

# The use of digital technologies in a 1:1 laptop initiative: The parent perspective

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## Abstract

The use of digital technologies is now a natural part of schoolwork in many schools. The use of digital technologies and the conditions for technology-enhanced learning and school development were studied in two schools, an upper-secondary school and a compulsory school, over a period of 3 years, exploring the student, teacher, school leader, and school perspectives. In this small study, two surveys (N = 26; N = 17) were used to provide further insights into the compulsory school, by exploring the parent perspective of a 1:1 laptop initiative. Laptop use in the classroom was seen as a potential pedagogical tool for structure and support in learning activities, student responsibility for schoolwork, and issues of digital equity. Challenges included increased laptop use, difficulties regarding insight into and monitoring of schoolwork and homework, students' focus on schoolwork in the classroom environment, and physical aspects. The results show that the parent perspective provides important insights for teachers, school leaders, and school organizers that may help support students' learning through the use of digital technologies in the classroom.

**Keywords:** Digital technologies, laptops, parents

## Introduction

The use of digital technologies is now a natural part of daily schoolwork in many schools. Policy makers continue to emphasize the need for students to acquire 21st-century skills, such as critical thinking, problem solving, and digital competence in the digital classroom

The use of digital technologies in a 1:1 laptop initiative: The parent perspective (European Commission [EC], 2018; Eurydice, 2012; Organisation for Economic Co-operation and Development [OECD], 2018). Recent policy efforts continue to seek the more efficient use of digital technologies for teaching and learning and the development of digital competence (EC, 2018). In the Swedish context, the government continues to refine the goals for the use of digital technologies in schools in the National Digitalization Strategy for Schools (Swedish Government, 2017). Despite these efforts, the impact of the use of digital technologies on teaching and learning continues to be somewhat uncertain (National Agency for Education, 2016). The National Agency for Education evaluates the implementation and use of digital technologies and digital competencies in Swedish schools every 3 years. The most recent report shows that although investments and access to digital technologies have increased, pedagogical development and digital competencies have not expanded to the same extent (National Agency for Education, 2016; Swedish Schools Inspectorate, 2012). Proposals to strengthen digitalization in schools were introduced in the Swedish National IT strategy (The Committee for Digitalization, 2014) and the National Digitalization Strategy for Schools (Swedish Government, 2017) in terms of adequate digital competency, which have been adopted (Eurydice, 2018). Moreover, the National Agency for Education pointed out the necessity for professional development (PD) in the area of digitalization for all levels (i.e., teachers, school leaders, and school organizers) of Swedish schools (National Agency for Education, 2016). However, adequate digital competency appears to be somewhat boundless, involving interpretation in relation to both overall and local contexts regarding digitalization in K-12 schools (Fransson, Lindberg & Olofsson, 2018).

Despite the strong intentions and expectations of policymakers, academic gains in the use of digital technologies appear to be somewhat vague (Cuban, 2013; Livingstone, 2012). In many schools, the implementation of digital technologies has included laptops or tablets in what are referred to as one-to-one (1:1) initiatives (Richardson et al., 2013; Valiente, 2010). These initiatives involve the introduction of laptops or tablets into lessons in a digital classroom, where teachers and students each have access to their own laptop or tablet. Here, researchers note a gap between policy intentions and expectations and the actual use of these devices in practice (McGarr, 2009; Olofsson, Lindberg, Fransson & Hauge, 2015, Säljö, 2010). Overall, efforts to support the development of 21st-century skills through the promotion of basic and more advanced information and communication technology (ICT) skills for the major stakeholders in these initiatives (i.e., students, teachers, and school leaders) is reported in the international literature (Cuban, 2013; Vrasidas, 2014; Warschauer et al., 2014; Williams, 2008; Zheng, Warschauer, Lin & Chang, 2016) as a way for the use of digital technologies to provide opportunities for technology-enhanced learning and school change (Fullan, 2001; Olofsson et al. 2015).

Studies in the Swedish context (Håkansson Lindqvist, 2015a; Bergström & Mårell-Olsson, 2018; Fleischer, 2013; Grönlund, 2014; Mårell-Olsson & Bergström, 2018; Pettersson, 2018; Tallvid, 2015) mirror international results. However, although the student, teacher,

The use of digital technologies in a 1:1 laptop initiative: The parent perspective and school leader perspectives are in focus in the literature, one important stakeholder, parents, seems to be lacking. Thus, the challenges and opportunities parents see regarding the use of digital technologies in the classroom appear to represent a relatively unexplored area.

## Literature review

In regard to the use of digital technologies in the classroom, as noted above, many researchers have focused on the 1:1 classroom context (Cuban, 2013; Lei & Zhao, 2008; Harper & Milman, 2016; Penuel, 2006; Richardson et al., 2013). An overview by Zheng, Warschauer, Lin, and Chang (2016) reported positive findings related to 1:1, noting an expected continued expansion of 1:1 in K-12 schools, but they also called for more systematic research in the area. Studies often involve students, teachers, school leaders, and the schools as organizations. These stakeholders are seen as the main partners in the implementation process of digital technologies, and parents are only occasionally included in this group (Mooij & Smeets, 2001). Keane and Keane (2017) described parents as silent stakeholders, pointing to the need to elevate parents to equal stakeholders in 1:1 laptop initiatives. Others argue that ICT integration efforts should potentially be coordinated with students' home computer use (Vekiri, 2010). Pullen (2015) reported benefits of linking students' home use to school use (e.g., in digital use and confidence). This would also help provide a learning environment with digital technologies, which would ideally support a seamless transition between the home and school. However, this requires the combined support of both schools and parents (Kong & Li, 2013).

As policy measures continue to push a focus on access, integration, and developing frameworks for use and curricula, students' perceptions and digital competence continue to develop outside the classroom, rather than within the classroom (Aesert & van Braak, 2014). Further, Aesert and van Braak (2014) argued that teachers' attitudes and experiences do not contribute to an improvement in students' ICT skills, but the home environment, including parents' ICT attitudes and experiences, does. These findings are in line with Zhong (2011), who reported that the out-of-school context in which children use ICT could be a more powerful predictor for ICT efficacy than the school context. According to parents, attitudes concerning ICT competence and a child's success appear to be related, although there were socioeconomic differences in how parents conceived of the relationship between computers and success (Scholfield Clark, Demont-Heinrich, & Webber, 2005). A school's potential to implement measures as well as the parent's level of education and occupation also had effects on differences in access to ICT and use (Pereira, 2016). Parents' expectations regarding use in school are of importance as well (Brigas et al., 2016). Laptop use was seen as important for keep up with the pace of life in modern society as well as for academic achievement and the strong social imperative of the information society (Pereira, 2016).

Pereira (2016) noted the importance of access, focusing on the family and the way children access and used ICT. A study of small children entering nursery school suggested that access is not equivalent to the ability to use digital technologies, based solely on the parents' intervention or modelling (O'Hara, 2011). Parents have an impact by providing children with the opportunity to use ICT, thorough supervision, by playing with children with ICT resources, and by drawing children's attention to ICT in the home and the world around them (O'Hara, 2011). It appears that parental ICT attitudes are related to primary school pupils' ICT competences, and that classroom use is also related to pupils' competences (Aesaert, Van Nijlen, Vanderlinde, Tondeur, Devlieger, & van Braak, 2015). This could mean that parents' ICT attitudes affect how they support and regulate children's use (Vekiri, 2010). For example, in a study of students who bring their own devices to school, parents were concerned with issues of equity, ethical use, safety, and device security (Kiger & Herro, 2015). These concerns were also in focus in a study by Kong and Li (2013) in which parents expressed what could be described as a shift in concern over use to a concern over how to build and cultivate proper attitudes and use. In a study of tablet use with parents and students, parents expressed more concerns regarding use by older children than younger children (Rončević-Zubković et al., 2016).

The use of digital technologies may offer support for students with special needs (Peterson-Karlan, 2011; Sik-Lányi, Hoogerwerf, Miesenberger, & Cudd, 2015; Starcic, 2010; Nordström, Nilson, Gustafsson, & Svensson, 2018). However, parents expressed concerns regarding the use of ICT technologies as entertainment rather than as educational media (Scholfied Clark et al., 2005). Use involving non-schoolwork activities was reported to be a concern, which parents reported as a distraction (Keane & Keane, 2017). Other concerns reported by parents were the lack of focus on traditional school skills, such as handwriting. Furthermore, parents reported general challenges related to students' prolonged use and ergonomic concerns, such as issues relating to posture and eye strain (Keane & Keane, 2017; Woo, White, & Lai, 2016). However, concerns regarding use can present an opportunity because understanding and addressing parents' concerns may also serve to increase resources and support the teaching of digital citizenship (Kiger & Herro, 2015). Schools can capitalize on parental interaction to increase the quality of parental involvement in school and out of school. Schools that see the opportunity to utilize family resources may increase parental awareness of the potential benefits and risks of ICT technologies (Vekiri, 2010).

Digital technologies, such as laptops, can be seen as tools to support and assist teachers' work and students' learning but also as tools for crossing boundaries and creating a culture of sharing between schools, parents, and other actors in the community (Niemi, Kynäslahti, & Vahtivuori-Hänninen, 2013). It appears that ICT alignment between parents and principals regarding preferences and expectations in the use of digital technologies improves parent satisfaction with the school, whereas misalignment appears to have the opposite effect (Heath, Maghrabi, & Carr, 2015). Schools may provide information through

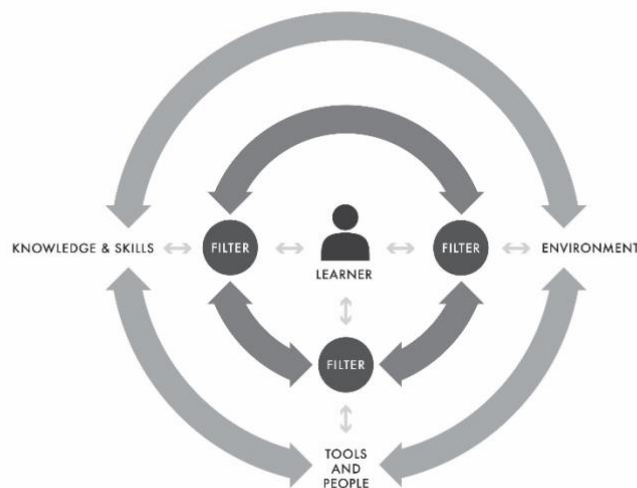
The use of digital technologies in a 1:1 laptop initiative: The parent perspective increased modes of communication as a way to increase access and communication between families and communities. However, this does not guarantee the quality of the information (Hohlfeld, Ritzhaupt, & Barron, 2010). Collaboration between schools and parents to foster information literacy was also an issue. The high expectations school leaders have for parental support reflect the need for schools to initiate cooperation with parents to extend technology-enhanced learning to the home setting (Kong & Li, 2013). Further, Kong and Li (2013) discussed the need to support home–school collaboration to provide opportunities and to mobilize parents to support learning at home.

## Context

The Umeå research project in Umeå, conducted between 2011–2014 in Sweden followed a 1:1 laptop initiative in two K-12 schools in the municipality of Umeå to study the use of digital technologies and the conditions for technology-enhanced learning as well as the educational change observed. Employing a research design with a case study approach (Yin, 2009), the data collection in the overall research project consisted of surveys, interviews, and classroom observations. Two schools were involved in the research project: a large upper secondary school and a middle-sized compulsory school. The teachers and school leaders in the research project were either teachers, mentors, or school leaders for the four classes involved in the research project. Previous research has explored the student perspective (Håkansson Lindqvist, 2013), the teacher perspective (Håkansson Lindqvist, 2015a; 2015b; 2019a), and the school leader perspective (Håkansson Lindqvist 2015c; 2019b). By providing insight into yet another important stakeholder perspective, the parent perspective, this paper aims to explore the challenges and opportunities of ICT technologies as perceived by the parents of the compulsory school students in the two classes studied in the research project.

## Theoretical framework

The Ecology of Resources model (Luckin, 2010) builds upon the idea of learning as an interaction between the individual and the sociocultural environment (Engeström, 1987; Säljö, 2000; Vygotsky, 1978). In the model, the learner is placed in the center. The model is illustrated in Figure 1.



**Figure 1** The Ecology of Resources model (Luckin, 2010) including resource elements and their filters.

With the learner in the central position of the learning activity, demands can be set on the surrounding learning environment, context, and design (Luckin, 2010). Surrounding the learner are three resource elements: environment, knowledge and skills, tools and people. These resources are available to the learner and can be accessed either through direct or indirect interaction. An important theoretical concept in the Ecology of Resources model is filters. According to Luckin (2010), the resources surrounding the learner may be restrained and impeded or expanded and enabled. Thus, the process of exploring and identifying filters can be used both to strengthen design and to ameliorate negative effects in technology-rich learning environments (Luckin, 2010). Identifying and making filters visible can be seen as an important part of identifying the challenges and opportunities related to the use of digital technologies, as in the case of a 1:1 laptop initiative. In this paper, the parents (learners) are placed in the center of the model to explore the aggregated parent perspective and provide parents' perceptions of the use of digital technologies in the classroom.

## Aim and research questions

The aim of this paper is to explore, identify, and analyze the challenges and opportunities related to the use of digital technologies in a 1:1 laptop initiative from the parent perspective. The following research questions are hereby put forward: (a) What challenges and opportunities are expressed by parents with regard to the use of digital technologies in the 1:1 classroom? (b) Using the Ecology of Resources model (Luckin, 2010) and the theoretical concept of filters, how can these challenges and opportunities be understood? I aspire to contribute to new insights regarding the challenges and opportunities in a 1:1 laptop initiative from the parent perspective.

## Methods

The participants in this study are the parents of the two classes involved in the 1:1 laptop initiative. Surveys were used to capture the perceptions of the parents and were sent to the parents of the students in the two classes involved in the 1:1 laptop initiative. The survey was comprised of 10 questions to capture how parents viewed the use of the laptop in relation to schoolwork, homework, and collaboration. The survey also included open-ended questions and the option to write comments.

Regarding procedure, the survey was sent to the students' parents according to a class list that specified the parents' names and addresses. One copy of the survey was sent to one-parent households and two copies were sent to two-parent households. A return envelope was enclosed. The first set of data was collected during late fall 2012, approximately 18 months after the start of the 1:1 laptop initiative at the compulsory school. One year later, the same procedure was repeated. The same survey was again sent out to the students' parents according to the class list. The data in this study consisted of the two sets of data collected (Survey 1, Survey 2). For the first mailing, the survey was sent to 57 households (94 parents of 52 students), and 26 were completed and returned. One blank survey was discarded, leaving 25 surveys remaining. For the second mailing, one year later, the same survey was sent to 50 households (80 parents of 50 students), and 17 were completed and returned. The first survey was answered by 25 parents (14 women and 11 men). The second survey was answered by 17 parents (12 women and five men).

Following data collection, the surveys were compiled, and the data were analyzed. The answers to the open-ended questions, i. e., the free text comments provided in the surveys, were analyzed using content analysis (Schreier, 2014). The 26 surveys in the first data set are identified as Parents 1A-1Y. The 17 surveys collected during the second data set are identified as Parents 2A-2Q. Following this analysis, the Ecology of Resources model (Luckin, 2010) was used to identify and understand the challenges and opportunities expressed by parents with regard to the use of digital technologies in the 1:1 classroom.

## Results

In this section, the survey results are presented. First, the overall survey results from the two surveys are presented. These results include the parents' perceptions of the 1:1 laptop initiative. The results from the two surveys are then combined and compared, then changes between the two surveys are presented. Thereafter, the parents' comments provided in the free text comments in the surveys are presented challenges and opportunities. Lastly, the results are summarized and presented using the Ecology of Resources model (Luckin, 2010).

## **Overall survey results: Survey 1**

In total, 24 parents viewed the 1:1 laptop initiative as very positive or positive, with only one parent reporting a negative view of the initiative. When asked if their view had changed since the start of the initiative, the majority of the parents noted no change or a change for the better. Six parents reported a change for the worse, two parents were indifferent, and one parent did not answer.

The majority of the parents found the rules for the use of the laptops at school to be reasonable. One parent thought that the rules were too strict, and six parents reported that the rules were too lenient. Three parents were not aware of what the rules were, and the remaining two parents did not answer.

A total of 22 parents reported that their children took their laptops home every day for schoolwork. Two parents reported that their children brought their laptops home a few times a week, and the same number reported that they took their laptops home a few times a month. One parent reported that their child never took the laptop home. When asked if their children used their laptops too often at home, 12 parents answered yes, eight parents answered sometimes, and three answered no. One parent did not answer.

## **Overall survey results: Survey 2**

All parents viewed the 1:1 laptop initiative as very positive or positive. When asked if their view had changed since the start of the initiative, the majority of the parents noted no change or a change for the better. Three of the parents reported a change for the worse.

In Survey 2, the majority of the parents found the rules for the use of the laptops at school to be reasonable. Three parents thought that the rules were too strict, and two parents did not answer. Nine parents reported that their children took their laptops home every day for schoolwork. One parent reported that their child brought their laptop home a few times a week, and three parents reported that their children took their laptops home a few times a month. Three parents reported that their children never took the laptops home, and one parent did not answer. When asked if their children used their laptops too often at home, nine parents answered yes, seven parents answered sometimes, and one parent answered no.

## **Changes - from Survey 1 and Survey 2**

The parents' perceptions of how the 1:1 laptop initiative had impacted learning for their children from Survey 1 to Survey 2 showed the largest changes in fully agree or agree to some extent, with a decrease of 19%. The number of parents who did not agree that



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 learning improved increased by 17%. Parents' perceptions of improved learning for their children regarding the 1:1 laptop initiative are illustrated in Table 1

**Table 1** Parents' Perceptions of improved learning for children

Improved learning	Survey 1	Survey 2	Change
Fully agree or agree to some extent	15 (60%)	7 (41%)	-19%
No change	5 (20%)	4 (24%)	+4%
Do not agree	3 (12%)	5 (29%)	+17%
No answer	2 (8%)	1 (6%)	-2%
Total	25 (100%)	17 (100%)	

Parents' perceptions of how the 1:1 laptop initiative offered opportunities for their children to have increased collaboration with schoolmates from Survey 1 to Survey 2 showed the largest change in those who reported No change, at 20%. Parents' perceptions of increased collaboration with schoolmates increased by 20% among those who fully agree or agree to some extent. Parents' perceptions of increased collaboration between their children and classmates regarding the 1:1 laptop initiative are illustrated in **Table 2**.

**Table 2** Parents' Perceptions of increased collaboration with schoolmates

Increased collaboration with schoolmates	Survey 1	Survey 2	Change
Fully agree or agree to some extent	10 (40%)	3 (18%)	-12%
No change	8 (32%)	9 (52%)	+20%
Do not agree	3 (12%)	3 (18%)	+0%
No answer	4 (16%)	2 (12%)	-2%
Total	25 (100%)	17 (100%)	

When parents were asked if they thought that the 1:1 laptop initiative had made schoolwork easier, the largest change was seen in those who fully agree or agree to some

extent, with a decrease of 20%. A change of 13% was seen in parents who do not agree. Parents’ perceptions that schoolwork was made easier is illustrated in Table 3.

**Table 3** Parents’ Perceptions that schoolwork was made easier

Schoolwork made easier	Survey 1	Survey 2	Change
Fully agree or agree to some extent	14 (56%)	6 (36%)	-20%
No change	5 (20%)	5 (29%)	+ 9%
Do not agree	4 (16%)	5 (29%)	+13%
No answer	2 (8%)	1 (6%)	+2%
Total	25 (100%)	17 (100%)	

Parents were also asked about their perceptions regarding whether the 1:1 laptop initiative made schoolwork more fun for their children. A decrease of 31% was reported in parents who fully agree or agree to some extent. An increase of 31% was seen in parents who reported no perceived change in whether schoolwork was fun for their children. Parents’ perceptions of whether schoolwork was more fun are illustrated in **Table 4**.

**Table 4** Parents’ Perceptions of schoolwork being more fun

Schoolwork more fun	Survey 1	Survey 2	Change
Fully agree or agree to some extent	18 (72%)	7 (41%)	-31%
No change	1 (4%)	6 (35%)	+31%
Do not agree	3 (12%)	3 (18%)	-6%
No answer	3 (12%)	1 (6%)	-6%
Total	25 (100%)	17 (100%)	

Parents’ perceptions of whether the 1:1 laptop initiative made their children take more responsibility for their schoolwork showed a decrease of 18% in those who fully agree or agree to some extent. An increase of 26% was seen in parents who reported no change in

The use of digital technologies in a 1:1 laptop initiative: The parent perspective whether their children take responsibility for their schoolwork. Parents' perceptions of whether children take more responsibility for their schoolwork is illustrated in **Table 5**.

**Table 5** Parents' Perceptions that children take more responsibility for schoolwork

More responsibility for schoolwork	Survey 1	Survey 2	Change
Fully agree or agree to some extent	10 (40%)	2 (12%)	-18%
No change	7 (28%)	9 (54%)	+26%
Do not agree	6 (24%)	6 (35%)	+11%
No answer	2 (8%)	2 (8%)	-8%
Total	25 (100%)	17 (100%)	

Parents' perceptions of whether the 1:1 laptop initiative led to children needing less help with homework decreased among those who reported no change at 25%. At the same time, parents who responded that they do not agree that their children needed less help with homework increased by 31%. Parents' perceptions that children needed less help with homework are illustrated in **Table 6**.

**Table 6** Parents' Perceptions that children needed less help with homework

Needed less help with homework	Survey 1	Survey 2	Change
Fully agree or agree to some extent	7 (28%)	5 (30%)	+2%
No change	12 (48%)	4 (23%)	-25%
Do not agree	4 (16%)	8 (47%)	+31%
No answer	2 (8%)	0 (0%)	-2%
Total	25 (100%)	17 (100%)	

In summary, the majority of parents who answered this study (Survey 1, Survey 2) saw the 1:1 laptop initiative as something that offered opportunities for improved learning (60%, 41%), making schoolwork easier (56%, 36%), and making schoolwork more fun (72%, 41%). Although some parents noted increased collaboration with classmates (40%, 18%) and increased responsibility (40%, 12%), many parents reported no change in these areas;

that is, no change in collaboration with classmates (32%, 52%) and no change in responsibility (28%, 54%). In reports of whether children needed less help with their homework, many parents (48%, 23%) reported this to be unchanged. The largest changes between the two surveys were seen in an increase in the number of parents who reported that they did not agree that children needed less help with homework (+31%), a decrease in the number of parents who agreed that schoolwork was more fun (-31%), and an increase in the number of parents who saw no change in whether schoolwork was fun (+31%).

## Challenges

When noting what parents regarded as challenges related to the 1:1 laptop initiative, the answers could be placed into the following categories: *technical issues, use, knowledge, the laptop as a distraction, physical aspects, and responsibility*.

### Technical issues

Access to the laptops was also seen to be a challenge. Parents noted that the laptops were always accessible, which implied challenges: “Too large a focus on the laptop. [Children] can’t work when there is something wrong with the laptop” (Parent 1W). Parents reported technical problems related to the laptops themselves: “Lots of technical problems with the laptops” (Parent 2L) as well as with the network, “Old laptops . . . hard to work when the Internet is not working” (Parent 2H). Another issue was access to technical support if a laptop broke down: “[My child] did not get any help with technical support until I, as a parent, called” (Parent 2L).

### Use

Parents reported concerns regarding the use of the laptops for non-schoolwork use: “The computer is used for things other activities than schoolwork” (Parent 2B). Another parent echoed the same sentiment: “The laptop is used for things other than schoolwork” (Parent 2Q).

Laptop use involved the element of distraction as well. This was noted as difficulties concentrating on work in the classroom: “He has said that he is distracted in the classroom, since he sits in the back and sees all of the laptop screens in front of him, often with games” (Parent 1J). Another parent commented that “sometimes the computers are used for other things, such as chatting, email, and games instead of ‘teaching’” (Parent 2A).

Distractions related to group work in the classroom environment were also reported: “It is difficult to concentrate on the right thing when email alerts are on and chatting is often going on. You can turn it off, but it is difficult” (Parent 1K). Parents also described non-school activities, such as access to games, as a distraction: “Too much computer gaming”

The use of digital technologies in a 1:1 laptop initiative: The parent perspective (Parent 2K), both in the classroom and on breaks, and “more individual gaming, and group pressure to play games during lunch, since access is free” (Parent 1I). Another parent commented:

Access can be abused. The laptop is used only for a small fraction for schoolwork, and the rest is up to the student’s own discretion. And in the teens, it is not searching for information on the web that is prioritized, but things that are fun, such as games, Facebook, YouTube, etc. (Parent 1C)

In summary, parents saw challenges in the students’ use of laptops for schoolwork, with many opportunities to do other things during lessons.

## Knowledge

The challenges parents reported regarding knowledge were related to the fact that children would potentially no longer read books and would not be able to write by hand. One parent noted an effect on lessons, as they often started late because the laptops were not turned off. Another parent hoped the laptops would be used more extensively: “Few good tasks, not often good homework assignments for using the laptop as a proper tool. Too bad that it is mostly reading and writing” (Parent 1B). Another parent reflected on the kind of knowledge that is lost:

As always, when you implement something new, you lose something else. In this case, it is the opportunities for breathing space and reflection, when Word fixes the spelling and the structure, and the disposition and becomes something that you can fix afterwards. The texts are not thought through before they are written—by the good students—first at the end of the process. Many [children] can’t cope at all. (Parent 1Q)

One parent expressed concerns over traditional school skills that were being lost, for example, handwriting:

Unfortunately, there are so many children who have handwriting that is not readable! When the laptops take over, children who need to develop their handwriting are not given the opportunity... the children should learn to use pencils, erasers, and paper before laptops and keyboards. (Parent 2Q).

Another parent saw the laptop as a challenge for children with special needs: “A child who needs extra help should not have a laptop—everything is too unclear, they cannot set guidelines for how to learn things” (Parent 1P). Another parent brought up the need for knowledge about social media and the Internet, seeing “too little dialogue about social media on the Internet, for example Facebook” (Parent 1X). Another parent summed this up:

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I usually ask my son if he needs to bring his laptop with him to school, but the answer is often no! My experience is that the laptop is not used very often in the teaching. It seems that it is more something that students themselves use after lessons. (Parent 1C)

In summary, these parents reported concerns about the lack of focus on traditional school skills to the extent that they risk being lost, while they also expressed a need for guidelines and discussions on the use of social media.

Some parents reported concerns regarding students searching for information in the classroom and a shift in learning activities: “It is more important to be able to find the right information than to learn things” (Parent 2A). Another parent expressed this as follows: “Schoolwork changes from learning things properly to ‘just’ finding information” (Parent 2B).

## Physical aspects

Parents also saw challenges in the physical, or ergonomic, aspects of working with laptops. These were related to more sitting still in front of the laptop, laptop work being tiring, and the increased use of the laptop in school and at home: “The level of laptop use is too high” (Parent 1H). Parents also noted concerns about children carrying the laptop back and forth to school: “The need to carry the computer back and forth is very strenuous” (Parent 1W) and “Too heavy for growing backs to carry laptops, books, and gym clothes” (Parent 1M). One year later, the parents also expressed concerns about the ergonomic challenges related to the laptop: “The computer is too heavy to carry back and forth” (Parent 2G) and “Heavy and difficult to carry the laptop between school and home” (Parent 2F). Another parent also reported concerns related to carrying the laptop back and forth: “Heavy computers and heavy books equals injured back. The backpack weighs at least 10 kilos, often more, and it is carried back and forth to school every day” (Parent 2J). Other sources of stress were technical problems, such as problems arising because the laptops had previously been used by another group of students, as well as problems with hard drives: “My son had a hard drive crash and the school’s backup wasn’t working, which led to a big problem and a stressed student” (Parent 1Y).

## Responsibility

Other challenges that parents noted related to the responsibilities of the children, parents, and teachers. One parent noted that the responsibility of taking care of an expensive laptop was too great for the children, considering the risk of theft and other damage.

Another parent noted that taking on responsibility for all of the students’ laptops was difficult for teachers: “The fact that the teachers do not have the ability to follow up on how

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the laptops are used” (Parent 2Q). Excessive use of the laptop for activities other than schoolwork could also give children the wrong idea about how to use the laptop for schoolwork: “Poor role models for work [with the laptop] in the future” (Parent 2J). Another parent noted that the work with the laptop places too much responsibility on the student for schoolwork, and others reported too little insight: “I have no idea/poor insight into what needs to be done. [I] don’t know if homework has been done or not. Too much responsibility is put on the student. Not on the teacher or mentor” (Parent 1Y). Parents also noted that they did not really know what students used their laptop for during lessons: “It is difficult to say how he uses the laptop during lessons, but if he does other things than schoolwork, that is not good” (Parent 2C). This lack of insight was difficult for parents who hope to help their children with schoolwork in that the lack of overview meant that they were “left out and cannot help in the same way” (Parent 2J). One parent saw this lack of overview and insight as exclusion: “It feels like the school is on the wrong path with too much laptop use in teaching. As a parent, I feel quite excluded from everything that is taking place” (Parent 2G). Another parent summarized this as follows: “The computer is used too much. You don’t even know what your child has for homework, don’t know if it has been done, the password for the computer makes this a problem” (Parent 2J). Another concern expressed by parents during the second survey was directed toward the lack of structure in documents and information published by teachers: “The teachers do not have structure when they publish documents . . . Documents should be put in files and dated” (Parent 2J). This parent also reported that the laptop meant that schoolwork for children “demanded both laptops and books, that is, the teachers have not kept up with the development” (Parent 2J).

The challenges and opportunities that parents reported were similar from the first year to the second year. In the first survey, parents noted opportunities in communication. In the second year, they saw opportunities in the use of the laptop to support efficient learning. The challenges the parents reported were also similar, for example, use, physical aspects, and responsibility. In the second year, parents expressed a need for teachers to structure information.

## Opportunities

When noting the opportunities the parents reported with regard to the 1:1 laptop initiative, the answers could be placed into the following categories: *access to laptops*, *the laptop as a pedagogical tool*, *learning with the laptop*, and *communication*.

### Access to laptops

Access was one of the opportunities reported in relation to the laptop initiative. Parents reported that all of the children had the same opportunities to use a laptop as a tool in the

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All children have access to laptops, even though some children's parents do not have the money or do not have access to laptops due to other reasons. All of the children have the same prerequisites in the 1:1 project. Good! (Parent 1C)

In this classroom, one parent expressed that “hopefully the laptop will always be available in the lessons as support and a supplement” (Parent 2Q). Access to laptops provided all of the children with the opportunity to search for information: “Every student has access to the Internet and can search for information whenever they like when doing school work” (Parent 2D). In both sets of surveys, parents also noted opportunities for access at home as a result of not having to share the laptop with siblings.

## **The laptop as a pedagogical tool**

Many of the parents' comments were related to the laptop as a pedagogical tool. Several parents noted the educational value of the laptop: “The children have a good pedagogical tool” (Parent 1R). Here, parents saw opportunities in the use of the laptop as a pedagogical tool: “they reflect and use the laptop as a tool for help” (Parent 1D).

Other potential opportunities were that it was easier to search for and find information and allowed students to become laptop savvy, write more easily, and be better structured in their work. One parent summarized this as follows: “Students learn both to use the laptop and access the information available on the Internet” (Parent 1S). This was due to the fact that, with the laptop, “all information is more accessible” (Parent 2A), and it is easier to find “up-to-date information” (Parent 2J).

Parents also noted the need for their children to develop skills in laptop use as a result of future demands: “They get used to a work method and tools that are used in society” (Parent 1Q). Here, parents made general comments, such as “computer skills” (Parent 2K) and “the opportunity for young people to learn technology at an early age” (Parent 2L). More specific uses were also reported, such as “learning to use the laptop's fantastic search engine” (Parent 2Q) and “learning computer technology and ICT” (Parent 2F) as well as “knowledge” (Parent 2N) and “innovative thinking” (Parent 2N). Another parent reports that laptops could lead to “positive young people” (Parent 2H).

## **Learning with the laptop**

Opportunities were also seen in the laptop programs, such as the spell check program and a speech- to text program. The laptop was also seen as a tool for structuring work because “all the assignments, notes, etc. are located in one place” (Parent 1F), all the information is close by, and “school materials are always accessible, i.e., there is no risk that he will forget



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his books” (Parent 1K). “Good for homework, they test each other on Skype and homework programs” (Parent 2H), and laptops facilitate “homework, mainly in languages” (Parent 2J). One parent reported that learning with the computer “works well at home” (Parent 2C).

Opportunities were seen for study skills in general as well as for producing texts with a nice layout. One parent noted the wide number of programs available on the laptops: “There are many tools for help on the laptop, which is positive” (Parent 1H). Parents of children with special needs commented: “For my child, who has a slighter form of reading and writing disability, the laptop is a fantastic tool for help” (Parent 1T); and “The laptop is a great tool for my child who has reading and writing difficulties” (Parent 2P). Another parent noted, “He has had a laptop since 7th grade, and we don’t know how he would have managed if he hadn’t had a laptop” (Parent 2D).

This category also included comments regarding parents’ thoughts about responsibilities and learning: “The student takes a greater responsibility and shows more interest in their own learning” (Parent 1T), including increased knowledge by learning to be responsible for the laptop. The theme of responsibility was also seen in the second survey in which parents noted that working with the laptop provided opportunities for students to “take responsibility” (Parent 2F). “They learn to take responsibility” (Parent 2L) and become “more self-sufficient” (Parent 2J). One parent summed this up as, “My child takes on a lot of responsibility and plans for his own learning” (Parent 2P).

In the second survey, parents noted what could be described as efficient learning. Here, a parent noted that “schoolwork could probably be done in shorter time; they don’t need to write a lot but just revise the same document . . . [to] make increased learning possible” (Parent 2A). As reported by another parent, the laptop was considered a tool that “facilitated schoolwork” (Parent 2B).

## **Communication**

The last category of comments was related to communication. Parents noted that communication between teachers and students improved. Another parent noted opportunities for children to communicate with each other: “Everyone in the class can speak to each other on the Internet, easier than calling” (Parent 1B). Communication between home and school was also seen as important: “All information, provided that the teachers put out information, is more accessible” (Parent 1T). Another parent noted that their child had recently started at the school and that information about the 1:1 laptop initiative had not been communicated (Parent 1A).

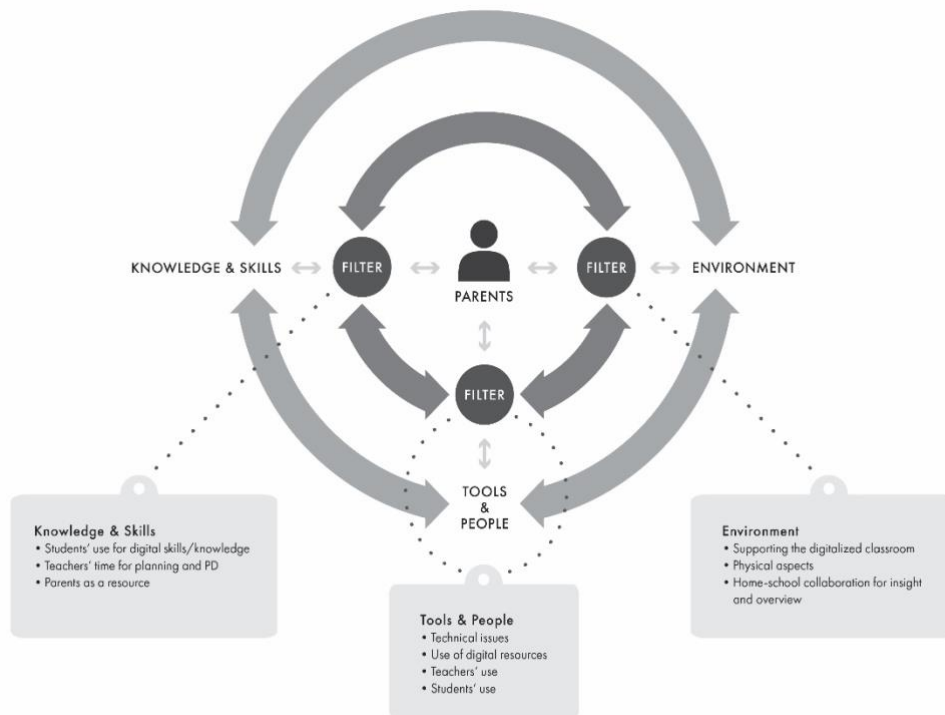
In summary, the results reported as challenges and opportunities are illustrated in Table 7.

**Table 7** Parents’ perceptions of challenges and opportunities from Survey 1 to Survey 2

Parents’ perceptions	Survey 1	Survey 2
Challenges	Use	Use
	Technical issues	Technical issues
	Knowledge	Knowledge
	Physical aspects	Physical aspects
	Responsibility	Responsibility
		Teachers’ structure
Opportunities	Access to information	Access to information
	Knowledge	Knowledge
	Laptop as a pedagogical tool	Laptop as a pedagogical tool
	Communication	Efficient learning

In returning to the research questions, the aim of this study was to explore, identify, and analyze the challenges and opportunities related to the use of digital technologies in a 1:1 laptop initiative from the parent perspective. The first research question explored and identified challenges and opportunities as expressed by parents regarding the use of digital technologies in the 1:1 classroom. Here, parents saw opportunities in children having their own computer for schoolwork, access to information, and pedagogical tools provided on the laptop. Parents saw challenges in non-school activities in the classroom, technical issues, and their lack of insight into and overview of children’s schoolwork and homework. To answer the second research question—how can the challenges and opportunities regarding the use of digital technologies in the classroom be understood using the ecology of resources model (Luckin, 2010) and the theoretical concept of filters?—I analyzed the results regarding the use of digital technologies in the 1:1 classroom from the parent perspective according to the resource elements: environment, knowledge and skills, and tools and people. In summary, based on parents responses to a survey regarding the use of digital technologies in the 1:1 classroom, parents support the change to a digital learning

environment (resource element: environment), the development of ICT skills (resource element: knowledge and skills), and the pedagogical use of digital technologies (resource element: tools and people). Using the Ecology of Resources model (Luckin, 2010), this can be illustrated as shown in Figure 2.



**Figure 2** Challenges and opportunities from the parent perspective using the Ecology of Resources model (Luckin, 2010).

## Discussion

In the following section, the results of the study will be discussed in relation to the resource elements and filters in the Ecology of Resources model (Luckin, 2010).

## Environment

In the resource element environment, parents reported positive views regarding the 1:1 laptop initiative and could see many opportunities for supporting children's learning with laptops in the classroom. This positive view appeared to continue over time. In this sense, the laptops are considered to be a resource for learning (Niemi et al., 2013; Vekiri, 2010).

One filter identified here is the classroom environment itself and how teachers work to support the digital classroom. If non-school activities and distractions such as email and text message alerts disturb the classroom work environment, as parents in this study expressed, students will likely find it difficult to focus on schoolwork as intended. Here, teachers' work to support digital work methods in the classroom will be key. Discussing individual and classroom laptop rules and guidelines may be of importance in this work. Although many of the parents in this study saw the classroom rules for laptop use as reasonable, they did have concerns regarding the balance of laptop use for school and non-school activities in the classroom (Kiger & Herro, 2015). Further, parents saw a need for increased dialogue to promote awareness of social media and Internet use. Another filter manifested in this resource element was the physical environment, or the physical aspects of the digital classroom, such as parents' reports of excessive laptop use and the need to carry heavy books and laptops (Keane & Keane, 2017; Woo et al., 2016). These factors may affect the learning environment for students as well. In this study, parents reported that excessive laptop use makes the students tired. They also had general concerns about the amount of time spent in front of the laptop. Alleviating this filter will likely be an important step for teachers to take, for example, by ensuring that laptop use is spread out across lessons throughout the day to better support the physical learning environment. The teacher's ability to provide well-designed and well thought-out lessons, thereby targeting the opportunities that the laptops offer as pedagogical tools, is important; this may involve closing the laptop during certain tasks to create time for reflection and nondigital learning activities. All of these physical aspects relate to concerns for students' long-term health, as the parents in this study noted. For teachers, this work will most likely demand time for planning with other teachers as well as for professional development (Vrasidas, 2015). If time and professional development are not provided, teachers will find collaboration to be difficult; therefore, time for planning and professional development could be a filter in this resource element. As the parents in this study acknowledged, an increase in laptop use for schoolwork and homework may create opportunities for bridging the gap between the home and school learning environments (Aesert & von Braak, 2014; Zhong, 2011). Increased opportunities for collaboration (Vekiri, 2010) and the alignment of information will be necessary (Heath et al., 2015). And more time will likely need to be allocated for teachers to provide the necessary schoolwork-related information and structure that the parents requested. If teachers provide this information, parents will most likely gain insight into and an overview of children's schoolwork. However, it will also be important for this information to be of good quality (Hohlfeld et al., 2010).

## **Knowledge and Skills**

In the resource element knowledge and skills, parents see opportunities in the use of the laptops for gaining both subject knowledge and skills in laptop use. Therefore, access to the

laptops for non-schoolwork activities could manifest as a filter in this resource element.

According to the parents in this study, students' free access to the Internet may present difficulties and will most likely have an impact on the laptops' pedagogical use. If the laptop is not used as a pedagogical tool in the classroom, this may, in turn, weaken the opportunities for students to attain increased knowledge and ICT skills (Kiger & Herro, 2015; Schofield Clark, Demont-Heinrich, & Webber, 2005). The parents in this study also expressed concerns over the lack of traditional school skills, such as handwriting, which are perhaps also important for students to acquire in the classroom. Further, the use of the laptops for non-school activities, as manifested as a filter, could take over the opportunities for knowledge and skills that pedagogical use of the laptop achieves. Pedagogical use of the laptops is a prerequisite for attaining the goals set in policies for digital competence (European Commission, 2013; Organisation for Economic Co-operation and Development, 2018). These skills appear to be related to parents' ideas regarding the skills their children need in modern society and for success in school and society (Pereira, 2016; Schofield Clark et al., 2005). Thus, a pedagogical challenge for teachers will be planning and designing classroom work that makes optimum use of student laptops, which may require professional development for the teachers (Vrasidas, 2015). New work methods will also place demands on teachers to develop teaching methods that overcome the concerns expressed by parents, i.e., using the laptop only for reading, writing, and searching for information. Teachers' skills and knowledge must also enable them to use laptops to post information in a structured manner and make it accessible for parents, which will be important for keeping parents updated on information that is important for students, such as providing insight into schoolwork and homework assignments. Teachers' lack of time to post and structure information can manifest as a filter from the parent perspective, as it impedes the parents' ability to communicate with teachers and leads to poor insight, as the parents in this study reported. This lack of transparency may also interfere with parents' ability to take on the responsibility of helping their children with schoolwork and homework and limit the opportunities to take full advantage of students' and parents' knowledge and skills (Keane & Keane, 2017; Kong & Li, 2013).

## **Tools and People**

In the resource environment tools and people, filters manifested in technological issues with the laptops. For the work with the laptops to be successful in the classroom, the laptops must be in good condition. Technical support must be available for students when needed. Another filter is the nonuse of all of the programs that may facilitate learning, such as spellcheck and text-to-speech programs and the underuse of other resources that are provided on the laptop that can be accessed on the Internet. It is likely that teachers occasionally need to remind students that these tools are available on the laptops. Here, parents can be a resource in the effort to better utilize laptop features. Moreover, to further

promote the use of these tools in the classroom, teachers may need additional professional development opportunities (Vrasidas, 2015), while parents need to learn these new skills as well so the tools can be used in the home environment. Therefore, the teachers' use can manifest as a filter in this resource element. Digital technologies, such as laptops, may be used to support the learning of students in general and students with special needs in particular (Nordström et al., 2018; Peterson-Karlan, 2011; Sik-Lányi et al., 2015; Starcic, 2010). The present study contains contrasting views regarding students with special needs. Laptops provide the students with tools, but it is important that they receive the help and support they need from both teachers and parents so that they are able to use the laptops optimally and access these tools. The parents in this study recognized the importance of these tools (Brigas et al., 2016; Keane & Keane, 2017; Kiger & Herro, 2015; Schofield Clark et al., 2005). However, although parents may be able to support this use in the home to a certain extent, it will be up to the teachers to support this use in the classroom to facilitate the students' learning. Thus, supportive and competent teachers will be important. Finally, regarding use, the laptop's lack of use can also manifest as a filter. Parents voiced concerns regarding disruptions in the classroom. Here, parents' attitudes toward (Aesert, van Braak, Rončević-Zubković, 2016; O'Hara, 2011; van Nijlen & Vanderlinde, 2015) and involvement in supporting awareness of digital competence and citizenship in school and out of school may also be of importance (Kiger & Herro, 2015; Vekiri, 2010). Involving parents could provide support for teachers' work in the classroom.

## Conclusions and Practical Implications

The aim of this paper was to explore and identify the challenges and opportunities presented by the use of digital technologies in the classroom in a 1:1 laptop initiative from the parents' perspective. The use of the Ecology of Resources model (Luckin, 2010) and the theoretical concept of filters appear to have been fruitful for understanding the challenges and opportunities as expressed by parents.

One of the opportunities presented by this 1:1 laptop initiative that parents reported was digital equity. Parents noted that the laptops provided the children, *all* of the children, with the opportunity to gain knowledge and twenty-first century skills as well as to find individualized support in planning and structuring their schoolwork. Many parents also felt that their children think that learning with the laptop is more fun. However, this depends on how they use the laptop in the classroom. If they use the laptop to complete well thought-out assignments designed by teachers with a focus on gaining knowledge and ICT skills and using the resources the laptops provide, then digital equity and digital competence will most likely be achieved. If this is not the case, it is possible that students who need extra support to use their laptop as an educational tool may fall behind in the digital classroom. As the parents of students with special needs expressed in this study, the

laptop offers fantastic opportunities at the same time it presents challenges, with teacher support being key.

The main challenges that parents report are issues related to responsibility. These issues comprise different roles and responsibilities. One issue is what responsibilities the teachers have to teach with the laptops and to inform parents of assignments and homework. Another issue is what responsibilities parents have for ensuring that their children have their laptops with them at school, that the laptops are charged, and that children use them as pedagogical tools for schoolwork both in the classroom and at home. Teachers must provide the necessary information for parents and students alike so that all stakeholders have an insight into and an overview of schoolwork and homework. Further, what responsibilities and how much responsibility can be placed on the students—in many cases, young children—is an important issue. For some children who lack the support of parents with a high level of ICT skills, this responsibility may be difficult. Finally, another question lies in the overall responsibility for increased laptop use and the potential physical aspects related to, for example, long days of work with the laptop, carrying heavy books and laptops, and stress, and what this may imply for the health of these young students over the long term. Determining how these challenges will be addressed will require collaboration between school organizers, school leaders, teachers, and parents as all stakeholders work together to provide children with the best possible pedagogical conditions for learning with laptops.

Finally, the use of digital technologies in the classroom appears to provide opportunities for parents to gain insight into schoolwork and homework. However, if the gap between the school environment and home environment is to be bridged, teachers will need to provide the necessary information in a structured manner to increase parental involvement and provide parents with the opportunity to take on this responsibility. At the same time, skills students acquire in the home environment should perhaps also be seen as an opportunity for learning in the classroom. Here, parents with digital skills and knowledge may also provide a well-needed resource in establishing the digital classroom.

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