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Digital transformation in Swedish schools – Principals' strategic leadership and organisation of tablet-based one-to-one computing initiatives

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Abstract

This paper reports on a research study about principals' strategic leadership and organisation of schools within established tablet-based one-to-one computing initiatives. The aim was to investigate how principals lead and guide one-to-one computing initiatives in K–12 education. The research questions focused on principals' expressed intentions and their strategic leadership and organisation when implementing tablet-based one-to-one computing initiatives in Swedish schools. The empirical material was collected through semi-structured interviews with seven principals in five municipalities where the schools had used tablets for more than six months within a one-to-one computing initiative. The findings are organised by themes concerning one-to-one computing as a strategy to change teaching and working methods, using technology for adapting teaching and learning to every pupil's needs, and strategies for organisation. The findings show that marketisation of schools (e.g. the school-choice reform) in combination with the annual presentation of national rankings have had an impact on the financial situations of schools because they receive a voucher for every attending pupil. The participating principals' strategic leadership concerning their intentions and applied strategies on how to lead and organise the digitalised school are an attempt to meet the demands that the marketisation and digitalisation of Swedish schools requires.

Keywords: qualitative study, principals, strategic leadership, one-to-one computing, marketisation of schools

Introduction

The rapid digitalisation of schools worldwide has affected stakeholders of all levels; from policy makers to grassroots. At the policy level, curriculums in the Nordic countries have started to use the concept of digital competence (Skolverket, 2017), mirroring EU policy about digital competence for all citizens. In Sweden, the recent national digitalisation strategy for schools (Dnr U2017/04119/S) defines digital competence for principals, teachers, and pupils. For principals, emphasis can be found on the term *strategic leadership*. Such leadership in relation to digital competence and the rich digitalisation through one-to-one computing initiatives is based on a terminology of principals' own digital competence regarding being able to lead and support teachers' digital development work and being able to identify and assess new solutions afforded through the digitalisation.

The Swedish school context demonstrates rich digitalisation by one-to-one computing initiatives. Several studies, internationally and nationally, have focused on the role of one-to-one computing in schools, including studies about the innovative use of one-to-one computing and its potential for changing and modernising teaching and learning (Bocconi, Kampylis, & Punie, 2013), teachers' teaching (Pegrum, Oakley, & Faulkner, 2013; Håkansson Lindqvist, 2015; Player-Koro & Tallvid, 2015; Saudelli & Ciampa, 2014; Bergström, Mårell-Olsson & Jahnke, 2017; Bergström, Mårell-Olsson, Häll, & Kumar, 2017), and pupils' use (Håkansson Lindqvist, 2013; Tallvid, Lundin, Svensson & Lindström, 2015; Norqvist, 2016). Few studies have focused on principals' strategic leadership and organisation of schools' processes of digital transformation through one-to-one computing initiatives. This paper makes an attempt to report on the principals' perspective by addressing research questions about their strategic leadership for how to lead and guide the process of transforming the school through one-to-one computing initiatives. Before presenting the aim and research question of this study, we set the scene by presenting previous reforms and research regarding principals' work on organising and leading the schools.

Background

Principals' strategic leadership does not take place in a vacuum. According to the national digitalisation strategy for Swedish schools (Dnr U2017/04119/S) a successful integration of information and communication technologies (Abbr. ICT) in schools demands a strategic leadership where the principals have the digital skills required to lead and support the staff in the digital development work. Further, strategic leadership also includes having digital competencies concerning the ability to identify and assess the relevance of new solutions that are made possible by digitalisation and develop their use based on the different conditions and educational needs of children and pupils so that digitalisation opportunities can contribute to improved knowledge outcomes and increased educational goal achievement (Dnr U2017/04119/S). The emphasis on strategic leadership is assumed to have grown from previous reforms.

In recent decades, there have been two important reforms that have had significant impacts on working conditions for principals and the organisation of Swedish schools. First, there was the introduction of an intensive reform that restructured the Swedish school system as part of the so-called *school choice reform* or *freedom of choice reform* (SOU 1991/92:95, Prop. 1992/93:230), and second, there has been the on-going digitalisation of Swedish schools. These two fundamental reforms have had a great impact on principals' working conditions and leadership and on the organisation of their schools (Lundström & Parding, 2011; Håkansson Lindqvist, 2015; Hult, Lundström & Edström, 2016; Pettersson, 2018). The school choice reform means that parents are free to choose any school for their children, and the schools receive an educational

voucher for every pupil that is attending the school during the school year (Alexiadou, Dovemark, Erixon-Arreman, Holm, Lundahl & Lundström, 2016). The deregulation of schools is not only happening in Sweden, but is part of an international trend (Lundström & Parding, 2011). However, compared to many other countries Sweden has gone further in its effort to create a kind of *school market* (Chubbs, 2007). A consequence of this reform is that Swedish schools are competing for pupils and trying to attract as many pupils as possible (e.g. parents' choice, Alexiadou et. al, 2016). Further, attempts to measure the quality of Swedish schools are presented every year by agencies and associations in the form of rankings of all Swedish schools. For example, the Swedish Teachers' Federation presents an annual ranking of the Best School Municipalities of the Year to inspire municipalities to invest in those who create 'good' schools. Reports on official school statistics are also presented by The Swedish National Agency for Education. In addition, The Swedish Association of Local Authorities presents statistics for grades 6 and 9 and statistics related to individual subjects for grade 3 (see Municipality and County database, 2015).

Consequently, these school statistics are presented and discussed in the national media every year, especially regarding which schools are ranked as 'the best' or 'the worst'. Schools can thus improve or worsen their positions in these rankings on a yearly basis. Lundström & Parding (2011) argue that this market logic affects principals' working conditions in a way that has never been experienced before. Hult, Lundström, and Edström's (2016) findings show that principals are pressured by the marketisation of the Swedish school system because school funding is directly linked to success in attracting and retaining pupils.

The digitalisation of Swedish schools has been going on in parallel with these school reforms, and Söderlund (2000) suggests that this means that the increased use of technology in society has increased pressure on the schools to acquire and use information technology (IT). Sweden has quite a long tradition of having different IT-projects in schools in recent decades. Jedeskog's (2002) study from 27 school-development projects in the mid-1990s had a focus on using IT in teaching and learning. Jedeskog found that the possibilities for teachers to construct good learning environments together with the pupils using IT in teaching and learning were affected by other circumstances, for example, changes in organising the work in school and changes concerning teachers' possibilities of having control over pupils' different activities in school. Söderlund's (2000) study showed that the experiences of the increased IT use in Swedish schools until the year 2000 was considered to bring many benefits to both pupils and teachers. The benefits were mainly linked to different forms of learning and the teachers were given greater opportunities for variation in teaching. Since the mid 1990s, Sweden has continued to increase access to digital tools in schools, and according to Becker and Taawo (2017) in today, almost all of the 290 municipalities in Sweden have invested in one-to-one computing in some way. One-to-one computing initiatives are not only happening in Sweden, but are increasing worldwide every year (Zucker & Light, 2009; Bocconi et. al, 2013). Even if great hopes are still expressed for what the digitalisation of schools will bring, recent studies (e.g. Håkansson Lindqvist, 2015, Tallvid, 2015) show that the large-scale digitalisation of schools in Sweden is not without problems. The discourse that surrounds one-to-one computing in schools is based on a terminology of modernisation and innovation of teaching and learning (Bocconi et al, 2013) and where ICT are considered as a catalyst for making such changes (Brown, 2006). Penuel's (2006) definition of one-to-one computing is based on pupils and teachers being equipped with a personal laptop or tablet, a wireless network in the school buildings, and software for school use. In addition, recent studies (Bergström et al, 2017) suggest that the affordances of cloud computing for sharing, storing, and retrieving information represent an expanded dimension of the one-to-one computing environment (Gonzales-Martinez, Bote-Lorenzo, Gomez-Sanches & Cano-Parra, 2015).

In the literature, principals' strategic leadership and organisation role is central to lead and guide the digitalisation process (Dexter, 2008; Bocconi et. al, 2013). However, Bocconi et al. (2013) showed that principals often engage in only limited competence development regarding their development of and understanding of what a technology-rich environment might provide and in turn how their strategic leadership and the organisation of their school might affect the digitalisation process. They argue that principals need support for making changes in modern schooling. Toy (2008) describes how it is important that principals within one-to-one computing initiatives support early adopters and risk-takers so that they can share and spread their enthusiasm. According to Toy, it is also important that principals provide appropriate professional development, time, and resources to support the effective implementation of these initiatives. Further, McGarr and Kearney (2009) emphasise that principals must always have pupils' learning in mind when making decisions about IT, and the principal must be a learner alongside the staff at school and be a role model concerning experimenting with innovative strategies for the implementation process. Hatlevik and Arnseth (2012) found that teachers' perceived usefulness of computers and frequency of computer use in school are correlated to experiences of ICT-supportive principals.

However, few studies have focused on principals' intentions about their leadership and organisation of schools within established one-to-one computing initiatives. This paper aims to describe and understand Swedish principals' strategic leadership and how they embody the new demands that these reforms require in terms of their leadership and organisational changes. More specifically, it presents how principals lead and organise the tablet-based one-to-one computing initiatives in K–12 education. This study focuses on the principals' expressed intentions with regard to their strategic leadership and organisation when implementing tablet-based one-to-one computing initiatives in Swedish schools.

Research questions:

1. How do principals lead and organise the tablet-based one-to-one computing initiatives in K–12 education? What do they want to achieve?
2. What strategies do principals use and how do they organise and implement their strategies in line with their intentions?

Study context and participants

This paper presents a study on seven Swedish school principals' experiences and narratives about their strategic leadership and organisation of a tablet-based one-to-one computing initiative. Applying a purposeful sampling (Patton, 1990), seven K–12 schools in five municipalities were selected based on the precondition of having used tablets for more than 6 months within a tablet-based one-to-one computing initiative. These schools were among the earliest in Sweden to start teaching with tablet-based one-to-one computing (Rogers, 2003). The principals at these schools were contacted and agreed to participate in the study. In total, three female and four male principals were interviewed. Four principals worked in K–9 schools, two principals in K–6 schools, and one principal in an upper secondary school. They had been working as principals for 3–14 years. All of the schools had been working with one-to-one computing in teaching and learning for 2–3 years except for one, which was a newly built school that had started operations 3 months before we visited it, although it is important to note that this principal had been previously working in another school for some years that had used one-to-one computing. The participating principals will be referred to as ID01–ID07.

Methodology and methods

A qualitative approach was taken, and the empirical material was collected through semi-structured interviews with the participating principals. The principals agreed to a statement of research ethics based on beneficence, non-malfeasance, informed consent, and confidentiality/anonymity (Gustafsson, Hermerén & Pettersson, 2011). The semi-structured interviews focused on the principals' own experiences and actions within the tablet-based one-to-one computing initiative at their school. The first section of questions focused on the principal's background. The next section probed the process of making the school digital through the one-to-one computing initiative by asking open questions such as "Tell us about your leadership as principal" and "Can you tell us how you as the principal support teachers labelled as "early adopters" i.e. teachers that take the lead for the development work?" Focus was also on the strategies the principals described for how to implement their vision of a digitalised education by asking, for example, "Can you tell us what you think of the future for the school regarding the one-to-one computing initiative?" The interviews lasted for 40 minutes to 80 minutes, and a total of 6 hours and 50 minutes of interview material was obtained. The material was transcribed verbatim.

Theoretical framework

The theoretical framework is based on Leontiev's (1986) activity theory and his concepts of *motives*, *goals*, *actions*, and *operationalisation*. These concepts of activity theory allow for an exploration of the context in relation to social relations and materials, tools, and intentions as well as the interplay among them and how they affect principals' decisions and their actions. It is not only the individual's perspective that is in focus within these processes, but also groups' actions in relation to the actions of the individuals within the activity system. In a context where activity theory is used, it is important to study the role an artefact or tool plays in everyday life (Nardi, 1996), for example, the investments and the uptake and use of tablets in one-to-one classrooms in Sweden. Further, activity theory embraces an exploration and an understanding of a context in relation to how social relations and materials, tools, and intentions affect actions in different situations.

Thematic Analysis

Thematic analysis (Ely, 1991) was used for constructing understanding and meaning of the empirical material and for identifying key themes and emerging patterns within the framework of activity theory (Leontiev, 1986). Boyatzis (1998) describe thematic analysis as a process for encoding qualitative information and to be used to assist the researcher in the search for insight. The process includes two perspectives – 'seeing' and 'seeing as' (Boyatzis, 1998). In line with Creswell (2013), seeing can be described as the process of searching for repetitive patterns of meaning (i.e. significance) in qualitative data. Thematic analysis includes several readings in iterative processes for identifying emerging patterns. The different steps include a) reduction of the data (coding), b) presentation of the data (thematisation), and c) summation of data in the form of conclusions and verification. First, the data in this study was coded into the emerging categories (e.g. motives, goals, actions, and operationalisation), and then into emerging themes within each category. For example, what the principals described they wanted to achieve (i.e., *motives* and *goals*) and what their strategies are and how they organise and implement their intentions (i.e., *actions* and *operationalisation*). Ely (1991) describes a theme as a definition of either utterances that all informants in a study are expressing or as a single statement of an opinion that has a great emotional or actual significance. As a step of making sense of the coded material, the phase of constructing meaning or 'seeing as', was made by searching for signs and patterns at a more abstract

level of the principals' utterances regarding what they explicitly or implicitly were saying in the interviews. These iterative processes formed the emerging themes in the material as presented in the next section of findings.

The quotations presented in the next section should not to be seen as evidence, but more as illustrations of the presented themes that emerged in the analysis of the empirical material.

Findings

The findings are presented in the following themes: *one-to-one computing as a strategy to change teaching and working methods*, *using technology for adapting teaching and learning to every pupil's needs*, and *strategies for organisation*. The first theme concerns the principals' visions of a digitalised education and their expressed intentions. The second theme illustrates how the marketisation of schools is affecting the principals' efforts to ensure that all pupils receive passing grades in all subjects. The third theme concerns the principals expressed strategies and how they organise and apply their strategies.

One-to-one computing as a strategy to change teaching and working methods

All seven principals described the one-to-one computing initiative as fulfilling three visions. First, to be a school in a modern digitalised society, second, to modernise the teaching methods, and third, to prepare the pupils for the future. As one principal described it: "*The school needs to keep up with changes and developments in society. We need to adapt to this context and change our working methods so that we can prepare the pupils for the future and the society they are living in*" (ID04). Another principal (D01) highlighted the strategy for one school's successful process:

> Our strategy from the beginning was very clear. We build on the enthusiastic teachers who want to change. Those who really want to lead the way and try new teaching methods. They can make the biggest mistakes in the beginning. They can act as inspirations and can teach others.

The above quotation indicates what will be described further in the next theme.

Using technology for adapting teaching and learning to every pupil's needs

This theme is based on two subthemes. The first subtheme concerns principals' efforts regarding the competition between schools. The second subtheme frames the principals' beliefs in improving equality in relation to one-to-one computing.

Principals' efforts and focus

The principals described an effort to construct a school that parents perceive as a 'good' school (i.e. a reputation for providing high-quality education to all pupils). The one-to-one computing initiative was in line with this effort, and the principals described that the use of one-to-one computing makes it possible for teachers to adapt their teaching more easily and more efficiently to meet every pupil's needs. As one principal said: "*When it comes to teaching overall, the tablets make it possible to easily make adjustments that fit every pupil's needs, and especially those pupils with special needs*" (ID01).

A yearly endeavour among the principals was to improve their position in the school rankings that are released by various agencies and associations. The primary focus was therefore on how many of the pupils at their school had

mastered all parts of the knowledge requirements in every subject. Being perceived as a 'good school' (i.e. having a high position in rankings) is therefore, linked to the success in attracting and retaining pupils in the school, which in turn affects the school's economy. Further, the principal described it as "a balanced economy", where they have the freedom to deploy resources where they are most needed. This effort and focus was more strongly expressed by the principals working in schools situated in the bigger cities compared to schools in the rural area where competition for attracting pupils is not as big an issue as in the cities. However, the principals working in the schools situated in the rural areas described how they are affected by the yearly presentations of rankings to some extent for being perceived as a good school even if there is no competition for attracting new pupils to the schools. However, regarding attracting more pupils the next theme indicates how the one-to-one computing is providing better school results.

Equality
The participating principals in this study have a strong belief that one-to-one computing will provide better possibilities for both boys and girls. One principal commented especially on how one-to-one computing as such had already had a great impact on the boys' school results. This principal described how the increased use of tablets made the boys more motivated for doing schoolwork and in turn getting better grades:

> We can see it in the results. There has always been a difference between boys and girls regarding the results. The difference between boys' and girls' merit value has been 50 points for quite some time. That means if the boys have 175, the girls have 225. That's a very big difference. But now we can see a difference in the boys' grades and results. If we look at the grades from the last semester, for example, the boys have risen and gotten better grades (ID03).

Strategies for organisation

The principals have a strong focus on the organisation. One principal (ID06) described her focus by giving an example as a question posed to herself *"How do I build an organisation and a structure to construct a 'self-playing piano'?"* (ID06). She continues by describing that it is of great importance for a principal to be able to reflect on how to solve problems *"I have an ambition to look at our organisation and our structure and reflect on things that didn't go so well and on how to solve the problem"* (ID06). Another principal (ID05) described that it is important to learn from mistakes.

> "I have a developed a strategy when I'm wrong and get criticism. I sit down and think about it and reflect on how I can do next time. It's important to be able to analyze yourself constructively to do a better job and to avoid mistakes you may have made. Sometimes I have apologized to the staff. It is a strength that has grown over the years. (ID05)

This theme is based on two subthemes related to the principals' strategies for how they lead and guide the process of digitalisation and how they organise and apply these strategies. Implementing one-to-one computing is seen as a catalyst for being able to change working methods, as mentioned in the first theme. The principals described that they are now able to start new types of discussions with their staff regarding how to change teaching and learning and what is required for such change. The one-to-one computing initiative also provides new possibilities for them to make practical changes in line with their personal understanding of how education and schools could be organised. This new situation, with new possibilities as well as new challenges for leadership and organisation, encourages them to organise their school differently. In this section two subthemes are presented regarding the principals' applied strategies – *building competent teams* and *organisation for technical and pedagogical support*.

Building competent teams

Building "good teams", as several of the principals called it, was presented as a key factor for being successful in the organisation phase. First, it is of great importance to be strategic in recruiting competent staff, including assistant principals, economists, administrators, ICT pedagogues, and IT technicians. These roles constitute the team needed to manage the organisation that digitalisation of schools entails, including both technical and pedagogical perspectives. Further, the principals described how they are now also trying to be strategic in recruiting new and innovative teachers who can be part of the process and how it is important for a school to have an organisation with staff at all levels who are eager to learn and who want to change teaching and learning using technology. The principal (ID07) at the newly built school described his strategy and how from the beginning he first picked two teachers who were known for being innovative teachers and later hired an economist that he trusted. "*From the start, I picked Lisa and Edvin. It is necessary to have the right persons around you. Especially those who have the same ideas about teaching and learning. Thereafter I picked an economist that I knew from before and that I trust*" (ID07). Recruiting staff that fit into the organisation requires that the principals have a clear vision of what they want to achieve and how to get there and knowledge about what is actually happening in the classrooms.

Organisation for technical and pedagogical support

Almost all of the principals described how they had put a lot of effort into the organisation concerning both technical and pedagogical support. The latter is based on ICT pedagogues and collegial learning. One principal (ID01) described that she was trying to get an in-depth understanding of teachers' different needs in order to take a strategic approach in the organisation; "*…to have the ability to listen to the teachers and understand what they really need and to organise support for these needs*". This can, for example, be quick technical support when tablets or Wi-Fi are not working properly in classroom (i.e. the technician's responsibility) or more continuous planned pedagogical support for those teachers who are not comfortable teaching with one-to-one computing (i.e. the ICT pedagogue's responsibility). The participating principals in the present study use a concept called *collegial learning* for competence development of their staff. This is a form of competence development that is arranged within the school itself. For example, the teachers who are frequently and continuously discussing their teaching with one-to-one computing (i.e. teachers who are perceived to be at the forefront and who are engaged in making changes in the school) have been given increased responsibility to inspire others and to show good teaching examples. Two principals (ID06 and ID01) described this as investing resources and creating conditions for those teachers who were eager to learn and willing to invest their time in learning how to teach with technology. *"I am lucky to have teachers that share a passion for this. My focus has been on to supporting them. I'm sending these teacher to different courses and then they can teach their colleagues"* (ID06). Principal (ID01) explained:

> We have chosen a clear strategy at our school. We have chosen to do this internally. That means that we have chosen to support those teachers who are curious and are at the forefront, and we give them the conditions to develop and investigate how to teach with tablets" (ID01).

Many schools are arranging and coordinating competence development internally by having some teachers share and spread their ideas to others by showing good examples. The principals describe that this gives them control over the cost, and they perceive this as a very cost effective strategy.

> We have organised our workplace meetings so we have 20 minutes on every meeting where some teachers are presenting good examples to each other.

> Sometimes, I'm also talking about and emphasize different aspect of teachers teaching that I think is important. For example, I can talk about how some of the teachers are using flipped classroom." (ID05).

It is not only important that teachers show each other good examples, it is also of great importance for the principal to act as a role model within this process of change.

> To be a role model is extremely important as a principal. My leadership affects teachers' teaching in the classroom. When I do classroom visits I can see that. My role as a principal, as a school leader, if I am not a driver of this development nothing will happen. If there really is going to be any change, a principal must lead the development. That's just how it is." (ID02)

One principal (ID06) described the importance of being a role model and being able to engage in the process and to show the staff through her own actions: *"I need to be a role model by being a digital principal. I need to think paperless and show the staff how to do it* (ID06). Another principal described it as participating in discussions and listening to what is going on among the staff: "I need to listen to be aware of what is happening. I also need to read a lot of stuff to be able to participate in discussions and give examples and to give good arguments." (ID04).

The structure of using collegial learning and role models as a concept for the development of teaching and learning with technology thus means that the schools have more continuous control over the planning for competence development. As one principle described: "The *teachers that are inspiring others and giving good examples are here tomorrow, also. We can ask them things the day after*" (ID02). Another principal (ID03) describes the value with collegial learning as "*the teachers are now starting to experiment more by themselves when they have seen how others have been solving problems or sharing an example for the whole teacher team*".

Discussion

This paper was an attempt to describe and understand principals' strategic leadership in schools with established tablet-based one-to-one computing programmes through Leontiev's (1986) theoretical framework of activity theory. By adopting this approach, the study aimed to increase the understanding of the participating principals' expressed intentions and how this is affecting their applied strategies concerning organising their school within this context. Based on Leontiev's (1986) activity theory, the context for the principals' strategic leadership concerns the implementation of their strategies and how they lead and organise this process. It is all about being aware of concrete motives and goals and how to achieve them by controlling the operations of the actions (Leontiev, 1986).

Strategic leadership concerns competences as being able to identify and assess new solutions afforded through the digitalisation (Dexter, 2008; Bocconi et. al, 2013; Dnr U2017/04119/S). McGarr and Kearney (2009) suggest that this requires principals who are learners alongside the staff and that they continuously are experimenting with innovative strategies. This is important since, as Hatlevik and Arnseth (2012) argue, teachers' perceived usefulness and use of technology in teaching are correlated to their experiences of a ICT-supportive principal and in turn their abilities to design a good learning environment for pupils (Jedeskog, 2002). In this study, the principals' digital competences (Dnr U2017/04119/S) and their skills of strategic leadership (Dexter, 2008; Bocconi et. al, 2013) in relation to their vision of what a school in a contemporary digitalised society is, affect their leadership and their applied strategies for organisational changes. Leontiev (1986) argues that humans

originally characterised the objects they acquired from the outside world as a means of satisfying their needs and giving them benefits. Further, there is a difference between individuals and how well they adapt to a situation in terms of their ability to become aware of themselves within an activity system. The same also applies to becoming aware of one's own self within such a system (Leontiev, 1986). The principals' applied strategies and organisational changes could be seen as the tools for reaching their satisfaction and for developing their own needs, which could be conveyed and transformed into the motives for the process.

The first research question highlights what the principals want to achieve with the implementation of tablet-based one-to-one initiatives. Based on the principals' narratives they consider the implementation as a potential opportunity for organisational changes. Even if the participating principals rhetorically describe their motivation as trying to provide a customised education for all pupils, indications can be considered as that the one-to-one computing initiative acts as a tool for the principals to implement practical changes and new teaching designs towards their own vision of applied teaching designs and teaching methods.

The findings indicate an endeavour to be perceived as a good school by parents and achieve a high position in the school rankings. A strong focus is to ensure that all pupils should be able to reach all of their educational goals in every subject, every year. This could be interpreted as in line with McGarr and Kearney's (2009) emphasis that principals must always have pupils' learning in mind when making decisions about IT. Although this is rhetorically expressed, according to the analysis, the principals appear to have a strong focus on the goal (Leontiev, 1986) only as a way for the school to be able to climb in rankings. This could be seen as an example of their strategic leadership and an adaptation to the marketisation of schools (e.g. the reform of school choice) in combination with the national policy of presenting the annual rankings of schools' results. The latter has an impact on schools' financial situations because they receive a voucher for every attending pupil (i.e. *the school is a market*, Chubb, 2007). This indicates, as Hult et. al (2016) describe it, that principals are to some extent experiencing themselves as 'victims' of external pressure and evaluation and that this affects the principals' strategic leadership and professional role. The principals in this paper perceive the one-to-one computing initiative as an opportunity to reach the goal to be a 'good school' with a reputation of providing high-quality education.

The second research question focused on principals' strategies and how they organise and implement their strategies. This concerns their actions taken (Leontiev, 1986) and the different operations (Leontiev, 1986) in organising for the tablet-based one-to-one computing initiatives. As an applied strategy, the principals described that they are supporting those teachers at school who are perceived as being at the forefront of using technology in teaching and learning. For example, these teachers sometimes are given special responsibilities for educating their colleagues (e.g. pedagogical and technical support). Similarly, Toy (2008) describes that it is important for a principal to support early adopters and risk takers so that they can share and spread their ideas.

According to Leontiev (1986), actions and operations are the tools for reaching the goals within an activity system. In this study, the principals' strategic leadership and their strategies for building competent teams and organising technical and pedagogical support at their schools could be seen as tools to be successful and to reaching their goals. Leontiev (1986) emphasises that the general principle of the relationship between different levels is that the current highest level always remains the leader, but this level can only realise itself by means of the underlying levels and is thus dependent on them. An interpretation of this in relation to the presented study might be that the principals' expressed intentions and their efforts to reach their goals affect their

applied strategies for how they lead and organise their schools. The presented findings in this study illuminate an example of principals' strategic leadership as described in the national digitalisation strategy for Swedish schools (Dnr U2017/04119/S), where a principal´s own digital competence in relation to how they are being able to lead and support teachers' digital development work is central.

Limitations

A methodological concern with this study is the selection of the principals. We assume that we would have obtained more extensive data and richer nuances if we had conducted more interviews with principals in more schools. It is hard to know if we would have come to different conclusions, but time limitations made further interviews impossible. Much can take place when visiting a school and we had of course to adapt to the daily practice. For example, the interview with one of the principals we had to conduct over telephone since it was not possible to find an appointment for a face-to-face interview. However, it is also important to note that these schools were chosen and contacted because they were among the earliest in Sweden to use tablet-based one-to-one computing (e.g. for at least 6 months) because we wanted to investigate specifically principals' own experiences and narratives about their strategic leadership and their organisation of tablet-based one-to-one computing initiative.

Another methodological issue concerns the theory-driven approach in the analysis, and we most certainly could have obtained different results if we had applied a more data-driven analytical approach. However, the concept of activity theory (Leontiev, 1986) was perceived as useful for the analysis according to the purpose of the study and the research questions.

Future research

The first recommendation for future research is to expand the number of participants. This would give a broader understanding and perspective on principals' strategic leadership and on how they lead and organise one-to-one computing initiatives in Swedish schools. It would also be interesting to investigate more broadly the principals' strategies and the effects these have on how they lead and guide one-to-one computing initiatives in K–12 education and in turn how their strategic leadership and organisation affect teachers' working conditions in the school. Further, it would be interesting to explore if, and if so how, the national digitalisation strategy for Swedish schools (Dnr U2017/04119/S) that took effect in 2018 overall affects principals' strategic leadership and organisation of schools in a broader perspective.

Concluding remarks

The participating principals' strategic leadership regarding their intentions and their applied strategies on how to lead and organise the digitalised school are an attempt to meet the demands associated with the reforms of marketisation and digitalisation of Swedish schools.

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