

Education in the North



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DOI Number: <https://doi.org/10.26203/x7t6-fh57>

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To cite this article: Stark, K. O. and From, J. (2020). Regional perspectives on remote teaching in Sweden. *Education in the North*, 27(2) pp. 7-23.



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Regional perspectives on remote teaching in Sweden

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Abstract

In rural parts of Sweden, there is a growing interest in remote teaching, i.e. synchronous teaching using ICT. The Swedish National Agency for Education views remote teaching as a way to meet teacher shortage. However, there is limited research on remote teaching as an educational form. The purpose of this study was to investigate opportunities and challenges with remote teaching from three perspectives: school, region, and research. The method chosen was content analysis of qualitative interviews with school leaders, regional officials and researchers. All informants ment that remote teaching had great opportunities. Common themes were equality, meeting teacher shortages, access to qualified teachers, and increased teaching quality. However, the informants highlighted challenges related to the technological, practical and organizational issues, learning, and legal issues. Limited use by the Education Act was the foremost challenge according to regional officials and researchers, while school leader more often highlighted technology, pedagogy, and organization as challenges. In conclusion, all three perspectives saw remote teaching as a way to ensure pupils in rural areas the right to equal education and teaching quality. Despite challenges introducing a novel form of teaching, there is a consensus on remote teaching as an integral part of the future school.

Keywords: Remote teaching; Rural schools; Content analysis; School leader's perspectives; School development

Introduction

It must be underlined that this is a study of the conditions at rural schools in Sweden before the outbreak of Covid-19. This is an important framework for reading, since it does not deal with schools forced to implement remote teaching under lockdowns and closures, but with schools and regions striving to develop remote teaching in order to handle challenges in rural areas.

The importance of making it possible for rural schools to improve, not only supporting them, has long been advocated (c.f. Sher, 1981), often by invoking the opportunities that new technologies offer. In Sweden, the latest example of such an opportunity is remote teaching (c.f. Stenman and Pettersson, 2020, Pettersson and From, 2018). It is based on ongoing changes linked to digitalization in the Swedish educational system, which includes compulsory school and upper secondary school. ‘The possibilities of digitalization to promote the development of knowledge and equality in the school system’ are stressed in an agreement between the government and the Swedish Association of Local Authorities and Regions (SALAR, 2017).

In other Scandinavian countries, remote teaching is currently available to varying degrees in elementary and upper secondary schools. Finland offers virtual schools, and a pilot project with remote teaching has been conducted in the archipelago of Åland. Pilot projects with remote teaching are also underway in Denmark (Hilli, Eklund and Törnroos, 2017; Hilli, 2016; Hilli, 2020). Norway offers online schools to students abroad and in sparsely populated areas, and it allows home-schooling (SOU, 2017).

However, research on remote teaching has mainly been conducted in the United States, Canada and Australia (Rehn, Maor and McConney 2017; Bower *et al.* 2015; Maor, 2008). In a Canadian context, remote teaching with video conferencing systems has long been used for teaching K-12 students in geographically inaccessible or sparsely populated areas. Remote teaching of pupils in sparsely populated areas also occurs, for example, in New Zealand, Australia and the U.S. state of Nebraska (Rehn *et al.*, 2017; Vize, 2014). However, only limited Nordic research focuses on distance teaching in rural schools in Finland (Hilli, 2020).

Rehn, Maor and McConney (2016) highlights an absence of research on how remote teaching is conducted and what models and teaching theories are used, which implies a risk to teaching quality. They argue that the absence of research prevents development in the area. This is supported by NEPC (2015), which points out that virtual K-12 schools show poorer results in teaching quality compared to regular schools. However, previous research on the inequality of outcomes mainly focuses on inequality based on gender, ethnicity or linguistics, while educational inequalities in the quality of teaching between urban and rural environments has received less attention (Wei *et al.*, 2018).

Borup, Graham and Drysdale (2014) stress the importance of teacher engagement in remote learning, including both regular remote education and combinations with remote teaching. The presence of a mentor contributes to a sense of community between remote teachers and remote pupils and thus to improved teaching quality (Drysdale *et al.*, 2016). Creating a learning community between pupils has been shown to have a great impact on the motivation to learn (Rehn *et al.*, 2017).

Purpose and research questions

Remote teaching is described by the Swedish legislature as ‘an interactive teaching that is conducted synchronously in real time with the help of ICT (information and communications technology)’, and it is currently regulated under Swedish law. Remote teaching is allowed only in compulsory school, compulsory school for pupils with learning disabilities, and the Sámi School in the following cases: courses taught in languages spoken from birth, the Sámi language, modern languages and sign language; guidance in studies of the mother tongue; and integrated teaching in Sámi between schools with the same principal (The Education Act, 2010:800).

In Sweden, remote learning is generally conducted between pupils in a school and a remote teacher in another location. Pupils use ICT to connect with the remote teacher, and a supervisor is always present with the pupils at the school. Blended learning, in which remote pupils join a class taught in another location, is not common.

While Swedish law currently allows only limited remote teaching, the Swedish government in 2015 commissioned an evaluation from the Swedish National Agency for Education to determine whether remote teaching should be allowed in more school subjects. The government provided a number of reasons for the evaluation, such as a shortage of qualified teachers and the new demands that the digitalization of the school system imposes on development work within schools. However, as of the time of this study, there has been no change in the Education Act (The Swedish National Agency for Education, 2017; The Swedish National Agency for Education, 2018A; The Swedish National Agency for Education, 2018B). From, Pettersson and Pettersson (2020) have studied how remote teaching relates to digitalization in the current school system. While government efforts have focused on digital technology and infrastructure, less attention has been given to pedagogy and organization within schools.

In this context, many rural schools have used this diffuse legal mode to try remote teaching, as it is seen as a way to manage local needs in sparsely populated areas of Sweden (c.f. Stenman and Pettersson, 2020). One example of this, is a sparsely populated region in the north of Sweden where active research and development work (RandD-work) on remote teaching has been conducted since 2015. The purpose of the project is to develop equivalence and quality in teaching, regardless of the geographical residence of the pupils within the region. Given this context, the purpose of this study is to investigate remote teaching from three perspectives: school leaders, regional officials and researchers, all involved in the RandD-work.

The research questions (RQ) are as follows:

RQ1: What opportunities can be identified within the three perspectives?

RQ2: What challenges can be identified within the three perspectives?

RQ3: What differences can be identified among the three perspectives?

These results may offer important insights into remote teaching in a Swedish context and may provide relevant new knowledge for future legislation and policy work at the regional and national levels.

Remote teaching and Covid-19

As mentioned above, it must be noted that this study precedes the Covid-19 pandemic that started in early 2020, when school closures in Sweden forced a transition from traditional to remote education. Unlike many other countries, Sweden chose to keep pre-schools and comprehensive schools operating from first through ninth grades, while upper secondary schools used distance learning during the spring term of 2020 when the Covid-19 pandemic reached Sweden (Bergdahl & Nouri, 2020). Distance learning is not defined in the Swedish Educational Act and can be both asynchronous and synchronous (The Swedish National Agency for Education, 2020A). During the pandemic, pupils have connected with teachers and classes from computers in their own homes.

When the autumn semester started at the end of August, new rules and regulations from the Swedish National Agency for Education (2020B) allowed individual schools to plan more flexible scheduling and allowed remote teaching, distance teaching and blended learning. In blended learning, a teacher leads the class in the classroom, but individual pupils with symptoms of Covid-19 or of a cold are not allowed to attend class.

Opportunities and challenges in remote teaching

In blended or remote learning through videoconferencing or virtual classrooms, higher demands are placed on the cognitive abilities of remote learners and teachers (Bower *et al.*, 2015). Research by From (2017) raises the importance of pedagogical digital competence in the development of remote teaching in a digital learning environment. This development integrates learning theories into teaching and lesson planning and incorporates ICT tools in the implementation of remote teaching. From (2017) argues that this development also needs to be considered from at least three levels: interaction, course planning and school organization.

Research on remote teaching has mostly focused on learning in the mother tongue. The challenges highlighted are mainly technology-related, including problems with camera or video, image delay, the digital skills of remote teachers and provision of remote services (Rehn *et al.*, 2016). Hilli *et al.*, (2017) argue that several components are necessary for functioning, flexible remote teaching: technology, teachers' skills, pupils' acceptance, school leaders' commitment, and political decisions.

International research has focused on remote teaching from the perspective of the teachers (i.e., Rehn *et al.*, 2016; Borup *et al.*, 2014). In a Swedish context, studies by Stenman and Pettersson (2020) analyse teachers' perspectives on remote teaching with a focus on equality and inclusion, while From, Petterson and Pettersson (2020) show that remote teachers perceive the importance of school leadership for remote teaching. Less attention has been given to the experience of school leaders and principals in remote teaching. However, Hilli *et al.* (2017) show the importance of school leaders' commitment to recruiting qualified remote teachers, incentives for competent teachers to work with remote teaching, peer support and a financial framework for remote teaching in Finland. Nevertheless, there is a lack of knowledge about the experience of school leaders with the opportunities and challenges of remote teaching, whether socially, organizationally, pedagogically, collegially or digitally.

Method

This study is based on 11 in-depth, semi-structured interviews with participants, school leaders (N=5, labelled SL 1-5), regional officials (N=3, labelled RO 1-3) and researchers (N=3, labelled R 1-3), each consisting of 20 to 30 minutes of recorded material from a targeted selection. The selection included informants engaged in the above-mentioned RandD-work. A semi-structured interview guide was used (Ahrne and Svensson, 2015); it was based on current guidelines for research ethics (Swedish Research Council, 2017), which were also followed throughout the study. A content analysis consisting of transcription, coding, thematisation and analysis (Hjerm, Lindgren and Nilsson 2014) was then conducted. After transcription, sentences and part of the text were coded into categories and then aggregated into major themes and analysed through identification of common and contrasting patterns among the three perspectives.

Results

One theme that is common to all the school leaders' statements is the ability to provide students with access to quality teaching and qualified teachers, a wider range of foreign languages, and more competitive teaching services for minor courses in rural, sparsely populated areas: 'There are all the possibilities of remote teaching!' (SL2). The overall experience is that remote teaching is necessary and that it is obvious for school leaders to develop this form of teaching. Remote teaching provides 'an opportunity to offer teaching by qualified teachers and to have those qualified teachers in all subjects, but mainly in minority and modern languages' (SL1).

According to the school leaders, remote teaching can be described as a way to complement traditional teaching in sparsely populated areas and to maintain schools in minor villages: 'We have a competence-supply problem, and small schools have huge problems recruiting staff, and remote teaching can give these pupils education' (SL 4). In the rural areas, an attempt is now underway to coordinate the teaching of modern languages such as Spanish and German between several municipalities in order to meet the school law's requirements for teaching skills in these languages. For these language courses, one participant stated, 'We are dependent on remote teaching' (SL4).

At the regional level, remote teaching is described as a means of ensuring equivalence, pupil's right to education regardless of locality, and the right to qualified teachers and quality teaching, but also as a part of the digitalization of schools and school development. The teacher shortage is another consistent theme in the officials' statements. At the regional level, remote teaching is also seen as a means of ensuring quality of teaching in sparsely populated municipalities where the number of educated teachers in some cases is less than 50%: 'We conduct remote teaching based on the fact that we are a large region. It is a sparsely populated region where we are forced to bridge distances and teacher shortages in some way' (RO 1).

There was consensus among regional officials that remote teaching implies increased equivalence in teaching, not least from the pupils' perspective: 'It is about putting the learner in the centre. The pupil has the right to education and an education of good quality through qualified teachers' (RO1). All regional officials described remote teaching as a necessity for providing teaching to all pupils, as their

democratic right. Another theme that emerges from the statements is that remote teaching is seen as part of the school's digitalization: 'Remote teaching is competence development' (R02).

All researchers stressed the importance of remote teaching for equivalence in quality, teaching and learning. They also emphasized that remote teaching increases access, collaboration and competence training for teachers. According to all researchers, remote teaching can be seen from several perspectives—that of the teacher, the pupils, the school or society. Increased access to skilled teachers in subjects where it is normally difficult to employ qualified teachers—especially minority languages, modern languages or science—was a consistent theme in the researchers' statements: 'If more pupils are given access to more educated teachers, their choices also increase, especially in subjects with a lack of teachers such as natural sciences, but also in languages' (R1). It was also suggested that remote teaching allows teachers to participate in a larger teaching team at several schools, increasing the possibility of skills development and the opportunity to employ teachers for full-time positions in smaller subjects.

Another theme found in the statements concerns digitalization. The researchers highlighted that remote teaching can contribute to the digitalization process of a school. Methods for remote teaching can also be used in traditional teaching. Moreover, remote teaching can also be viewed from a societal perspective, as one of the informants stated: 'Remote teaching in a way is work to increase equivalence in increasingly unequal Swedish schools' (R2).

The possibilities of remote teaching

Through a comparison of keywords and descriptions from statements by all informants, four consistent themes concerning the possibilities of remote teaching were identified: equality, qualified teachers, solving the teacher shortage and quality (Table 1).

Table 1. Four consistent themes were identified from school, region and research.

Theme	Examples of statements within the theme
Equality	<p>"... For students to receive an equal education..." (RO2).</p> <p>"...I see it [remote teaching] as an opportunity for more equal education for our students (SL2).</p>
Qualified teachers	<p>"... opportunity to offer teaching of qualified teachers and have qualified teachers..." (SL1).</p> <p>"...they are taught by competent teachers..." (RO1).</p>
Meet the teacher shortage	<p>"... An overall perspective on the possibility of remote teaching at the macro level is to give students the opportunity to equivalent teaching as they are taught by competent teachers..." (R1).</p> <p>"... Yes, I see that the possibilities of remote teaching are great [...] Actually, I can say that this is the opportunity we have to tackle the teacher shortage..." (RO2).</p>
Quality	<p>"Equivalence, availability, and closeness" (R2)</p> <p>"... I want to see it a little further as it would enable the equivalent quality [...] It is both a right and allows to choose modern languages for example...." (RO1)</p>

Challenges in remote teaching

In general, school leaders raise practical challenges with remote teaching from the perspectives of both pupils and teachers. These challenges include required technology for teachers and pupils along with technical competence, access to wireless communication networks, and new requirements for teachers. In addition, school leaders also expressed questions about quality and equivalence in remote teaching. School leaders described remote teaching as more intense and close, but at the same time, they described it as another way to work with teaching.

Another theme was that remote teaching is staff-intensive and depends on access to knowledgeable remote teachers with experience and working technology—the learning platform or other digital media: 'To cope with the technical and pedagogical approach is a challenge' (SL3). However, school leaders also raised scheduling issues, as the use of certain classrooms only for remote teaching leads to scheduling issues that can affect multiple courses. Teachers request more classrooms for remote teaching. At the same time, leaders also underlined problems in judging the quality of remote teaching: 'I find it very difficult to evaluate the quality of teaching' (SL5).

Several school leaders shared the view that there is a risk that pupils receiving individual remote teaching may feel excluded and isolated, and that remote teaching in groups may be preferable. In

addition, pupils often work individually with school assignments using individual computers. Thus, the leaders also mentioned issues related to learning communities and social presence, as well as the pedagogical challenges that a remote teacher faces in creating a classroom:

“The challenge in creating a pedagogy [...] to reach the pupils through a screen is not only to be technically talented [...] Some teachers are really good at computers, but you have to have pedagogical skills to create relationships through a screen, and it is not easy, but there are actually some who do it.” (SL 4).

Several school leaders highlighted that today's pupils, who have grown up in the digital community with access to the Internet since childhood, create and maintain their private social relations online, and they therefore may have an easier time adapting to the forms of remote teaching. The leaders believed that this was an area in need of further research. At the same time, they underlined that with remote teaching, pupils across the country may have access to classes and study guidance in their native languages, even in small minority languages such as North and South Sami.

Regional officials highlighted several challenges, including changes in school organization, changes in the roles of teachers and pupils, lack of legislation, and lack of knowledge. Organizationally, remote teaching places new demands on schools, teachers and pupils: ‘Remote teaching is very new’ (RO 3). Many parts of the school curriculum originated in the old compulsory schools. Thus, new requirements have arisen, such as the adaptation of classrooms for remote teaching, demands in scheduling, and the development of digital and pedagogical skills. According to regional officials, these issues require changes within both the school system and the municipalities.

However, the biggest challenge to the development of remote teaching in Sweden is, according to all the regional officials, current legislation: ‘It takes a lot to go outside the Education Act’ (RO3). However, all regional officials emphasize that their own regions are working on issues related to remote teaching. The obstacles to increased development in this area are not at a regional level but at a government-policy level. All regional officials feel that their regions view remote teaching positively as a possible means of giving pupils equivalent teaching and as a matter of cooperation and development. However, equivalence does not apply only to the right to education and qualified teachers; it also applies to the forms of remote teaching.

The researchers raised organizational challenges such as school leadership, teachers' and pupils' perceptions of what remote teaching is, the difficulty of changing the way school as an institution is built, general opposition to change, and creation of knowledge and understanding among pupils and teachers about what remote teaching means: ‘The teaching staff's initial understanding of remote teaching [...] fears that it will not be good [...] uncertainty for any new didactic approach’ (R1). Research, evaluation and development in the field of remote teaching are currently lacking:

“...requires a secure process and research. It is important to research [... remote teaching...] So that we know it will be good.... If we do not test, we do not know what challenges we face [...] The challenge is to dare to plunge into it, to dare to meet the challenges.” (R3).

Researchers point out that remote teaching requires knowledge, vision, guidelines, documents and stated targets at several levels: national, regional and municipal. According to the researchers, remote teaching should be seen as a completely different form of teaching, separated from traditional classroom teaching, which means that research must challenge its own understanding of what learning theories and strategies can be used. Moreover, remote teaching cannot be expected to have the same approaches as distance learning, which is performed asynchronously.

The challenges of remote teaching

In the analysis, four consistent themes on the challenges of remote teaching were identified: legal challenges, practical and organizational issues, learning communities, and a lack of research (Table 2). All informants highlighted the legal challenges, and a majority of them demanded changes in the Education Act.

Table 2. Four consistent themes were identified when comparing statements from school leaders, regional officials and researchers on the challenges of remote teaching.

Theme	Examples of statements within the theme
Legal challenges	"... There is regulation on remote teaching and it is not suitable today. We need a completely different kind of legislation " (RO1) "... There is a willingness to facilitate remote teaching, but we do not see this in the legislation yet..." (RO3)
Practical and organizational challenges	"... I find it very difficult to evaluate the quality of teaching..." (SL2) "... Another way to work [...] Another way to teach [...] There are other preparations for adapting the teaching..." (SL1)
Learning and learning community	"... Remote teaching is very new. Many parts of the school are from the time of the Old Compulsory School [the Swedish School system between 1842-1974, in Swedish called Folkskolan] ..." (RO3) "... Professional teacher training must be changed up [to include remote teaching]..." (RO2)
Lack of research	"... Requires a secure process and research. It is important to do research on remote teaching...So that we know it will be good..." (R3). " ...We do not know how the pupils learn [with remote teaching]? (SL1)

Differences among the three perspectives

The study reveals that there is a strong consensus among school leaders, regional officials and researchers on the possibilities of remote teaching. Common themes were equivalence, teacher shortages, pupils' right to education and quality. According to the informants, remote teaching is a way to provide pupils in sparsely populated areas with the same opportunities as pupils in places with more qualified teachers. The informants highlighted remote teaching as the only way to ensure access to

qualified teachers in remote areas and as an opportunity to offer a broader range of courses. These two aspects were common objectives in their RandD-work. At the same time, it is obvious that remote teaching can be viewed as a challenge to the traditional school, as an opposition or tension between different activity systems—the traditional school and the new activity system for remote teaching (c.f. Engeström, 2001).

However, when it comes to the challenges of remote teaching, there are some interesting differences. School leaders are more practical and organizationally focused on technical challenges. They are concerned that the pedagogy has to be changed, that remote teaching is a new way of working, that teaching skills must be developed, and that the need for different classrooms and changes in scheduling are difficult to avoid. School leaders emphasize legislation to a lesser extent. Regional officials highlight legislation as the main challenge for remote teaching, but they also highlight the need for development work. In particular, the researchers highlight a lack of regulation as well as the need for development work.

While teaching quality is a common theme among regional officials, researchers and school leaders, researchers and regional officials focus on the possibilities of remote teaching for providing pupils in rural areas with equal educational quality and access to qualified teachers. However, school leaders agree that remote teaching is the only way to provide qualified teachers in rural areas, but they also express great concern about how to evaluate the quality of remote teaching: 'I find it hard to evaluate quality in teaching' (SL5). In addition, school leaders do not feel that they have the tools or education to evaluate whether remote teaching is comparable to traditional teaching. Observations of remote classes are considered more difficult and time-consuming.

School leaders express great concern for many practical and organizational issues with a new curriculum, including additional difficulties in scheduling or lack of equipment, technical competence, the need to train teachers for remote teaching, and a lack of research on how students are affected by remote teaching: 'To cope with the technical and pedagogical approach is a challenge' (SL3). In addition, remote teaching requires more time for preparation, and, to date, there are no curriculum guidelines for how remote teaching should be conducted.

According to the Education Act, a school's mission is not just learning and education but also social education: 'Part of teaching is not to just provide learning [...] The social aspects of school could be forgotten' (SL1). Despite concerns among school leaders about how to form learning communities and social presence in remote teaching, several school leaders pointed out that their pupils had grown up in a digitalized society and had adapted to remote teaching more easily than they had. In contrast, one of the researchers expressed concern: 'The experiences of school leaders, teachers and pupils in remote teaching may prove a challenge' (R2). No school leaders expressed concern about the resistance of pupils or teachers to the new educational form.

In the analysis, four consistent themes were identified in the differences between the school leaders, on one hand, and the researchers and regional officials on the other: the perspective of the pupils, the school's mission to socialize pupils, the lack of evaluation tools, and practical and organizational issues

(Table 3). Because no pupils were interviewed in this study, the perspective of the pupils is based on the perceptions of the school leaders.

Table 3. Concerns identified in statements by the school leaders.

Theme	Examples of statements within the theme
Perceptions of pupil's perspective	"... some pupils will benefit from a more rigid environment..." (SL2)
School's mission to socialize pupils	"...part of the is not to just provide leaning [...] the social aspects of school could be forgotten..." (SL1) "... Yes the school's mission is not only learning, you can miss the social bits..." (SL4)
Lack of evaluation tools	" ... It is much more difficult for me to visit a remote classroom..." (SL5) " ... I find it very difficult to evaluate the quality of teaching..." (SL2)
Practical and organizational issues	"...classrooms will be looked up [not to be used for traditional teaching] if used for remote teaching....this will effect scheduling in the whole municipality..." (SL2) "...The digitalization allows for individualized learning, closeness and for pupils to interact..." (SL1)

To sum up, school leaders look at remote teaching more from the perspective of their own schools and pupils, while regional officials and researchers relate remote teaching more to a societal perspective and future opportunities. The lack of research was a common theme, indicating that additional research on remote teaching in a Swedish setting is warranted. However, future researchers will need to take into account the knowledge already available to school leaders, teachers and pupils in rural schools that are using remote teaching.

Discussion

The informants stated that teacher shortages in sparsely populated regions, especially a shortage of educated language teachers, leads to a poorer course offering for pupils unless those courses are offered through remote teaching (c.f. Rehn *et al.*, 2017; From, Pettersson and Pettersson, 2020). Most informants experienced remote teaching as the only opportunity for rural schools to offer their pupils an equivalent education with qualified teachers—a logical way not only to support rural schools but also to improve them (c.f. Sher 1981). School leaders also raised the importance of offering attractive teaching services through remote teaching in sparsely populated areas (c.f. Hilli *et al.*, 2017, Hilli 2020). In Australia, schools in sparsely populated areas use mentoring programs for students who are interested in educating themselves as teachers, thereby ensuring the availability of future teachers (Lock, Budgen, Lunay, and Oakley, 2012), an alternative not yet tested in Sweden.

The informants also suggested that new artefacts place new demands (c.f. From, 2017) on teaching, didactics and technical competence. As previously reported, in a Swedish remote-teaching context, it is important that school management and leaders support and provide teachers with opportunities to increase their technical competence. Thus, the creation of supportive networks for remote teachers has been proposed (Pettersson and Olofsson, 2019).

Remote teaching uses learning platforms such as computer programs, computers, tablets and video conferencing systems as mediating artefacts for remote delivery. However, the mediating artefacts used to support learning in remote teaching vary across contexts and countries. For example, in Australia, radio was used for synchronous instruction in remote areas, although they now use internet for individual lessons and individual school work (Rehn *et al.*, 2017; Vize, 2014). Rehn *et al.* (2017) pointed out that video conferencing systems are widely used for synchronous K-12 teaching in the United States. Multivoicedness in remote teaching carries its own perceptions and history, which can lead to contradictions (Engeström, 2001), not least when it comes to diversity in rural schools (Sher, 1981).

Social presence is an important factor in the creation of a learning community. Garrison (2011) and Anderson (2008) put forward the importance of interaction between teachers and students in creating a distance-based learning community consisting of cognitive presence, teacher presence and social presence. Group affinity, confidence and daring to communicate are prerequisites for learning in both remote and distance education (Garrison, 2011). Social presence in online distance learning has been shown to correlate with motivation, the formation of a learning community, knowledge acquisition and study success (Öjefors Stark, 2017). Joksimović, Gašević, Kovanović, Riecke and Hatala (2015) have shown that students who feel part of a digital learning community become more motivated.

Several informants emphasized that remote teaching enables closeness and that remote learners feel that they are being taught directly by the remote teacher, which can be interpreted as social presence. However, it is challenging for the remote teacher to support pupils individually, to scaffold and to help the learner. It is also challenging for the school to provide the prerequisites for the teacher to do this. How can rural school organizations provide the necessary conditions that enable social interaction so that the remote teacher can increase the knowledge of the learner? Creating knowledge that is useful in teaching is important (Rönneman, 2018) in developing rural schools.

In the social interplay between remote learners and teachers, both teachers and pupils can be 'the learner' and 'the knowledgeable' who appropriate and internalize new knowledge (Jakobsson, 2012). Regional officials and researchers pointed out that remote teaching, as a new educational form, challenges the school's traditional teaching, which has been tied to a place since the establishment of the compulsory school. School management, teachers, pupils and parents may experience how remote teaching fundamentally changes the way school works. Generally, the introduction of remote teaching is a process of change.

All the interviewed informants were participating in the same RandD-project, which could be a major reason for their similar views on the topics discussed. However, our results showed that despite being in the same RandD-work, the three groups held diverse views on the opportunities and challenges of

remote teaching. Thus, when formulating research questions, it was important that the researchers take into account the views of the school leaders as well as the remote teachers, remote pupils and regional officials. This diversity also highlights the need for regional officials to find consensus with the researchers and the schools when formulating new policies and regulations concerning remote teaching.

Regional officials and researchers pointed out that remote teaching would challenge traditional teaching. Traditional teaching in a school setting has been practised in Sweden since the introduction of the Swedish Folkskola in 1842. During the Covid-19 pandemic, a great challenge was immediately apparent as teachers were forced to transition from traditional teaching to remote teaching in a very short period of time after pupils were sent home. Bergdahl & Nouri (2020) interviewed Swedish teachers in March and April 2020. Their research showed that most teachers had limited experience with distance teaching, and they adapted their already planned learning activities to distance education. Most teachers also stated that their schools had no strategy for distance education. Technology was a challenge for many teachers, and many viewed online student interaction and collaboration as difficult (Bergdahl & Nouri, 2020).

Swedish schools have been working on digitalisation since the 1980s, but the purpose has been to introduce new technologies (From, Pettersson & Pettersson, 2020). Today, digitalisation and the use of ICT are often integrated in classroom education. However, studies have shown that ICT is dependent on pedagogy (From, Pettersson & Pettersson, 2020) and support (Pettersson, 2018). Digitalisation is not only dependent on technology but on teachers' digital competence, pedagogical strategies and organisational support (From, Pettersson & Pettersson, 2020).

From, Pettersson and Pettersson (2020) have recently shown that digitalisation is a pedagogical, not a technical question, and they have emphasised that digitalisation and remote teaching can cross-benefit each other in the Swedish school system. Today, pupils use artefacts such as computers, mobile devices and social media for their contacts and relationships during their spare time, and the digitalization of school is closely related to the digitalization of society.

All changes undergo a number of stages and face resistance. Learning has evolved over a long period of time with a limited number of mediating artefacts ranging from painting and pen and paper to the computers and ICT used in Swedish schools today. The introduction of new mediating artefacts through remote teaching might challenge traditional learning, as several school leaders pointed out, and might open up new spaces for school development (c.f. Bock and Probst, 2016). However, if used in ways that are similar to traditional teaching, the new mediating artefacts might enforce the reproduction of traditional-subject culture (c.f. Player-Koro, 2013).

It is the combination of new forms of teaching and new artefacts that opens the space for potential development in rural schools. In a recent interview-study from Finland, rural Finnish remote teachers stated that in remote schools, the cultural-discursive and social-political contexts are connected with arrangements surrounding education (Hilli, 2018).

Conclusion

Furthermore, while remote teaching is perceived as a necessity for the survival and development of rural schools, research is needed in a number of other areas. One area concerns how remote teaching, as a new educational form, can become an integral part of the contemporary rural school and society. Remote teaching may provide a novel closeness between teacher and pupil and new possibilities for scaffolding, but it will require new teaching strategies and the social and political will to change. However, the pedagogical issues accompanying the introduction of remote education—both remote teaching and distance teaching—need further research, and the Covid-19 pandemic has shown that research and development in remote teaching is more pressing than ever.

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