational technology is rather fragmented because primary schools have the autonomy to decide whether and which educational technology to use. With an eye towards the future where digital and quantifiable skills are likely to become more important, large differences between schools in terms of digital learning resources policy may have large consequences. Stricter supervision of the digital education policy by the central government by, for example, a joint procurement policy for digital learning resources may be a solution to this. Another solution to maintain public values is to create a public alternative to offset the market power of commercial EdTech providers.

What furthermore was found from the interviews is that distance-learning during the COVID-19 lockdown has made the schools where the interviewees work more reliant on EdTech applications. Some of the respondents stated that distance-learning has kickstarted a more intensive use of EdTech. In this light, Sheikh and Prins (2020) have called for a new debate on digitization. These authors argue that due to distance-learning Dutch education has become even more dependent on a few very large (US-based) technology companies, which means that traditional public tasks are placed even further into the hands of the private parties. Sheikh and Prins (2020) argued that it should be investigated what the continuation of digital education and distance learning mean for the guarantee of the public values with which education is served. According to these authors, the shifting balance towards private interests and efficiency that technology facilitates calls for new research on the effect on public values, and thereby a necessary reflection on the ‘digital sovereignty’ versus the increasing dependency of commercial (foreign) providers (Sheik and Prins, 2020; van Trigt, 2020).

Reference list

Angwin, J., Larsson, J., Mattu, S., & Kirchner, L. (2016, February 29). Machine Bias. ProPublica. https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing

Arendt, H. (2018). The Human Condition (2 (Revised) ed.). Chicago University Press.

Autoriteit Persoonsgegevens. (2014, September 19). *CBP constateert overtreding wet bij Snappet* [Press release]. https://autoriteitpersoonsgegevens.nl/nl/nieuws/cbp-constateert-overtreding-wet-bij-snappet

Baker, D., & Perie, M. (1997). Job satisfaction among America's teachers: Effects of workplace conditions, background characteristics, and teacher compensation. National Center for Educational Statics. https://nces.ed.gov/pubs97/97471.pdf

Bakker, N. (2019, December 3). *Platformisering van het onderwijs, zijn er ook nadelen?*. https://vives.nl/platformisering-van-het-onderwijs-zijn-er-ook-nadelen/

Ball, S. J. (2009). The governance turn. *Journal of Education Policy*, *24*(5), 537–538. https://doi.org/10.1080/02680930903239904

Bok, C. (2019, November 5). *Hoe beschermen we publieke waarden in het onderwijs in tijden van platformisering?* Linkedin. https://www.linkedin.com/pulse/samenscholen-verslonden-worden-christien-bok/

Bouma, K., & Van der Klift, L. (2019, October 31). *Steeds meer Google-scholen in Nederland - Privacy Ondernemers vrezen*. Nederlands Dagblad. https://www.nd.nl/nieuws/nederland/516067/steeds-meer-google-scholen-in-nederland-privacyondernemers-vrezen

Bradbury, A., & Roberts-Holmes, G. (2017). The Datafication of Primary and Early Years Education: Playing with Numbers (Foundations and Futures of Education) (1st ed.). Routledge.

van Bruggen, W., Pijpers, R., Stiller, L., & Boeke, H. (2016, October). Computational Thinking in het Nederlandse Onderwijs. Kennisnet. https://www.kennisnet.nl/app/uploads/kennisnet/publicatie/Computational_Thinking_in_het_Nederlandse_onderwijs.pdf

Brunetti, G. J. (2001). Why do they teach? A study of job satisfaction among long-term high school teachers. Teacher Education Quarterly, 28(3), 49–74. https://www.jstor.org/stable/23478304?seq=1#metadata_info_tab_contents

Van Bueren, E., & Klievink, B. (2017). Institutionele leegte: nieuwe bronnen, nieuwe uitdagingen. Bestuurskunde, 26(3), 3-14.

Cator, K. (2015, July 21). *How Should We Approach Education's Digital Divide? - BRIGHT Magazine*. Bright Magazine. https://brightthemag.com/how-should-we-approach-education-s-digital-divide-dc1ea6c37c42

CBP onderzoek naar de verwerking van persoonsgegevens door Snappet. (2014, July). *Onderzoek CBP naar de verwerking van persoonsgegevens door Snappet*. CBP. https://autoriteitpersoonsgegevens.nl/sites/default/files/downloads/mijn_privacy/rap_2013_snappet.pdf

Dartford, K. (2020, October 1). *EU looks to curb powers of Big Tech with new Digital Services Act*. Euronews. https://www.euronews.com/2020/10/01/eu-looks-to-curb-powers-of-big-tech-with-new-digital-services-act

Dignan, L. (2018, March 27). How Apple, Google, and Microsoft stack up in education technology: Hardware, software, and deployment. ZDNet. https://www.zdnet.com/article/how-apple-google-microsoft-stack-up-in-education-technology-hardware-software-and-deployment/

van Dijck, J., & Poell, T. (2018). Social media platforms and education. In J. Burgess, A. Marwick, & T. Poell (Eds.), The SAGE Handbook of Social Media (pp. 579-591). London: SAGE reference.

van Dijck, J., Poell, T., de Waal, M., van Dijck, J., & de Waal, M. (2016). De platform samenleving. Amsterdam University Press. https://doi.org/10.5117/9789462984615

van Dijck, J., Poell, T., Waal, M., (2018). *The Platform Society*. Oxford University Press

Van Efferen-wiersma, E., Van der Stege, H., Nelen, W., Van Zoest, K., De Swart, F., & Scholte, R. (2017). "Vul lekker zelf die vragenlijst in!" *Kind & Adolescent Praktijk*, *16*(2), 42–45. https://doi.org/10.1007/s12454-017-0022-x

Escueta, M., Oreopoulos, P., Nickow, J., and Quan, V. *Education technology: an evidence-based review.* (National Bureau of Economic Research No. 23744). Cambridge Massachusetts: NBER.

Eubanks, V. (2018). Automating Inequality. St. Martin's Press.

Faber, J. M., & Visscher, A. J. (2016, January). De effecten van Snappet: effecten van een adaptief onderwijsplatform op leerresultaten en motivatie van leerlingen. Universiteit Twente. https://docplayer.nl/18489208-De-effecten-van-snappet.html

Gamoran, A., & Long, D. A. (2007). Equality of Educational Opportunity A 40 Year Retrospective. International Studies in Educational Inequality, Theory and Policy, 23–47. https://doi.org/10.1007/978-1-4020-5916-2_2

Giroux, H. A. (2012). *Education and the Crisis of Public Values*. Peter Lang.

Grek, S. (2009). Governing by numbers: the PISA 'effect' in Europe. *Journal of Education Policy*, *24*(1), 23–37. https://doi.org/10.1080/02680930802412669

Grek, S., Lawn, M., Ozga, J., & Segerholm, C. (2013). Governing by inspection? European inspectorates and the creation of a European education policy space. *Comparative Education*, *49*(4), 486–502. https://doi.org/10.1080/03050068.2013.787697

De Gruijter, W., & Klaus, E. (2018, April 5). De lessen van Hannah Arendt voor het onderwijs. Nieuw Wij. https://www.nieuwwij.nl/opinie/de-lessen-van-hannah-arendt-voor-het-onderwijs/

Haerlemans, C. (2018, May). Digitale hulpmiddelen in het onderwijs. Over gebruik, effecten en de rol van de leraar. NRO. https://www.kennisnet.nl/app/uploads/kennisnet/publicatie/Kennisnet-Digitale-hulpmiddelen-in-het-onderwijs.pdf

Hajer, M. (2003). Policy without polity? Policy analysis and the institutional void. *Policy Sciences*, *36*(2), 175–195. https://doi.org/10.1023/a:1024834510939

Har Carmel, Y. (2016). Regulating "big data education" in Europe: lessons learned from the US. *Internet Policy Review*, *5*(1), 1–17. https://doi.org/10.14763/2016.1.402

Ingersoll, R. M. (1997). Teacher professionalization and teacher commitment: A multilevel analysis. The National Center for Education Statistics.

Ingersoll, R. M., & Collins, G. J. (2017). Accountability and control in American schools. Journal of Curriculum Studies, 49(1), 75–95. https://doi.org/10.1080/00220272.2016.1205142

Inspectie van het Onderwijs. (2020, April). De Staat van het Onderwijs 2020. https://www.onderwijsinspectie.nl/documenten/rapporten/2020/04/22/staat-van-het-onderwijs-2020

Kennisnet. (2017, June). *Vier in balans-monitor: De laatste stand van zaken in ict en onderwijs*. https://www.kennisnet.nl/publicaties/vier-in-balans-monitor/

Kester, L., Cviko, A., Janssen, C., de Jonge, M., Louws, M., Nouwen, S., Paas, T., Van der Ven, F., Admiraal, W., Post, L., Lockhorst, D., Buynsters, M., & Damstra, G. (2018). *Docent en leerling aan het stuur Onderzoek naar leren op maat met ict*. https://www.nro.nl/wp-content/uploads/2018/02/Doorbraakproject-Onderwijs-ICT_Eindrapport.pdf

Khine, M. S. (2019). Emerging Trends in Learning Analytics. Brill Sense.

Klecker, B. J. (1998). Defining and measuring the dimensions of teacher empowerment in restructuring public schools. *Education, 118*(3), 358–370. https://eric.ed.gov/?id=ED400254

Kloprogge, J. (2008, January). *Decentralisatie in het onderwijsbeleid: een historische analyse en een vooruitblik*. Oberon. https://www.delokaleeducatieveagenda.nl/bookups/Oberon-Decentralisatie.pdf

Kool, L., van Est, R., & Dujso, E. (2018). *Doelgericht digitaliseren Hoe Nederland werkt aan een digitale transitie waarin mensen en waarden centraal staan*. Rathenau Instituut. https://www.rathenau.nl/nl/digitale-samenleving/doelgericht-digitaliseren

Kool, L., Van Est, R., Royakkers, L., & Timmer, J. (2017). *Opwaarderen: Borgen van publieke waarden in de digitale samenleving*. Rathenau Instituut. https://www.rathenau.nl/sites/default/files/2018-02/Opwaarderen_FINAL.pdf

Kurshan, B. (2017, July 10). *The Elephant in the Room With EdTech Data Privacy*. Forbes. https://www.forbes.com/sites/barbarakurshan/2017/06/22/the-elephant-in-the-room-with-edtech-data-privacy/

Lingard, B. (2011). Policy as numbers: accounting for educational research. *The Australian Educational Researcher*, *38*(4), 355–382. https://doi.org/10.1007/s13384-011-0041-9

Lingard, B., Creagh, S., & Vass, G. (2012). Education policy as numbers: data categories and two Australian cases of misrecognition. *Journal of Education Policy*, *27*(3), 315–333. https://doi.org/10.1080/02680939.2011.605476

Lips, A., Schudalaro, A., Prins, J., & van der Hof, S. (2005). Issues of online personalization and commercial and public service delivery. Wolf Legal Publishers.

Mangal, U. (2009). *Essentials of Educational Technology*. PHI Learning.

MacBeath, J. (2012), Future of Teaching Profession. Education International Research Institute.

Mayer-Schönberger, V., & Cukier, K. (2013). *Big Data*. Houghton Mifflin Harcourt.

Meijer, A., Schäfer, M. T., & Branderhorst, M. (2019). Principes voor goed lokaal bestuur in de digitale samenleving. Bestuurswetenschappen, 73(4), 8–23. https://doi.org/10.5553/bw/016571942019073004003

Molenaar, I., Campen, C. A. N., & Van Gorp, K. (2016). Rapportage Kennisnet. Onderzoek naar Snappet; gebruik en effectiviteit. https://www.kennisnet.nl/fileadmin/kennisnet/leren_ict/leren_op_maat/bijlagen/Onderzoek_naar_Snappet_Radboud_Universiteit.pdf

North, D.C. (1990). Institutions, institutional change and economic performance. Cambridge. Cambridge University Press

NRO. (2017, September). *"Teaching to the test" Een verkennende studie naar het in lijn brengen van doelen, toetsen, curriculum en onderwijsaanbod*. Oberon. https://www.nro.nl/wp-content/uploads/2016/09/VRAAG-015-Eindrapport-nieuw-onderzoek-Teaching-to-and-from-the-test.pdf

Onderwijsraad. (2017, May). Doordacht Digitaal. CPS Onderwijsontwikkeling en advies. https://www.onderwijsraad.nl/publicaties/adviezen/2017/05/09/doordacht-digitaal

O'Neil, C. (2016). Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy. Penguin Random House.

van Ooijen, D. (2019, October 11). *Strijd om publieke waarden in een online wereld*. https://platformoverheid.nl/artikel/strijd-om-publieke-waarden-in-een-online-wereld/

Ozga, J. (2009). Governing education through data in England: from regulation to self-evaluation. *Journal of Education Policy*, *24*(2), 149–162. https://doi.org/10.1080/02680930902733121

Parker, G. N. R. (2015). Teachers' Autonomy. Research in Education, 93(1), 19–33. https://doi.org/10.7227/rie.0008

Pasquale, F. (2015). The Black Box Society. Amsterdam University Press.

Pearson, C., Hall, B. (1993), 'Initial Construct Validation of the Teaching Autonomy Scale', Journal of Educational Research 86 (3), 172–78.

Pearson, L., & Moomaw, C. (2005). The Relationship between Teacher Autonomy and Stress, Work Satisfaction, Empowerment, and Professionalism. Educational Research Quarterly, 29(1), 38–54. https://eric.ed.gov/?id=EJ718115

Perie, M., & Baker, D. P. (1997). *Job Satisfaction Among America's Teachers*. Office of Educational Research and Improvement.

Polonetsky, J., & Jerome, J. (2014). Student Data: Trust, Transparency, and the Role of Consent. *SSRN Electronic Journal*, 1–25. https://doi.org/10.2139/ssrn.2628877

Pijpers, R. (2020, March 9). *Er is meer dan Google - onderwijs het digitale alternatief*. Kennisnet. https://www.kennisnet.nl/artikel/6584/er-is-meer-dan-google-onderwijs-het-digitale-alternatief/

Pijpers, R., Bomas, E., Dondorp, L., & Ligthart, J. (2020, January). Waarden Wegen: Een Ethisch Perspectief op Digitalisering in het Onderwijs. Kennisnet.

https://www.kennisnet.nl/app/uploads/kennisnet/publicatie/Kennisnet-Ethiekkompas-Waardenwegen.pdf?download=1

Pijpers, R., & Van Elk, W. J. (2018, February 15). *Facebook en Google en de risico's van 'platformisering' in het onderwijs*. Kennisnet. https://www.kennisnet.nl/artikel/6681/facebook-en-google-en-de-risicos-van-platformisering-in-het-onderwijs/

Pitt, A. (2010). On having one's chance: Autonomy as Education's Limit. *Educational Theory*, *60*(1), 1–18. https://doi.org/10.1111/j.1741-5446.2009.00342.x

Privacy Convenant. (n.d.). *Privacy Convenant Onderwijs*. Retrieved June 1, 2020, from https://www.privacyconvenant.nl/

Reich, R. (2002). *Bridging Liberalism and Multiculturalism in American Education*. Chicago University Press.

Remie, M., & Sedee, M. (2020, July 19). Techreuzen willen de school hervormen. NRC. https://www.nrc.nl/nieuws/2020/07/19/techreuzen-willen-de-school-hervormen-a4006368

Rijksoverheid. (2019a, March). Digitaliseringsagenda Primair en voortgezet onderwijs. https://www.rijksoverheid.nl/documenten/publicaties/2019/03/22/digitaliseringsagenda-primair-en-voortgezet-onderwijs

Rijksoverheid. (2019b, August 2). *Data protection impact assessments DPIA's Office 365 ProPlus, Windows 10 Enterprise, Office 365 online and mobile apps*. https://www.rijksoverheid.nl/documenten/rapporten/2019/06/11/data-protection-impact-assessment-windows-10-enterprise

Robinson, R., Molenda, M., & Rezabek, L. (2007). Facilitating Learning. *Association for Educational Communications and Technology*, 2–35. https://htirtayasa.files.wordpress.com/2010/09/facilitating-learning-rhonda-robinson-northern-illinois-university-michael-molenda-indiana-university.pdf

Rohmensen, G. J. (2017, June 9). Helft scholen alweer gestopt met iPad-onderwijs. Trouw. https://www.trouw.nl/nieuws/helft-scholen-alweer-gestopt-met-ipad-onderwijs~b3558061/

Scheff, S. (2014, September 4). *Google Apps for Education: Data Mining and the Threat to Student Privacy*. https://www.huffpost.com/entry/google-apps-for-education_b_5083478

Schleicher, A., & Zoido, P. (2016). Global Equality of Educational Opportunity: Creating the Conditions for all Students to Succeed. Journal of Social Issues, 72(4), 696–719. https://doi.org/10.1111/josi.12190

Schouwenberg, F. (2020, March 9). *'Dicht de digitale kloof voor meer gelijkheid in het onderwijs.'* Kennisnet. https://www.kennisnet.nl/artikel/6581/dicht-de-digitale-kloof-voor-meer-gelijkheid-in-het-onderwijs/

Selwyn, N. (2015). Data entry: towards the critical study of digital data and education. Learning, Media and Technology, 40(1), 64–82. https://doi.org/10.1080/17439884.2014.921628

Selwyn, N., & Facer, K. (2016). *The Politics of Education and Technology*. Palgrave Macmillan.

Shacklock, X. (2016). *From Bricks to Clicks - The Potential of Data and Analytics in Higher Education*. https://www.policyconnect.org.uk/hec/research/report-bricks-clicks-potential-data-and-analytics-higher-education

Sheikh, H., & Prins, C. (2020, July 29). *Coronacrisis vraagt om debat over digitalisering*. Platform Overheid. https://platformoverheid.nl/coronacrisis-vraagt-om-debat-over-digitalisering/

Singer, N. (2017, May 13). *How Google Took Over the Classroom*. Https://Www.Nytimes.Com/#publisher. https://www.nytimes.com/2017/05/13/technology/google-education-chromebooks-schools.html

Slob, A. (2020, February 5). *Digitale leermiddelen Verslag van een schriftelijk overleg*. Rijksoverheid. https://www.rijksoverheid.nl/documenten/kamerstukken/2020/02/05/32034-verslag-so-digitalisering-in-het-funderend-onderwijs

Snappet. (2019, September 18). *Snappet NL*. https://nl.snappet.org/meer-over-snappet/

Social Cultureel Planbureau SCP. (2016). De toekomst tegemoet Leren, werken, zorgen, samenleven en consumeren in het Nederland van later. https://www.scp.nl/publicaties/publicaties/2016/12/21/de-toekomst-tegemoet

Stikker, M. (2019). Het internet is stuk. Maar we kunnen het repareren. de Geus.

van Trigt, M. (2020, June). Het post-coronatijdperk vraagt om een langetermijnvisie op publieke waarden. SURF. https://www.surf.nl/files/2020-06/200501-surf-magazine_2020-nr02.pdf.

Toshkov, D. (2016). *Research Design in Political Science*. Macmillan Publishers.

Verdoodt, V., & Lievens, E. (2017). De AVG bekeken vanuit een kinderrechtenperspectief : pluspunten, knelpunten & vraagstukken. *COMPUTERRECHT*, (4), 230–236.

Wang, Y. (2016). Big Opportunities and Big Concerns of Big Data in Education. *TechTrends*, *60*(4), 381–384. https://doi.org/10.1007/s11528-016-0072-1

Watters, A. (2017, December 9). *Education Technology and the Power of Platforms*. Hack Education. http://hackeducation.com/2017/12/09/top-ed-tech-trends-platforms

Watters, A. (2019 August 28). *Education Technology and The Age of Surveillance Capitalism*. Hack Education. http://hackeducation.com/2019/08/28/surveillance-ed-tech

West, D. (2012). *Big Data for Education: Data Mining, Data Analytics, and Web Dashboards*. https://www.brookings.edu/research/big-data-for-education-data-mining-data-analytics-and-web-dashboards/

West, D., Huijser, H., & Heath, D. (2016). Putting an ethical lens on learning analytics. Educational Technology Research and Development, 64(5), 903–922. https://doi.org/10.1007/s11423-016-9464-3

Williamson, B. (2015). Digital education governance: data visualization, predictive analytics, and 'real-time' policy instruments. *Journal of Education Policy*, *31*(2), 123–141. https://doi.org/10.1080/02680939.2015.1035758

Williamson, B. (2017). *Big Data in Education*. SAGE Publications.

Wilson, S. M. (1993). The Self-Empowerment Index: A Measure of Internally and Externally expressed Teacher autonomy. *Educational and Psychological Measurement*, *53*(3), 727–737. https://doi.org/10.1177/0013164493053003017

Wise, A. E. (1969). Rich Schools, Poor Schools: The Promise of Equal Educational Opportunity. University of Chicago Press.

WRR (2000). Het borgen van publiek belang. Den Haag: SDU Uitgevers

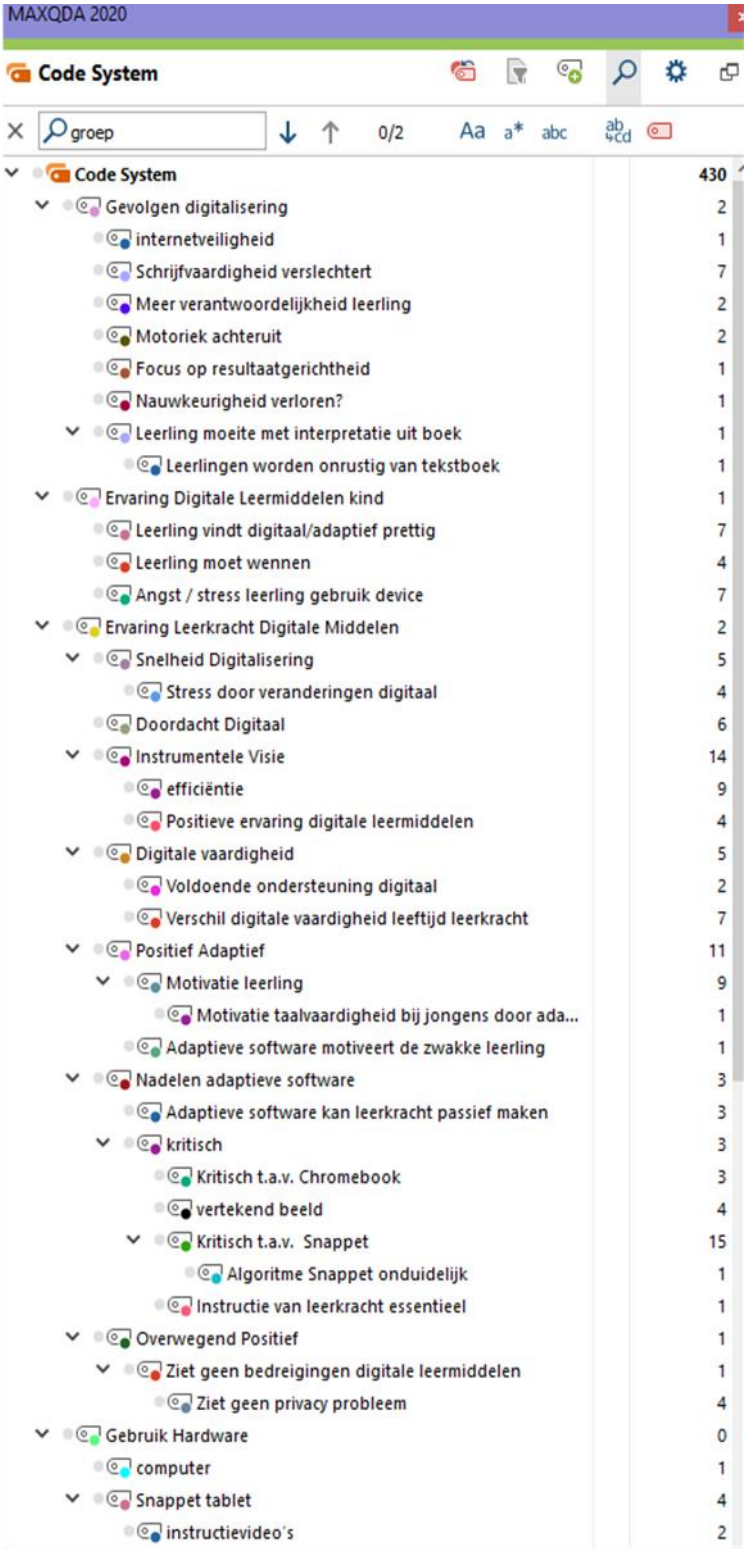
WRR (2013). Toezien op publieke belangen. Amsterdam: Amsterdam University Press.

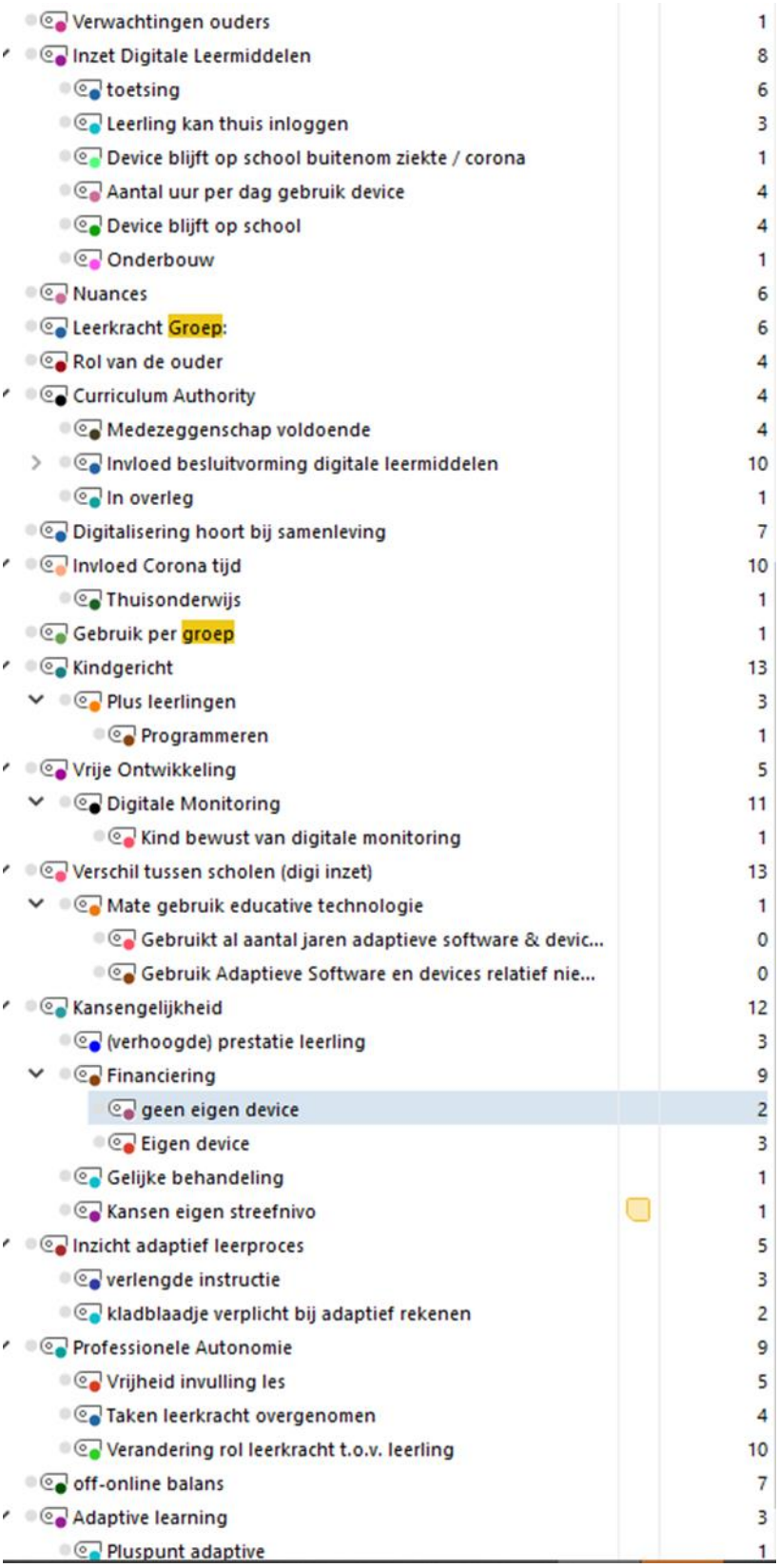
Young, E. (2015). Educational privacy in the online classroom: FERPA, MOOCS, and the big data conundrum. *Harvard Journal of Law & Technology*, *28*(2), 549–592. https://heinonline-org.ezproxy.leidenuniv.nl:2443/HOL/Page?lname=&public=false&collection=journals&handle=hein.journals/hjlt28&men_hide=false&men_tab=toc&kind=&page=549

Zeide, E. (2017). The Structural Consequences of Big Data-Driven Education. Big Data, 5(2), 164–172. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2991794

Appendices

Coding in MAXQDA




Verwachtingen ouders 1
Inzet Digitale Leermiddelen 8
toetsing 6
Leerling kan thuis inloggen 3
Device blijft op school buitenom ziekte / corona 1
Aantal uur per dag gebruik device 4
Device blijft op school 4
Onderbouw 1
Nuances 6
Leerkracht Groep: 6
Rol van de ouder 4
Curriculum Authority 4
Medezeggenschap voldoende 4
Invloed besluitvorming digitale leermiddelen 10
In overleg 1
Digitalisering hoort bij samenleving 7
Invloed Corona tijd 10
Thuisonderwijs 1
Gebruik per groep 1
Kindgericht 13
Plus leerlingen 3
Programmeren 1
Vrije Ontwikkeling 5
Digitale Monitoring 11
Kind bewust van digitale monitoring 1
Verschil tussen scholen (digi inzet) 13
Mate gebruik educative technologie 1
Gebruikt al aantal jaren adaptieve software & devic... 0
Gebruik Adaptieve Software en devices relatief nie... 0
Kansengelijkheid 12
(verhoogde) prestatie leerling 3
Financiering 9
geen eigen device 2
Eigen device 3
Gelijke behandeling 1
Kansen eigen streefnivo 1
Inzicht adaptief leerproces 5
verlengde instructie 3
kladblaadje verplicht bij adaptief rekenen 2
Professionele Autonomie 9
Vrijheid invulling les 5
Taken leerkracht overgenomen 4
Verandering rol leerkracht t.o.v. leerling 10
off-online balans 7
Adaptive learning 3
Pluspunt adaptive 1

Appendix B: Informed Consent Form

Geïnformeerde Toestemming

Hierbij bevestig ik dat:

1. Ik op duidelijke wijze ben geïnformeerd over dit onderzoek.
2. Ik geheel vrijwillig deelneem aan dit onderzoek.
3. Ik ervan op de hoogte ben dat mijn anonimiteit wordt gewaarborgd en dat mijn gegevens en antwoorden onder geen enkele voorwaarde aan derden wordt verstrekt zonder mijn toestemming.
4. Ik ervan op de hoogte ben dat deelname aan dit onderzoek geen ongemakken of risico's met zich meebrengt.
5. Ik ervan op de hoogte ben dat voor eventuele klachten over dit onderzoek ik me kan wenden tot de ethische commissie van de Universiteit Leiden

Ik stem ermee in dat:

6. De deelname aan dit onderzoek vrijwillig is en dat ik zonder opgaaf van reden het interview voortijdig kan afbreken.
7. Dat ik tot uiterlijk één week na deelname, mijn toestemming kan intrekken voor het gebruik van mijn antwoorden en gegevens voor dit onderzoek.
8. Dat dit interview wordt opgenomen met een recorder voor wetenschappelijke redenen.

Datum:

Plaats:

Handtekening deelnemer:

Handtekening onderzoeker:

*for online interviews I asked the respondent either to sign with an online signature or I recorded their consent.

Informed consent form translated

Master Thesis Public Administration
Student: Shirley Bruijnzeel (s2637901)
Supervisor. Dr. Ing. B. Klievink.

I declare that:
1. I am informed clearly about this research
2. I voluntarily participate to this research
3. I am aware that my anonymity is guaranteed and that my data and answers will under no circumstances be provided to third parties without my consent.
4. I am aware that participating in this research does not cause any inconvenience or risk.
5. I am aware that for any complaints about this research I can turn to the ethics committee of Leiden University.

I agree that:

6. Participation in this survey is voluntary and I can terminate the interview prematurely without giving any reason.
7. I can withdraw my consent for the use of my answers and data for this research up to one week after participation.
8. This interview is recorded for scientific purposes.

Date:
Place:
Participant's signature:
Examiner’s signature:

Appendix C: Topic List

Practical Matters

Introduction interviewer
Purpose of the research and the interview
Informed Consent and signing informed consent form
Ask the respondent whether he/she has questions

Topic 1 Characteristics of the respondent

1. What is your date of birth?
2. How long have you been working as a teacher?
3. Which class are you currently teaching?

Topic 2 Deployment of Educational Technology

4. Who decides on the deployment of educational technology at your school?
5. What is your role with respect to this decision? Do you feel sufficiently involved in the decision-making process? If so, in what do you get involved?
6. Which digital learning resources do you use during the lessons? (apps, software, platforms such as Snappet, Gynzy, Google Suite or Apple Classroom)
7. Are you familiar with adaptive software or personalized learning? (How is this deployed by the digital learning resources you work with?) How are the courses that you teach supported with educational software (EdTech)?
8. For which subjects do you use digital learning resources?
9. Can you tell a little bit more about how you work with digital resources in practice?
10. How many hours or how often per week do you use these digital learning resources?
11. Do you have any influence on the teaching material that is offered via the platform (i.e. uploading material yourself)?
12. Do you also use laptops, iPads or chrome books? Are these provided by the school or do the parents pay for them? (further question: compensation? Fin. Support?)
13. Do the students take the tablets home or do they stay at school? (If so, ask if they are also used in free time)
14. Are your pupils generally good at using digital learning methods?
15. Do your students generally enjoy working with tablets and other digital learning resources?
16. What about yourself, do you enjoy working with digital learning resources?
17. Do you think that the digital learning resources support your lessons? (ask questions, e.g. evaluation?)
18. Do you think that your role as a teacher has changed through the use of digital learning resources? (if so, in which way?)
19. Do you have the feeling that the digital learning resources are taking over your tasks? (i.e. reviewing, testing) (Do you see this as a positive development?
20. Do you have the idea that you have more insight into the learning performance of your students through the use of digital learning resources?

Topic 3. Equality of Educational Opportunity

21. In your opinion, does the use of educational technology and devices contribute to or reinforce equality of opportunity? Can you motivate this?

22. Considered that schools are free to decide which and to what extent educational technology is deployed in the classrooms, do you think this will give some students advantages over other students in the future?
23. In your opinion, do you think that children with parents that have more financial resources have an advantage in dealing with technology? (i.e. these children may have been familiarized with educational apps at a younger age). If so, can you share an experience?
24. (optional: only ask when adaptive / personalized software is used) Previous research found that adaptive learning software improves the learning outcomes of high-performing students, but research did not find this for other students. How do youexperience this with your students?

Topic 4. Vrije ontwikkeling van de leerling

25. Studies have shown that the use of digital learning platforms such as Snappet can influence the free development of the student. For example, students may be afraid to make mistakes or be too slow because they know their performance is constantly being measured. This is also known as digital monitoring. With the educational technology that you use (or call specific name of platform) are you able to follow (digital monitoring) every student?
26. What is measured (i.e. pace, time task completed, level).
27. Do you think that students are aware that they are being followed? (If so, ask for an example)
28. Do you think that with the use of digital technology, primary schools are transferring the standard of always being "on" or being online?

Topic 5 Closing

29. As this research looks at the impact of educational technology on the values of professional autonomy, equal opportunity and free development I have asked several questions with respect to this. In your opinion, do you think these values are threatened or may be threatened in the future?
30. Do you think that everything that is of importance is discussed? Do you have anything to add?

Topic List translated

Praktische zaken voorafgaand

Introductie interviewer
Doel van het onderzoek en het interview
Informed Consent ondertekenen
Gelegenheid om vragen te stellen

Topic 1 Characteristics of the respondent

1. Wat is uw geboortedatum?
2. Hoe lang bent u werkzaam in het onderwijs?
3. Welke groep doceert u op dit moment?

Topic 2 Gebruik en ervaring met digitale leermiddelen & autonomie

4. Wie neemt de beslissingen over de inzet van digitale leermiddelen op deze school?

5. Heeft u een rol in de beslissing over het gebruik van digitale leermiddelen? (mag u bijvoorbeeld zelf bepalen in welke mate digitale leermiddelen worden ingezet in uw les?)

6. Welke digitale leermiddelen gebruikt u tijdens de lessen? (apps, software, platforms zoals Snappet, Gynzy, Google Suite of Apple Classroom)

7. Bent u bekend met adaptieve software of gepersonaliseerd leren? (Hoe wordt dit ingezet door de digitale leermiddelen waarmee u werkt?)

8. Voor welke vakken zet u deze digitale leermiddelen in?

9. Kunt u iets meer vertellen over hoe u deze digitale leermiddelen in de praktijk gebruikt?

10. Hoeveel uren of hoe vaak per week zet u deze digitale leermiddelen in?

11. Heeft u enige invloed op het lesmateriaal dat wordt aangeboden via het platform (i.e. bijv. zelf materiaal uploaden)

12. Maakt u ook gebruik van laptops, iPads of chromebooks? Worden deze door de school verstrekt of betalen de ouders hiervoor? (doorvraag: tegemoetkoming?)

13. Nemen de leerlingen de tablets mee naar huis of blijven ze op school? (evt. Doorvragen of ze ook in de vrije tijd worden gebruikt)

14. Kunnen leerlingen over het algemeen goed met de digitale leermethoden omgaan?

15. Vinden uw leerlingen het over het algemeen prettig om met tablets en andere digitale leermiddelen te werken?

16. Vindt u het prettig om met digitale leermiddelen te werken? (Eventueel doorvragen, instrumentele visie)

17. Vindt u dat de digitale leermiddelen uw lessen ondersteunen? (doorvragen bijv. evaluatie?)

18. Denkt u dat u rol als docent is veranderd door het gebruik van digitale leermiddelen?

19. Heeft u het idee dat de digitale leermiddelen uw taken overnemen? (doorvragen ziet u dat als een positieve ontwikkeling? (bijvoorbeeld nakijken)

20. Heeft u het idee dat u meer inzicht heeft in de leerprestaties door het gebruik van digitale leermiddelen?

Topic 3. Kansengelijkheid

21. Denkt u dat de inzet van digitale leermiddelen gevolgen heeft voor de kansengelijkheid van leerlingen?

22. Gezien basisscholen zelf mogen bepalen in welke mate digitale leermiddelen worden ingezet, denkt u dat sommige leerlingen voorsprong hebben ten opzichte van andere leerlingen?

23. Denkt u dat leerlingen waarvan de ouders meer financiële middelen beter kunnen omgaan met digitale technologie (bijv. deze kinderen zijn al op eerdere leeftijd bekend met digitale leermiddelen)

24. (Optionele vraag) Eerder onderzoek wijst erop dat adaptieve leersoftware de leerresultaten van hoogpresterende leerlingen verbetert, maar vond dit niet voor andere studenten. Hoe ervaart u dit bij uw eigen leerlingen?

Topic 4. Vrije ontwikkeling van de leerling

25. Uit studies is gebleken dat het gebruik van digitale leerplatformen als Snappet invloed kan hebben op de vrije ontwikkeling van de leerling. Leerlingen kunnen bijvoorbeeld bang zijn om fouten te maken of bang zijn dat ze te langzaam zijn, omdat ze weten dat hun prestatie constant wordt gemeten. Dit staat ook wel bekend als digitale monitoring.

Kunt u uw leerlingen constant volgen via (X het platform dat gebruikt wordt)?

26. Wat wordt er onder andere gemeten? Hier doel ik op tempo, niveau, aantal taken voldaan)

27. Heeft u het idee dat uw leerlingen er bewust van zijn dat ze worden gevolgd? (zo ja, vraag door)

28. Denkt u dat basisscholen met de inzet van digitale technologie de norm overdragen om altijd ‘aan te staan’ of online te zijn?

Topic 5 Closing

29. Omdat in dit onderzoek wordt gekeken naar de impact van onderwijstechnologie op de waarden van professionele autonomie, gelijke kansen en vrije ontwikkeling, heb ik hierover verschillende vragen gesteld. Denk je dat deze waarden worden bedreigd of in de toekomst kunnen worden bedreigd?

30. Denkt u dat alles wat van belang is aan bod is gekomen? Heeft u nog iets toe te voegen?

Appendix D: Introduction Poster Interview

Uitnodiging deelname interview over het gebruik van digitale leermiddelen

Beste leerkracht,

Mijn naam is Shirley Bruijnzeel en ik studeer Bestuurskunde aan de Universiteit Leiden. Momenteel ben ik bezig met het afronden van mijn masterscriptie, daarvoor zou ik graag uw hulp willen vragen.

Het onderzoek

Mijn afstudeeronderzoek gaat over onderwijsdigitalisering en de gevolgen daarvan. Door middel van kwalitatief onderzoek hoop ik inzicht krijgen in hoe leerkrachten in het basisonderwijs gebruik maken van digitale leermiddelen tijdens hun lessen en hoe zij dit ervaren. Specifiek richt ik me op wat digitale leermiddelen zoals tablets en onderwijsplatforms betekenen voor waarden als kansengelijkheid, vrije ontwikkeling en professionele autonomie van de leerkracht.

Wat houdt het interview in?

Het interview zal gemiddeld ***30 minuten***, maar dat kan iets uitlopen. Het interview gaat over de volgende onderwerpen:

1. Het gebruik van digitale technologie tijdens uw lessen
2. Uw ervaring met het gebruik van digitale technologie
3. De implicaties van digitale technologie voor waarden als kansengelijkheid, vrije ontwikkeling en de professionele autonomie van de leerkracht

De interviews worden door mijzelf afgenomen, dit kan face-to-face of via Skype afhankelijk van uw voorkeur. Ik zal een vragenlijst voorbereiden als handleiding voor het gesprek. Het interview kan worden voorgesteld als een informeel gesprek waarin u over uw ervaringen als docent kan vertellen. Bij het interview zal ik u vragen of ik het gesprek op mag nemen met een recorder om het vervolgens thuis uit te werken. De interviews zullen na de afname worden geanonimiseerd, zodat uw privacy gewaarborgd wordt.

Wanneer?

Ik kan de interviews afnemen in de periode van:

9 t/m 11 september 2020
14 t/m 18 september 2020
21 t/m 25 september 2020
28 september t/m 2 Oktober 2020

Wilt u deelnemen?

Zonder uw hulp kan ik mijn afstudeeronderzoek niet uitvoeren. Ik zou het daarom erg waarderen als u mij zou willen helpen. We kunnen samen een afspraak maken via email, telefoon of Whatsapp.

Contactgegevens: 0610351380 s.bruijnzeel@umail.leidenuniv.nl

Vriendelijke groet en hopelijk tot binnenkort,

Shirley Bruijnzeel

Appendix E: Overview of the Respondents

Overview of Respondents
All respondents were female primary school teachers in the age category 26-57. Two of these teachers were also ICT-Coordinator in their school. A majority of the respondents were teaching in the advanced stage (6th , 7th, and 8th grade). In these grades, digital learning resources are most frequently deployed. In order to capture the schoolwide use of digital learning tools, teachers of all grades were interviewed.

Interview 1
Respondent A
Teacher
Date: 14.09.2020
Time: 19.30PM
Duration: 25.07 minutes
Type of Interview: Face-to-face
Female
Full-Time Contract
Age: 32
Initials: ME
Group: 4,5 and 6
School Type: Christian Primary School

Interview 2
Respondent B
Teacher
Date: 15.09.2020
Time: 3PM
Duration: 34.47 minutes
Type of interview: Skype call
Female
Part Time, 3 days
Age: 46
Initials: YG
Group: 7
School Type: Catholic Primary School

Interview 3
Respondent C
Teacher/ICT coordinator
Date: 16.09.2020
Time: 10AM
Duration: 36:51 minutes
Type of Interview: Face-to-face
Female
Full-Time contract
Age: 57
Initials: JS
Group: 7
School Type: Public Primary School

Interview 4
Respondent D
Teacher
Date: 21.09.2020
Time: 8PM
Duration: 26.17 minutes
Type of interview: Skype call
Female
Part-Time contract
Age: 42
Initials: JV
Group: 1-2
School Type: Public Primary school

Interview 5
Respondent E
Teacher
Date: 22.09.2020
Time: 7PM
Duration: 24 minutes
Type of Interview: Skype Call
Female, Part-Time contract
Age: 26
Initials: KH
Group: 6 and 8
School Type: Public Primary school

Interview 6
Respondent F
Teacher
Date: 23.09.2020
Time: 1PM
Duration: 40.46 minutes
Type of Interview: Face-to-face
Female, Full-Time Contract
Age: 27
Initials: RO
Group: 6
School Type: Public Primary School (Cosmicus School)

Interview 6
Respondent G

Teacher/ ICT coordinator
Date: 23.09.2020
Time: 2PM
Duration: 40.46 minutes
Type of Interview: face-to-face
Female
Full-Time Contract
Age: 33
Initials: DG
Group: 7
School type: public primary school

Interview 7
Respondent H
Teacher
Date: 24.09.2020
Duration: 24.38 minutes
Type of Interview: Skype call
Time: 4PM
Female, Full-time contract
Age: 27
Initials: DH
Group: 6
School type: public primary school

Interview 8
Respondent I
Teacher
Date: 25.09.2020
Time: 3PM
Duration: 17.29
Type of Interview: Skype Call
Female: part-time contract
Age: 28
Initials: AZ
Group: 5
School Type: Roman-Catholic primary

Appendix F Transcripts

The transcripts are left out in this version for privacy reasons.