

Exploring Student Perceptions of K-12 Synchronous Remote Education

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Despite increased interest in synchronous remote K-12 education, there is limited research on how students perceive such education. This article explores student perceptions of remote education, tutor support, social presence, learning and satisfaction. We developed a survey, and after distributing it and analyzing the results, the survey was offered to practitioners as a formative assessment tool. The findings showed that students were slightly positive toward synchronous remote education. Key factors that correlated with student perceptions of social presence, learning and satisfaction were positive perceptions of tutors and, to some extent, being enrolled in a smaller class. Some students appreciated the flexibility and quality of remote education, although many experienced technical and communication challenges. Our findings suggest that it is not sufficient only to engage qualified teachers in their subject; there is also a need to consider the continuous development of teaching practices and how to support and use digital technologies in remote education.

Keywords: K-12, remote education, social presence, perceived learning, perceived satisfaction, tutoring, survey

INTRODUCTION

An OECD report states that distance education is a well-established way of offering education to students in rural and remote areas (OECD, 2018). The report highlights that such initiatives are critical to extending qualitative education to more remote places or where qualified teachers are lacking. However, distance education in rural and remote areas is wider than one educational mode (*ibid.*). In Sweden, synchronous remote education arose to ensure equal access to education in rural areas with shortages of qualified teachers in specific subjects. Sweden adopts a form of remote education where a class receives online synchronous instruction at school from a remote teacher or the teacher instructs co-located students and students in rural/remote classroom(s) simultaneously (Lindfors & Pettersson, 2021; Stenman & Pettersson, 2020). The Swedish school law stipulates designation of an on-site tutor to assist the students. The students interact with peers and the remote teacher through video conference systems, learning management platforms and other online resources. There are no regulations concerning qualifications to be a tutor, however, the tutor needs to be a person who is suitable for the purpose (Swedish National Agency for Education, 2021). While there are rural and remote education in other parts of the world, such as China (e.g., Yang, Yu & Chen, 2019) and Canada, one difference between Canadian and Chinese remote education and Swedish, is that the students may shift between studying at school and from home (LaBonte & Barbour, 2018). In the US, K-12 students enrolled in distance education courses through state virtual schools are usually assigned tutors that are present in the classroom (Zhang & Lin, 2020). In Swedish K-12 education, every tenth school leader stated that they had organized remote education for their students during the spring term in 2018 (Swedish National Agency for Education, 2019). Even though remote education seems to be an internationally needed format, that is becoming increasingly common, aspects related to rural schools and synchronous remote education have received little attention from researchers and educational authorities (Bæck, 2016; Stark & From, 2020).

, For example, while remote education has been suggested to overcome geographical hindrances in rural areas, such areas are often not prioritized for high-speed internet access (Salemink et al., 2017). In addition, as-brought forward by Pettersson and Hjelm (2020) the remote teacher has limited insight into the student's day-to-day life in school, for example, if something has happened before the lesson. Here the tutor has an important role in showing empathy as the remote teacher by not "being there" might become an obstacle.

This article explores student perceptions of synchronous remote education, tutors, social presence, learning and satisfaction. Informed of this aim, we raised the following research questions:

- RQ 1. How do students perceive tutor support, social presence, learning and satisfaction in remote education and which correlations can be found?
- RQ 2. Which benefits and challenges do students perceive with remote education?

Literature Review

Connectivity in synchronous and co-located remote education often relies on interaction: teacher-student, tutor-student, or student-to-student (Xiao, 2017). While co-located, students may easily interact with peers in their classroom; the online setting makes it more difficult for them to develop community and social connectedness (Oliphant & Branch-Mueller, 2016). Subtle signals and non-verbal cues may be lost online, yet they may affect how the teacher or peers responds and how the student perceives the online instruction and the social presence (Marks & Ogden, 2017).

Social presence is a well-established concept when planning, executing and evaluating distance education in K-12 (Moore et al., 2017; Rehn et al., 2018; Whiteside, 2015) and higher education settings (Horzum, 2017; Richardson et al., 2017). One of the key challenges when students and teachers are not co-located is to instil a sense of social presence. According to Garrison and Akyol (2013), social presence is a prerequisite to forming productive relationships. It is beneficial if the learning climate promotes a sense of belonging, open communication, mutual support, contributions of ideas, and peer-to-peer collaboration (ibid.). Social presence is defined as the degree to which individuals are perceived as ‘real’ people in online settings (Gunawardena, 1995). Other influential definitions of social presence include “the effectiveness and impact of person-to-person telecommunications” (Short et al., 1976, p. vi) and the “degree of salience of the other person in a mediated communication and the consequent salience of their interpersonal interactions” (Short et al., 1976, p. 65). In addition, there are different suggestions on how to study social presence, ranging from self-reports, e.g., surveys, to behavioral indicators, e.g., content analysis (Lim & Richardson, 2016). In recent years, the most common measurement has been the social presence element within the Community of Inquiry (CoI) instrument (Arbaugh et al., 2008). It measures three categories of social presence: affective expression, open communication, and group cohesion (Rourke et al., 2007; Swan, Garrison & Richardson, 2009).

Factors affecting social presence include participants' ability and willingness to direct their learning, available technology types, time availability, and course content depth (Joksimović et al., 2015). Students who were invested in online activities also reported higher social presence (Poquet et al., 2018). Social presence is strongly linked to cognitive presence, with mutual influences (Rolim et al., 2019; Stranach, 2017; Turula, 2017). Joksimović et al. (2015) found that teaching presence moderated the association between social presence and final grade, indicating that teachers significantly impact the development of social presence by designing courses and activities that increase the level of meaningful interaction.

Social presence is related to positive learning outcomes (Doo & Bonk, 2020; Molinillo et al., 2018). Social presence is related to retention (Liu, Gomez, & Yen, 2009), participation in online discussions (Swan & Shih, 2005), test results (Hostetter & Busch, 2013), grades (Joksimović et al., 2015; Liu, Gomez, & Yen, 2009) and satisfaction (Gunawardena & Zittle, 1997; Richardson & Swan, 2003; Richardson et al., 2017; Swan & Shih, 2005). There is limited research on remote and distance education in the K-12 setting. In a study on high school students' social presence, there was a statistically significant improvement for students in blended learning courses compared to distance education courses, although there were no differences in perceived learning (Harrell & Wendt, 2019). Hilli and Åkerfeldt (2020) found that upper secondary teachers promoted social presence in remote education through student-student interaction by using methods such as mind maps, discussions, and peer feedback. As noted in the introduction, some countries assign tutors to support students. It has been found that students with local face-to-face tutors were more likely to have higher pass rates (Roblyer et al., 2008), and the effect was especially beneficial for students who struggled with their courses or were frustrated (de la Varre et al., 2011). The presence of tutors also positively predicted students' self-regulated learning (Zhang & Lin, 2021). Åkerfeldt et al. (2022) reported that teacher groups developed their distance education competence by reflecting on and testing different ways to communicate synchronously and asynchronously and by teaching online.

METHOD

Participants

The presented study was part of the research and development (R&D) program *Digital learning environments - equal education through remote and distance teaching* (2019–2022). The R&D program was led by the Swedish non-profit organization Ifous. Eight municipalities in Sweden and

Finland participated in the program. About 65 participants from fifteen different units and schools (including K-12 and adult education) participated. Four researchers (three authors of this article) were involved in the program. The overarching aim of the R&D program was to find ways and develop methods to use digital learning resources and create and enhance equal education opportunities in rural areas.

During the program, the participants focused on challenges in their practice. One of these challenges was how to enable a sense of social presence, develop rich communication between students in group discussions, and strengthen the communication between teachers and students. Twice each year, the participants were invited to participate in a two-day seminar to discuss and share ideas and experiences. Twelve process leaders met regularly between the seminars to discuss their work and get input from the researchers (see Hilli & Åkerfeldt, 2020). Webinars and literature seminars were arranged, and supportive material was developed, such as a guide on how to work with and develop social presence.

Purposive sampling (Bryman, 2016) was adopted. Teachers who offered remote education classes in three municipalities were invited to distribute the study. Teachers in 21 schools accepted. The survey was distributed between March and May 2021, along with a letter and instructions. We asked the teachers to relay a letter to the student's guardians. The letter contained information about the study, that data was anonymized, and that participating was optional. The guardians could tell their children not to participate. Students taking part in the study did not choose to study remotely. The main reason the schools organize remote education is the lack of qualified teachers in the subjects.

Procedure

The survey was distributed to 128 students (aged 11-15) who undertook remote classes. The response rate was 48% and was equally distributed between girls ($n=28$) and boys ($n=34$). The students were in grade 5 ($n=4$), grade 6 ($n=18$), grade 7 ($n=13$), grade 8 ($n=13$) and grade 9 ($n=14$). Most respondents studied modern languages ($n=35$) and mother tongue ($n=17$), followed by science subjects ($n=7$) or other subjects ($n=3$). They were studying in a municipality in the south ($n=34$), in the north ($n=21$) or in the middle ($n=7$) of Sweden (see Table 1).

Table 1
Distribution Demographics

Municipality location	Subjects	Number of respondents/ schools
Northern Sweden	Modern languages, other subjects, mother tongue	21 respondents 3 schools
Mid Sweden	Science studies	7 respondents 3 schools
Southern Sweden	Modern languages, mother tongue	34 respondents 15 schools

The survey included two open questions on the benefits and challenges of remote education. The students submitted 37 benefits and 48 challenges in response to the open-ended questions (see Table 2). It can be noted that some students stated that they did not know or did not provide an answer, especially for benefits. A thematic analysis (Braun & Clarke, 2006; Nowell, 2017) was conducted to identify themes. The analysis of the answers was done independently by two of the authors to validate the analysis. After identifying the themes, they were clustered into nine areas (five areas with benefits and four with challenges). Some of the answers from the students contained several themes. The excerpt below is an example of an answer from a student which includes challenges that relate to the themes; support, communication, and technical issues: “Sometimes it can be harder to understand, and it is harder to get help from the teacher. The internet can also be slow, so you get thrown out of zoom, or the sound disappears, and the teacher’s screen freezes.”

Table 2
Overview of Answers to Open-Ended Questions

Category	Answers	Do not know	Nothing	No answer	Total
Benefits	37	9	4	11	62
Challenges	48	4	5	5	62

Materials

A survey was adapted primarily from the previously validated CoI survey and measures of perceived learning and satisfaction (Arbaugh et al., 2008; Swan et al., 2008; Lim & Richardson, 2021). The survey is to function both as a research tool and as a formative assessment tool that teachers and school leaders could use. Apart from background questions, the survey collects data on student perceptions of the benefits and challenges of remote education, tutor support, social presence, learning and satisfaction. Background questions included gender, grade, subject, the number of students in the class, where students study during remote sessions, and student experience of remote education.

A measure of tutor/adult support was included. Students were asked whether a tutor or adult was physically present during synchronous remote classes. If that was the case, students answered two items on the perceived support from the tutor/adult. When testing two items for reliability, calculating the Spearman-Brown coefficient is often preferred over Cronbach's alpha (Eisinga et al., 2012). A high level of reliability was achieved (Spearman-Brown = 0.92). For example, one item was: "My tutor/adult helps me when I have a need". All indicators in the survey were measured on a five-point ordinal scale ranging from strongly disagree to agree strongly.

Measures of open communication and group cohesion were adapted from the CoI survey (Arbaugh et al., 2008; Swan et al., 2008). Affective expression included indicators on whether the respondent got to know other course participants and whether they formed distinct impressions of some course participants. Since many of the respondents of this study were in the same class and already knew each other, the affective expression could not be used. The indicators were translated into Swedish and formulated more straightforwardly to be understood by K-12 students. Open communication included three items, i.e., and achieved a high level of reliability (Cronbach's alpha = 0.80). For example, one item was: "It feels good to ask questions during the remote lessons". Group cohesion included three items and achieved a high level of reliability (Cronbach's alpha = 0.81). For example, one item was: "Other students are interested in what I say during the remote lessons".

Measures of perceived learning and satisfaction were adapted from Lim and Richardson (2021). Perceived learning included three items and achieved a reasonable level of reliability (Cronbach's alpha = 0.68). For example, one item was: "I could tell others what I learn during the remote lessons". Perceived satisfaction included two items and achieved a high level of reliability (Spearman-Brown = 0.85). For example, one item was "I would recommend my friends to study remotely".

In addition to the above measures, two open-ended questions asked students what they perceived as benefits and challenges with remote lessons.

While the development of the survey was informed by theory, it was subsequently pre-tested for ecological validity with teachers. As a result of the pre-test, some questions were revised to adapt the language to the age of the respondents or to increase clarity. One such example was in the question of whether the students had seen the teacher in “real life”. The teachers pointed out that some students regard meeting the teacher when video conferencing applications were used.

Results

How do students perceive tutor support, social presence, learning and satisfaction in remote education and which correlations can be found?

Most students met their remote teacher in person ($n=54$, 87%). Further, many students had a tutor/adult in the room during remote classes ($n=38$, 61%), and a few were in the same room as the teacher ($n=5$, 8%). A few students were sometimes together with an adult/tutor ($n=4$, 7%). Some students were not co-located with a tutor/adult or teacher ($n=15$, 24%). The lack of a co-located tutor was surprising as the Swedish regulation stipulates that a tutor should be present on the premises where the student receives their remote education. A majority of students did not collaborate with their peers from other schools ($n=39$, 63%), while a substantial portion did engage in such interactions ($n=20$, 32%). Many students did not study with students from other schools ($n=39$, 63%), but a considerable number of students did ($n=20$, 32%). For some students, this was the first subject they had studied remotely ($n=21$, 34%), while others had studied remotely for several semesters ($n=19$, 31%). Most students were studying in the classroom ($n=40$, 65%), at home ($n=11$, 18%) or in a smaller room in the school ($n=7$, 11%) during remote classes. There were 7.2 students on average in each remote class ($SD=4.2$).

In Table 3, descriptive statistics for each item are presented. Notably, the students that had a tutor/adult present perceived that the tutor/adult provided help when they asked ($M=3.9$, $SD=0.9$) or had a need ($M=4.1$, $SD=0.8$). Several students felt they could tell others what they had learned in a remote lesson ($M=3.6$, $SD=1.1$). The students did not agree that they learnt more in remote lessons than in usual lessons ($M=2.4$, $SD=1.0$) and were hesitant to recommend their friends to study remotely ($M=2.7$, $SD=1.1$). The students were quite neutral when asked whether other students were interested in what they had to say during the remote lessons ($M=3.3$, $SD=0.9$). For most indicators, the mean was between neutral and agreed, suggesting slightly positive perceptions.

Table 3
Descriptive Statistics for the Items in the Survey

	<i>n</i>	Min.	Max.	M	SD
Tutor/adult support					
I get help to understand the subject when I ask a tutor/adult.	41	2	5	3.9	0.9
My tutor/adult helps me when I have a need.	41	2	5	4.1	0.8
Open communication					
It feels good to ask questions during the remote lessons.	62	2	5	3.6	1.0
It feels safe to discuss with other students at remote lessons.	62	1	5	3.6	1.1
It feels safe to talk in the remote lessons.	62	1	5	3.6	1.2
Group cohesion					
Everyone can say what they think during the remote lessons.	62	1	5	3.6	1.1
Other students are interested in what I say during the remote lessons.	62	1	5	3.3	0.9
We students collaborate well in the remote lessons.	62	1	5	3.7	0.9
Perceived learning					
I can tell others what I learn during the remote lessons.	62	1	5	3.6	1.1
I learn a lot in the remote lessons.	62	1	5	3.4	1.0
I learn more in remote lessons than in usual lessons.	62	1	5	2.4	1.0
Perceived satisfaction					
I am satisfied with remote teaching in the subject.	62	1	5	3.6	1.1
I would recommend my friends to study remotely.	62	1	5	2.7	1.1

In Table 4, a correlation matrix is presented and interpreted by drawing on Cohen (1988). No statistical differences could be identified when comparing girls and boys or for classes that included students from different schools. There were no significant differences when comparing different grades, except that students in higher grades had more experience with remote education and were more likely to have met their teacher, which could be expected. A weak but significant correlation suggested that students who met their teacher in person were less likely to study with students from other schools ($r = -.34$, $p < .01$). There was also no significant difference based on the long experience students had of remote education. Interestingly, smaller classes were associated with several correlations, i.e., improved open

communication ($r=-.47$, $p<.01$) and perceived learning ($r=-.40$, $p<.01$), and weak but significant correlations for group cohesion ($r=-.28$, $p<.05$) and perceived satisfaction ($r=-.26$, $p<.01$). Positive perceptions of tutoring were associated with open communication ($r=.61$, $p<.01$), group cohesion ($r=.67$, $p<.01$), perceived learning ($r=.53$, $p<.01$) and perceived satisfaction ($r=.54$, $p<.01$). There were moderate to strong correlations between open communication, group cohesion, perceived learning, and perceived satisfaction (between $r=.54$ and $r=.75$, $p<.01$).

Table 4
Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11
1. Gender	1.0										
2. Grade	.05	1.0									
3. Students other schools	.05	-.20	1.0								
4. Number of students	.09	.03	.13	1.0							
5. Experience remote ed.	.11	.45**	.23	.04	1.0						
6. Met the teacher in person	-.06	.34**	-.34**	-.15	.44	1.0					
7. Perceptions of tutor	-.00	-.05	.23	-.10	.15	-.06	1.0				
8. Open communication	-.25	.03	-.11	-.47**	.28	-.07	.61**	1.0			
9. Group cohesion	-.19	-.24	.06	-.28*	.02	-.13	.67**	.71**	1.0		
10. Perceived learning	-.20	-.13	-.07	-.40**	.15	.04	.53**	.55**	.57**	1.0	
11. Perceived satisfaction	-.12	-.01	-.10	-.26**	.17	-.03	.54**	.54**	.56**	.75**	1.0

*. Correlation is significant at the .05 level (2-tailed).

**. Correlation is significant at the .01 level (2-tailed).

Which benefits and challenges do students perceive with remote education?

Perceived Benefits

Based on qualitative thematic coding, perceived benefits and challenges relating to remote education were identified. In Table 5, the perceived benefits of remote education are presented. Results revealed that student responses were often related to flexibility and the Covid-19 pandemic ($n=14$).

The survey was distributed during the pandemic, and some students mentioned the benefits of attending class despite feeling sick, as well as the only way to attend class. The students expressed several benefits of remote education, such as high quality ($n=12$).

Further, some students mentioned the opportunity to have a teacher that is qualified in the subject ($n=9$). A few students expressed that they perceived no differences between studying remotely and in class. These students had studied remotely for more than one semester or several years.

Table 5
Perceived Benefits of Remote Education

Theme	<i>n</i>	Examples
Covid-19 related Flexibility	14	Attend class despite feeling sick
		It is good during these Covid-times
		Not having to get up so early to get to school...
		You are at home
Improved quality related to learning, communication, structure, and subject	12	It is the only option
		you get a little more responsibility
		... it feels easy to learn through it
		... easier to listen
Qualified teacher	9	Send a question to the teacher
		We have a teacher in the subject. Otherwise, you might not have that
		That we have qualified teachers.
Technical benefits	6	Turn off the microphone
		Use the computer and understand more about computers
Same quality as lesson in-person	3	Write in the chat
		Basically, it is like a regular lesson
		It works as good as a regular lesson

Perceived Challenges

Technical issues, communication and support from the teachers were the most frequent challenges that the students addressed (see Table 6). Technical issues were often about problems with the network connection or sound issues ($n=25$). Communication-related to students not feeling comfortable asking questions or talking in a video conference meeting ($n=15$).

Sometimes it was hard to hear what was being said, which can relate to technical and communication issues. Regarding support, students expressed challenges in getting hold of the teacher and getting help from the teacher when studying remotely ($n=8$). There were a few students that mentioned maintaining focus as a challenge when studying remotely. Students ($n=23$) studying remotely for a longer time (several years or several semesters) were less focused on technical issues. Instead, these students reported challenges relating to communication and lack of support from the teacher.

Table 6
Perceived Challenges of Remote Education

Theme	<i>n</i>	Examples
Technical issues	25	Trouble with the internet...
		Slow connection
		The sound is not always the best...
		We have no applications that support remote education...
Communication	15	Difficulties talking..
		To understand what the teacher is saying
		Sometimes it is hard to explain things if it is hard to show
Support	8	Get in contact with the teacher
		Help that is required when working with a task is hard to get, not the same as in the classroom
Other (social, structure, learning, subject related)	4	... if you need help and are in a group meeting in teams. Lack of support from the teacher
		Some subjects can be difficult to study remotely.
		Hard to focus when working with the computer... can be distracting
		You must work with the computer

DISCUSSION

The first research question addressed how students perceive tutor support, social presence, learning and satisfaction in remote education and which correlations can be found. Our results revealed that, overall, students were slightly positive toward synchronous remote K-12 education. Positive perceptions of tutoring correlated with perceived social presence (open communication and group cohesion), learning, and satisfaction. This underlines the importance of tutors in remote education, which is also supported by research in the US (Roblyer et al., 2008; de la Varre et al., 2011; Zhang & Lin, 2021). The results also revealed that being enrolled on a smaller

class was weakly to moderately correlated with perceived open communication, group cohesion, learning, and satisfaction, which also were strongly inter-correlated. A previous study found that the act of enrolling in a particular course can have a direct effect on social presence and indirectly affect student learning (Law et al., 2019). However, in K-12 education, remote synchronous classes are not optional, which means that some students might not have an alternative. It is not surprising if the perceptions of K-12 students might be less positive than adults who have voluntarily enrolled in, for example, distance education.

Student perception of and satisfaction with synchronous remote education can also be understood in the light of their expectations (Oliver, 2014). One aspect of this is that students who had studied remotely longer were less focused on the technical issues than students who had studied a shorter time. This can be as students with long experience have grown accustomed to the limitations and come to accept them and might have gained increased digital competence in troubleshooting technical problems, such as audio or network issues. As previously mentioned, rural areas may often lag behind in developing digital infrastructure (Salemink et al., 2017). Schools may also often be stuck in old systems and face restrictions that impede investments (Hylén & Karlén, 2019). However, technology breakdown can be due to a range of reasons, such as poor-quality equipment, limited access, usability or limited digital skills and have a negative impact on online learning (Bond et al., 2021). However, with functioning digital technologies, the challenge of the online mode still exists. Here our findings reveal that students, on the one hand, were slightly positive and mostly perceived well-functioning social presence but, on the other hand, the students were hesitant to recommend synchronous remote education to a friend. Our results regarding the students' slightly positive answers towards a well-functioning social presence is an initial yet important result (Richardson & Swan, 2003; Joksimović et al., 2015; Richardson et al., 2017). The result means that the teachers may have found a successful way to increase the sense of social presence when teaching remotely, which in turn may influence student engagement and learning (Doo & Bonk, 2020; Molinillo et al., 2018).

The second research question addressed which benefits and challenges students perceived with remote education. We found that the perceived benefits of remote education were flexibility, quality and having access to a certified teacher who is qualified in a specific field. The students reported more challenges than benefits, and there were also a higher number of students that did not report any benefits. We found that the students reported negative effects of remote education in terms of low bandwidth and poor audio related to hardware and infrastructure limits. Some students reported a decrease in focus when looking at a screen for a longer time. Based on our

findings, stakeholders that organize synchronous remote education need to recognize that students both need high-quality technologies and that there need to be investments in teachers' continued professional development to support the development of effective online practices, which include supporting engagement and social presence online.

The survey used in this study was tested for ecological validity with teachers, and the reliability measures were good to strong. However, the instrument needs to be tested in other settings and with larger groups of students to be further validated. Future research could explore how teachers and school leaders could use the survey to support evaluating and developing remote education.

This article is based on a small number of students in specific Swedish contexts. To get further insights into synchronous remote K-12 education, future research could conduct large-scale and more in-depth qualitative studies in different contexts. It should also be put forth that the survey was distributed during the Covid-19 pandemic, during which some Swedish schools were fully or partly shut down. This might have affected some of the answers from the students, underlining the importance of conducting further research on remote K-12 education. However, as noted above, we addressed this issue by asking the students to focus on a subject discipline that they had studied remotely also before the pandemic, i.e., primarily modern languages and mother tongue but also science subjects. The study was part of an R&D program where teachers were engaged. The effect the R&D program has had on remote teaching has not been investigated in this study, even though it might have impacted the design of the remote lessons. During the program, participants focused on social presence and developing rich communication between students in group discussions and strengthening the communication between teachers and students.

CONCLUSIONS

The findings of this article suggest that it is not sufficient to only engage teachers who are qualified in their subject; there is also a need to consider the continuous development of teaching practices in remote settings and the support and use of digital technologies in synchronous remote education. Even though the students were satisfied with their tutors, we believe that the collaboration between the remote teacher and the tutor could be devel-

oped and investigated further. Further, it is important to develop methods to increase social presence and engagement, which in turn lead to positive learning outcomes (Doo & Bonk, 2020; Molinillo et al., 2018). To sum up, challenges include directing finances to infrastructural development, high-quality, usable technologies and supporting professional development. All aspects are needed to secure high-quality education in remote education. When these issues are resolved, we believe that the benefits of synchronous remote K-12 education will be more prominent.

DECLARATIONS

The authors declare no conflicts of interest associated with this study.

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