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Finnish upper secondary school students' experiences with online courses

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Abstract

During 2020, online education has become an alternative way of studying in primary and secondary education in situations in which ordinary contact teaching is not possible. In our study, we investigated upper secondary students' experiences of virtual online courses in 2018–2019 using a questionnaire and open-ended questions. Students participated in virtual online courses during which they met the teacher and peer students regularly in online sessions and completed individual homework assignments. A private company provided a digital platform, a conferencing tool, and other digital applications. Teachers could tailor the environment and links to the contents and to other digital applications. Students were from one school (Group 1, N=53) and they studied all courses online while their school was being renovated, and Group 2 (N=109) were students studying a subject (mainly language) which was not taught at their own school. The experiences of students in both groups were mainly positive. Students were especially satisfied with the course content and organisation. The lowest scores were in interaction and the support provided for study skills.

Keywords: online education; upper secondary; student experience; digital technology

Introduction

Online education is often an alternative to traditional face-to-face learning and teaching, although it has become more common for ordinary education in some countries, such as in the United States (DiPietro, Ferdig, Black, and Presto, 2010; Kerr, 2011; Moore-Adams, Jones, and Cohen, 2016) and Australia (e.g., Ames, Harris, Dargusch, and Bloomfield, 2020). Because of COVID-19, in many more countries online education has temporarily substituted or complemented contact teaching even in basic and secondary education. In general, online teaching offers an opportunity for exceptional conditions, such as preparing for earthquakes, to ensure that students have options for learning and resilience of education (Baytiyeh, 2018) and especially as the COVID-19 pandemic closed schools in many countries during 2020. For instance, Finnish schools were closed on 18 March 2020 till the end of May, and all education was moved online. In autumn 2020, online education continued in turn with face-to-face education.

In addition to these exceptional situations, some current problems in societal structures demand new educational solutions. In many countries, including Finland, the diminishing birth rate as well as urbanisation and the related concentration of the population to a few major cities could radically reduce the number of students even in middle-sized cities. It is estimated that from the 2030s on, the number of upper secondary students in Finland will diminish and vary profoundly from one year to the next (Aro, Aro, and Mäkelä, 2020). To ensure the supply and quality of teaching, decisions by local governments (which in Finland are responsible for the provision of school education) have to start using new solutions rather than relying on traditional schooling with contact teaching, one teacher and a fixed group of students in a classroom. There are simply not enough students to fill classrooms. One of the new solutions is online education: organising teaching by combining small groups or even individual students in a virtual classroom, often across municipal borders.

One problem in research concerning online education is the rapid technological development. Online education has changed radically in the last few years as digital technology has become easier and faster to use, and especially because the interaction through conferencing tools has become possible. Previous studies based on asynchronous interaction or the use of individual applications instead of collaborative digital tools and personal devices with video-conferencing applications, represent different and often limited, pedagogical opportunities (see e.g. the review about video-conferencing, Lawson, Comber, Gage, and Cullum-Hanshaw, 2010). Online learning environments might cause difficulties for students, especially if they are required to study independently with several applications online, even if they also have contact sessions (Kim, Lee, Leite, and Huggins-Manley, 2020).

Online education has been investigated extensively in higher education and in adult education. However, the results cannot be adopted as such to lower levels of education although there are often similar problems, such as missing interaction with peers and technical problems. Students at lower levels need support of all kinds in their studying, their self-regulation skills are less developed and they are still learning problem solving, project work or inquiry activities embedded in the learning activities. There is a gap in research concerning online studying in primary and secondary education in the Nordic context, and especially in Finland because online education was rare before the COVID-19 situation.

In this sense, this study in the Finnish context is a pioneer study. The aim here was to investigate Finnish upper secondary school students' experiences about online courses before the exceptional COVID-19 situation in two contexts and in this way, inform further research but also practitioners to improve online educational practices.

Previous studies about online learning and teaching

In what follows, we review previous research about online studying implemented in lower and upper secondary levels. We focused on research investigating online school education settings (not including e.g., such as blended learning, hobbies), in which students had some teacher interaction and intervention (e.g., not studying alone in a virtual course) as well as peer collaboration.

First, as well as considering specific characteristics of online education, online teaching should be based on pedagogical practices, which support effective and meaningful learning, such as authenticity, collaboration with peers, support for metacognition, engagement and task-related motivation (Herrington, Reeves and Oliver, 2014; Järvelä, Renninger, 2014; Järvelä, Järvenoja, and Veermans, 2008; Rajala, Martin and Kumpulainen, 2016). The challenge for educators is how to implement these characteristics in the novel situations of online teaching.

Online teaching is a novel practice for most teachers, and it requires specific knowledge of pedagogy, content, and technology, compared to situations in which the teacher meets students face-to-face, as Moore-Adams *et al.* (2016) state in their review of K-12 teacher preparation for online teaching. The authors emphasised the need to improve teachers' competence to develop feelings of a virtual (learning) community and social presence, which the authors regarded as the primary challenges in online teaching. Similarly Ames *et al.* (2020) suggested more distance education specific professional development for teachers so that they know how to support diverse learners online. Baytiyeh (2018) proposed that maintaining live interaction among students, including competence to solve conflicts, is an essential teacher task, as is guiding students through the online learning materials and responding to questions. Kerr (2011) emphasised the teacher's task in giving feedback, scaffolding and supporting students, but also in organising communication with students and between students.

Online learning is also a new practice for students, and just as teachers have challenges in teaching online, so do students. Studies on middle and secondary school students studying online have focused on several areas of contents. For example, Denis (2016) investigated video-conferencing to help distance music education with students from the seventh and eighth grades. Chin-Hsi, Zheng, and Zhang, (2017) reported about high school students' language courses and the interactions between students, teachers, peers and learning content. In their study about middle and high school students learning languages, Lin, Zhang, and Zheng (2017) investigated learning strategies among middle and upper secondary students. They found that learning strategies were the only variable that predicted students' satisfaction, perceived progress, and final grades, not motivation or technology. In addition, they found that learner-instructor and learner-content interaction had positive effects on satisfaction, and learner-content interaction was the only one, which had a positive effect on learning progress.

These findings indicate that online learning should be investigated from a pedagogical point of view, not only as a new technological innovation.

Studies that focused on students' experiences produced interesting results. In general, students missed interaction with their teachers or peers (Harvey, Greer, Basham, and Hu, 2014; Longjohn, Ogwurumba, and Ajala, 2020; KARVI, 2020) but many students were satisfied with online learning. For example, middle school students had positive experiences of online education, and most participants enjoyed taking online classes, they were keeping up with the classwork, and they received enough help and support from their online teachers (Harvey *et al.*, 2014). One challenge for students and teachers alike (e.g., Ames *et al.*, 2020; Beck and Warren 2019; Moore-Adams *et al.*, 2016), was the digital technology needed for studying online. Many students had technical problems during online learning; e.g. missing good and reliable network connections or unfamiliar software (Denis, 2016; Longjohn *et al.*, 2020). Even though the use of digital technology is common among students, they have shortcomings in their digital competence, their competence is often overestimated, and there are major differences between students in competence and access (Hatlevik, and Christophersen, 2013; OECD, 2015). Kaarakainen, Kaarakainen, and Rinne (2018) investigated Finnish upper secondary students and found, first, that students' competence varied profoundly, and second, that in general, the level was not very high. It cannot be presumed that students manage the technical requirements and problems independently at home, although in the preliminary results from March – May 2020, students did not report problems in their digital competence (KARVI, 2020).

In online education, the digital infrastructure typically consists of several elements, such as a learning and working platform through which activities are organised (e.g., sharing the learning materials, sharing practical information, such as timetables, or returning home assignments); a video-conferencing tool for online meetings; various digital tools, e.g., for writing or making presentations, and other applications, such as games or specific educational applications (see Ames *et al.*, 2020; Hannum, Irvin, Banks, and Farmer, (2009). Video-conferencing (synchronous audio and video communication through computer or telephone networks between two or more sites) easily used with personal devices has been the important application for recent online education (Lawson *et al* 2010). Digital applications naturally have a range of affordances and the organisers of online studies choose the ones, which they regard as being pedagogically meaningful. This pedagogical design of digital infrastructure is essential; not all online teaching is carried out in the same way, just as is the situation with face-to-face teaching, and the teachers' role and competence in designing the course are essential (Lakkala, Iilomäki, Kosonen, 2010). The learning outcomes of online studying depend on several factors, among them the pedagogical setting and the digital infrastructure. Kivinen, Saikkonen, and Saikkonen (2016) emphasised that the usefulness of tools depends on how they are used in practice, and that they need regular revision to make the best use of the new technology. Kerr (2011) summarised the results of a successful online course: teachers and students maximally utilise the tools afforded to them.

Remote studies at upper secondary school in Finland

By the 1990s, the first research-based Finnish pioneer project was taking place, when a remote school in Lapland had virtual contact with a university teacher training school in Helsinki, aiming to create a

virtual lower secondary class (Salminen, 1997; Husu, 2000) but these teaching practices never became established, not even in rural and remote areas. One major reason restricting remote education is the legislation that requires basic education to be conducted face-to-face in a safe learning environment and during defined timetables to students of compulsory school age (17 years); although remote connections are allowed to be used if the safe environment and defined timetable are followed (OPH, 2020). For this reason, online learning and teaching have been used with few students in primary and secondary education, and it has been to overcome an exceptional solution, e.g. for students with disabilities, mental health issues or living abroad.

One exception is teaching in the Sámi languages: since 2006, they have been taught virtually but with limited resources and sporadically (Aikio-Puoskari, 2007). For instance, one teacher has taught virtual Sámi languages' courses at the upper secondary level and during 2018–2020 within a project, Sámi languages have been offered in basic and upper secondary education. In 2019, 63 students from pre-school to upper secondary level participated in it (Saamelaiskäräjät, 2019.). One essential resource for virtual studies is a specific e-school, which gives teaching in Sweden, Norway and Finland and enriches the limited Finnish resources.

In Finland, organisations providing remote or online education include a few networks of schools, educational institutions or commercial companies. In addition, some schools themselves organise occasional remote education to students who, e.g. study Islam or orthodox religion: students work independently but they get feedback or guidance from a teacher by email (J. Oksa, personal communication, October 26, 2020).

In 2017, a private company started to offer online courses to all upper secondary students, and this was a variation from the norm: it connected public and private commercial education, which had not previously been realised in Finland. Most of the courses were uncommon languages in Finnish schools or advanced level language courses, enriching the course offering at the school (similarly as Hannum *et al.*, 2009 described in their study). The digital infrastructure consisted of novel technologies, including conferencing tools, but the setting was organised as a classroom: there was a teacher, peer students, lessons, and course content following the national curriculum. The aim of this study is to investigate the experiences of upper secondary students participating in these online courses during 2018 and 2019.

Research questions:

How did upper secondary level students experience online studying?

How did student groups differ in their perceptions of online studying?

Methods

The study was conducted within a larger teacher education development project in 2017–2019, funded by the Ministry of Education and Culture in Finland (Lavonen, Mahlamäki-Kultanen, Vahtivuori-Hänninen and Mikkola, 2020). The sub-project for this study aimed to support both teacher students and in-service teachers to develop their competence in virtual teaching.

Setting and participants

In Finnish upper secondary schools, study is organised in courses, some of which are obligatory, and a student must take at least 44 courses. Each course lasts six to seven weeks and consists of 28 hours, usually divided into 75-minute lessons.

The private company offered and organised the online courses, which were called Digiclassess. The company employed fully qualified teachers, and their teaching experience varied from being newcomers to those with a long teaching background.

The online learning environment consisted of the following elements:

- A digital platform for organising the courses and sharing materials. This was created and provided by the company. Teachers tailored the course areas for their needs and added the content they regarded as being necessary.
- A conferencing tool for classroom sessions. This was a tailored version of Blackboard Collaborate, provided by the company. It provided breakout rooms for managing online group work other than ordinary functionalities (microphone, camera, chat).
- Digital study books provided by the company.

In addition, teachers used other tools and applications for motivation, brainstorming, reflection, presentations or online dictionaries. These were usually cloud services, which the teacher had linked to the basic applications. Teachers also used some mobile applications, like WhatsApp to maintain contact with the students.

The study consisted of two settings:

In the first setting, a school ordered online courses for students during the renovation of their school building. The school is located in southern Finland. During March 2018, the courses were moved online, students were given assignments and they worked alone without contact with their peers. From August 2018, besides studying alone, students were offered the opportunity to study in a virtual class with a teacher (and these students participated in this study). The first group of students (Group 1) participated in 16 obligatory and voluntary courses, such as Swedish, Mathematics, Geography, Finnish, Biology, English and Psychology. The data were collected in autumn 2018. Between two and 11 students per course completed the questionnaire (mean 3.3). 67 students finalised the course and 53 answered the questionnaire (79.1%).

In the second setting, students studied at their own schools, located anywhere in Finland, often in small schools in rural areas. In addition to ordinary courses in their own school, they chose some voluntary online courses, which then were part of their certificate. These students did not know each other, and they only met online. Students chose the courses themselves, but usually a teacher, study advisor or the school principal informed students or suggested the course. The local authorities paid for the courses. Most of the courses were language courses. (In Finland, students are free to study a range of languages, but English is the most popular and it is often difficult to get enough students to form a group

for languages such as German, French, and Russian, not to mention less-common languages like Japanese or Chinese.) The second group of students (Group 2) studied mainly languages; all but one course were language courses (Russian, German, Spanish, French, and English). The only exception was Islam. The data were collected from 15 courses during autumn 2018–2019. The number of students who answered the questionnaire per course varied from two to 16; the mean of students was 7.8. Altogether 120 students finalised the course and 109 answered the questionnaire (90.8%)

Online studying was a new practice for both groups, most of whom were female. Table 1 describes the background information of the students. In Group 1, it is notable that for gender so many chose “other”. This might indicate that they were reluctant to answer this question.

Table 1. Participants in the study

	Group 1 (N=53)	Group 2 (N=109)
Male/female/other	11/31/11	23/84/2
Age, min. / max. / mean	16/19/17.2	16/19/16.7

Instruments and procedure

To investigate students’ experiences, we created a questionnaire with six background questions (gender, age, name of the school, location, course, where they got information about the course) and 31 statements concerning online studying. For the statements, we used a 5-point Likert scale in which 1=Totally disagree ... 5=Totally agree. The statements focused on the challenges of studying, organisation of the course, workload, use of digital technology, students’ own activity in the online course, students’ collaboration, and support for acquiring study skills. The topics in the questionnaire were based on the research findings described above, and in creating the questions, we wanted to emphasise relevant pedagogical issues but for which previous research has been shown to be problematic in online education. In addition, there were three open questions about the positive and disturbing issues and about recommending the course to others. The questionnaire was revised after Group 1 had responded. The questions concerning the problems and difficulties of digital technology were not useful because students reported low means in questions concerning technical difficulties. For example, the mean was 1.5 in response to the statement “I had problems with the microphone”, and the highest mean in the statement “Technical problems disturbed my studies” was 2.7. For the questionnaire used with Group 2, we created six statements concerning meaningful use of digital technology. The answers are reported separately below. In addition, both groups were asked if they had received enough help to solve technical problems.

The data were collected at the end of the course. Students were provided with a link to an electronic questionnaire, which they filled in during the last lesson, guided by the teacher. Students participated voluntarily in the study and they could also fill in the questionnaire without granting permission to use it

in the research that has led to this paper. In this case, the responses were used only to give feedback to the teacher. In Group 1, all students granted permission; in Group 2 eight students did not do so.

We analysed the statistical data using IBM SPSS version 25. To identify the factors about online studying, we analysed the data using an explorative Varimax factor analysis. To find out if the opinions about online studying differed between the groups, we analysed the factor scores with Kruskal-Wallis nonparametric analyses of variance.

We analysed students' responses to two open questions using data-driven thematic analysis (Braun and Clarke 2006) and quantification of data using Atlas.ti software version 8.4.20. The answers were segmented into quotations, each of which represented a separate idea describing positive or successful and challenging or disturbing features of the course. In all, 368 quotations were selected and categorised from the data, of which 245 were positive and 123 negative. In the final analysis, we used the main content categories mentioned by the students to categorise both positive and negative features: Way of studying, Teaching practices, Benefits / Challenges, Sense of community, and Use of digital tools. The final categories were constructed iteratively by moving back and forth through the data set, the coded quotations, and the categories produced, combining categories or defining new ones based on the increased understanding of the data (Braun and Clarke, 2006). The second author carried out the initial analysis, which was then examined by both authors, discussing disagreements and making changes if needed. We performed a chi-square test of independence to examine the statistical significance of the difference between the two study groups in their course evaluations.

The answers to the third question, "Would you recommend studying in a Digiclass to others" were classified into four groups:

- Yes. Examples: "Yes, because it provides an opportunity to study subjects, which my own school is unable to teach" and "Yes, it is a much better alternative to the totally independent studying, which we had to do before the Digiclass alternative" (a student from Group 1, pointing to studying during the renovation).
- Conditionally. Examples: "Maybe" and, "If there is interest enough, yes. In the Digiclass you need a lot of self-study and it has to be done in addition to ordinary upper secondary studying, that means it can be quite hard. But if there is enough interest and time then absolutely yes!"
- No. Examples: "It was not a very pleasant experience to me, so no." and "No"
- No clear answer / no answer.

Results

Upper secondary students' experiences with online studying

To get an overview of students' experiences with online studying, we conducted a factor analysis on the statement answers to find the major content combinations. Explorative factor analysis was carried out for the 31 items in the questionnaire. The items loaded on six factors: Course structure and content,

Own activity, Study skills, Collaboration, Interaction and Workload. Three items were excluded because of their low loadings. The scales were formed as sum variables, using the 5-point Likert scale, as in the original statements. Scale example items and Cronbach's alphas are presented in Table 2. The reliability of the scales was considered to be good.

Table 2. Scales, reliability test and examples of items

Scale	Cronbach Alpha (number of items)	Example items
Course structure and content	.920 (11)	The course was well organised; Teacher's guidance was clear.
Own activity	.722 (3)	I mostly participated actively in working during the course; I was more active in the virtual class than in an ordinary class.
Study skills	.874 (5)	During the course, I learned to plan and organise my studying; With help of the course, I learned to plan my time use.
Collaboration	.741 (4)	During the lessons, I got the feeling of presence with the other students; Group and pair work was used in assignments in a meaningful way.
Interaction	.736 (3)	At the beginning of the course, the teacher helped us to learn to know each other; During the course, I got acquainted with other students.
Workload	.738 (2)	The workload expected during the course was appropriate; Doing the home assignments did not take too much time.

In general, students' experiences with the online courses were positive. The results indicate that the students were satisfied with all the basic elements of online learning: none of the means of the factors was under average (3), and the mean in the scale Course structure and content was 4.1 (SD = .704), which was quite high. Students' answers were also quite high in the Own activity and Collaboration scales. Factor Interaction had the lowest mean and it was about the average of the scale. Figure 1 shows the means of students' answers to each scale.

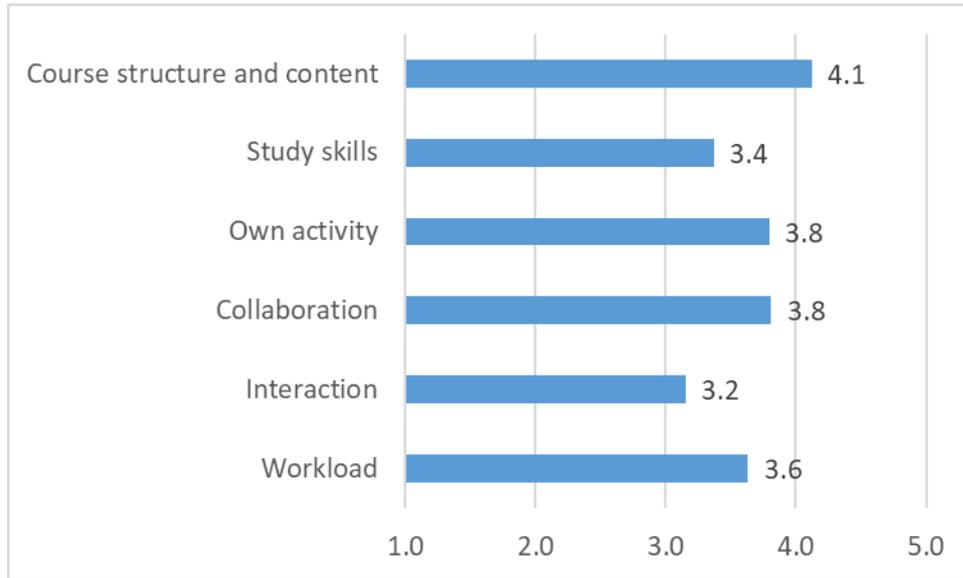


Figure 1. Means of the factors

As explained, for the questionnaire used for Group 2 we had created statements concerning how meaningful the digital technology was. Students' experiences were positive: the lowest mean was in statement "During the course, I learned new issues about using digital technology" (mean 3.5, SD 1.206; the highest mean was in the statement "Digital technology was used during the course in a meaningful way" (mean 4.2, SD 4.2.).

Student groups' differences in their perceptions about online studying

Students groups' differences in the statistical data

For analysing the differences of experiences between the two student groups, we used the Kruskal-Wallis nonparametric analysis of variance. Table 3. shows the means, standard deviations and statistically significant differences.

Table 3. Factors, means and standard deviations of the groups and statistical differences

Factor	Group 1		Group 2	
	Mean	SD	Mean	SD
Course structure and content	4.1	0.070	4.1	0.650
Study skills	3.5*	0.798	3.3	0.805
Own activity	4.1**	0.686	3.6	0.863
Collaboration	3.8	0.842	3.8	0.698
Interaction	3.1	0.853	3.2	0.916
Workload	3.2***	1.086	3.9	0.907

* p<.039, ** p<.001, ***p<.000

The groups differed in three factors: Workload, Own activity and Study skills. Students in Group 1 studied several subjects online, and they regarded the workload to be heavier than students in Group

2 did. Their assessments that they had been more active and that they had acquired study skills during the online course than during ordinary class were higher.

Both groups were asked if they received enough help to solve technical problems. Table 4 shows the means and standard deviations relating to the statement.

Table 4. Means and SDs of the statement about help for solving technical problems

Group	Mean	SD
Group 1	2.7	1.427
Group 2	4.0	1.036

There was a statistically significant difference between the groups ($p < .000$). Students in Group 1 assessed that they did not get enough help; the mean was under the average (3). Students in Group 2 were more satisfied, with the mean being 4.0. The result of Group 1 is interesting because they did not report problems with digital technology. Both groups used the same digital platform and tools, and both groups had used digital technology before, but Group 1 regarded the help as being insufficient.

Students' answers to open the questions about positive or impressive issues and challenging or disturbing issues

In addition to statistical data, we wanted to use answers to two open questions to clarify students' opinions.

Table 5 shows the positive or the issues that impressed the students in both groups. In Group 1, 40 (75.5%) students provided comments and in Group 2, 77 (70.6%) students.

Table 5. Positive and impressive issues

	95 comments	159 comments
Way of studying	46 / 48.4%: well-working and natural (10), easy (9), effective (6), pleasant (5), flexible (4), peaceful (4)	67 / 42.1%: relaxed (11), flexible (10), easy (9), pleasant (9), effective (9), peaceful (7), positive experience (6)
Teaching practices	31 / 32.6% good and encouraging teacher (12), good teaching methods (4), scaffolding and guidance (5), good tasks	50 / 31.4%: good and encouraging teacher (13), course in general (8), good teaching methods (7), scaffolding and guidance (5), timetable (5), good tasks (4)
Benefits	6 / 6.3%: possible to study (5)	30 / 18.9%: possible to study (15), new learning (8), courage (4), experience of way of studying (3)
Sense of community	10 / 10.5%: interaction (6), small groups (3), group tasks (1)	10 / 6.3%: interaction (7), group tasks (2), small groups (1)
Use of digital tools	2 / 2.1%: well-functioning (2)	2 / 1.3%: well-functioning (2)

Students' positive evaluations of the study experience included many comments, especially, about the way to study online generally and the quality of teaching, which the teacher offered. These are in line with the statistical results: The arrangements of the courses and the teachers' work were of high level. A chi-square test of independence showed that there was no statistically significant difference in the distribution of frequencies between the two student groups, $X^2(5, N = 254) = 8.8, p = .067$.

Table 6 shows the challenging or disturbing issues which the students in both groups commented on.

Table 6. Issues found to be challenging or disturbing by the groups

	36 comments	87 comments
Way of studying	1 / 2.8%: demands self-regulation (1)	25 / 28.7%: use of own time (20), demands self-regulation (5)
Teaching practices	3 / 8.3%: bad teaching methods (3)	17 / 19.5%: bad teaching methods (9), time (after school day) (8)
Challenges	13 / 36.1%: too much homework (10), challenging content (2), hard lessons (1)	17 / 19.5%: too fast progress (7), challenging content (6), hard lessons (4)
Sense of community	11 / 30.6%: group tasks (3), social distance (5), too dense interaction (3)	11 / 12.6%: group tasks (6), social distance (4), too dense interaction (1)
Digitechnology	8 / 22.2%: technical problems (4), the use of technology (4)	17 / 19.5%: technical problems (16), the use of technology (1)

The results in Table 6 show that the negative features mentioned were distributed evenly among all analysis categories, and students had far fewer negative comments than positive ones. Groups had differences, which they mentioned as negative issues: a chi-square test of independence showed that there was a statistically significant difference in the distribution of frequencies between the two student groups, $X^2(5, N = 123) = 17.6, p = .001$. Students in Group 2 also frequently mentioned Way of studying and Teaching practices in negative terms, whereas the students in Group 1 frequently commented negatively on Challenges of online studying and Sense of community. The challenge of a heavy workload is in line with the results of the questionnaire data, whereas the more negative results in Sense of community do not directly match with the results of the questionnaire data on Interaction.

In addition to these open questions, students were also asked if they would recommend online courses to other students. Table 7 shows the distribution of the answers.

Table 7. The distribution of students' answers about recommendation

Answer	Group 1 (N=51) N answers / %	Group 2 (N=109) N answers / %
Yes	23 / 45.1 %	64 / 58.7%
Conditionally	14 / 27.5%	35 / 32.1%
No	3 / 2.0%	2 / 1.8%
No clear answer / no answer	13 / 25.5 %	8 / 7.3%

Based on the results of the table above, students are willing to recommend online courses. They argued the recommendations e.g., by answering: "Yes, I recommend them because it is nice to study in a different way", and "I recommend them if there are no language teachers in own school" and "A special and experiential way of studying". Those students, who recommended conditionally, often wrote about the need to work hard and be responsible. One student in Group 1 answered that "Maybe I can recommend one course in a Digiclass but if all courses are in a Digiclass, it does not work", which describes the difficult situation during the schools' renovation.

Limitations of the study

The study focuses on a specific online education context, which was new and pioneering in the Finnish context. Therefore, the number of participants in both groups was small, which does not allow generalisations about all Finnish upper secondary students. The two groups represented two backgrounds for online studying: the students in the first group were "ordinary" upper secondary students who "had to" study either alone or online in Digiclass. In this sense, they were like other Finnish upper secondary students who suddenly had to change from ordinary face-to-face studying to online studying during March 2020, but they had the opportunity to choose how to study. However, the number of students per course was much smaller and the teacher could concentrate on every student. The second group differed even more from an ordinary upper secondary class. The students had voluntarily chosen extra language courses and they often studied after school day. Their interest and motivation was certainly high.

During the development project that formed the context for the study, the technical infrastructure was continuously improved, and the teachers were motivated to teach online, they improved their pedagogical practices collaboratively and they followed the results of the development project regularly. In this sense, the project setting was of a high-level, which might partly have influenced the students' positive experiences.

Discussion and conclusions

It is promising that in this study the upper secondary students' experiences with online studying were positive, similarly to results reported by Harvey *et al*, (2014). Students were especially satisfied in the ways the courses were organised. That factor consisted of issues that were the responsibility of both the private company and the teachers: the company provided the basic structure of the digital course

platform for the teachers, but then the teachers organised their course areas and the lessons based on the affordances of the platform and other resources. Furthermore, it was the teachers' responsibility how clearly and well they presented the content, explained the assignments and how well they guided students in using the digital tools. In this sense, teachers in all the courses investigated appeared to have taught at a high-level. The high mean of the responses also indicate that the affordances of digital tools worked well, and teachers were competent to use them. It is obvious that the pedagogical and technical infrastructure were planned in a way, which did not cause problems for students in participating or studying (as discussed in KARVI, 2020). The good planning and implementation of the pedagogical and technical infrastructure is something to learn from this study about online education in general.

The scores of interaction were at a lower level than the other factors in both groups. In ordinary contact education, students also get to know each other during the breaks, after lessons and while going to school. Naturally, the physical closeness during lessons helps them to become acquainted with each other. In a virtual course, the interaction does not appear spontaneously. Interaction and forming a sense of community is the challenge for teaching online, as also reported by Moore-Adams *et al.* (2016). In future online education solutions, the interaction needs to be emphasised, and there is a need to invent ways to support trustful interaction. This challenges research to investigate the virtual learning communities from interaction and sense of community points of view.

As mentioned by both student groups, studying online in a virtual class demands motivation and self-discipline. Lin *et al.* (2017) emphasised the importance of learning strategies. The results from this study indicated that students were quite satisfied with how their learning skills were promoted, but they also realised the challenges of online learning. In online pedagogy, the support of study skills could be integrated in several ways: a tool for planning learning activities, guidance about effective learning strategies, and templates for reflections or giving feedback to peers. These would also help teachers to support students' study skills in a conscious way.

Did this study bring something specifically Nordic that can be learnt? The results provide information about students' experiences during online education in general, but less so than about Nordic practices. In Nordic countries, the resources for conducting online education are better than in many other countries, and students have digital devices at home, the networks are in good condition, and teachers have university-level qualifications, and these are essential elements for online education. However, from this study, the Nordic countries could learn about the opportunities provided by online education, and arrange and support learning online. Students are willing and motivated. In our study, the motivation for studying online was clear: without this opportunity, they could not study the topics (as the students from various upper secondary schools) or they could only do it in a less effective way, very alone and independently (as the students were at a school being renovated). In addition, many students liked the independence and that it was possible to study at home.

Our study indicates that well designed and implemented online education, with continuous interaction with a teacher and peers, offers a good alternative to various new situations, such as exceptional

learning situations or remote schools with a diminishing number of students, as Hannum *et al.* (2009) described in their study about schools in rural areas in USA.

For further studies, the experiences of exceptional situation brought by the COVID-19 pandemic will certainly be reported in the near future. Among the first to be published are studies by Longjohn *et al.* (2020) and KARVI (2020). The change to online education had to do without extensive planning and preparations, which caused shortcomings in students' digital devices. The preliminary results (KARVI, 2020) showed that about half of the teachers estimated that their pedagogical and technological competence was sufficient; however, about three-quarters of teachers thought that their workload had increased markedly. Various stakeholders were worried about those students who had social or learning difficulties, and they emphasised the need for individual support, which was not realised well enough during online learning. About 20% of teachers had difficulties in being in online contact with students. Students had contradictory opinions about online learning: some of them estimated that they had been to their advantage, but some experienced serious difficulties, and about half of students missed school.

Investigation of good practices in online education will be needed, such as with design research methods, as suggested by Barbour (2010), and the pedagogical implications as suggested by Lin *et al.* (2017), especially with regard to guiding and scaffolding practices, which help to better support all kinds of students.

The results, together with previous research, help define recommendations for practitioners to improve their online educational practices. First, educational administration have to organize and maintain the technical infrastructure, including laptops and tablets but also the digital environment. Our results show that teachers need a well-structured digital environment for sharing materials and links to other services and applications, and for providing practical information, guidance and hints about online learning practices and assessment. These support students to concentrate on the learning aims instead of trying to find out what to do. Teachers should plan their teaching well in advance and focus on supporting students' interaction with each other with various collaborative digital tools, and being present themselves, also socially and not only for "sharing information". Teachers' social presence is especially important for those students who need teacher guidance and encouragement. In addition, teachers should know how to use digital tools appropriately, and to get the best out of them, as Kerr (2011) wrote, for motivating students and teaching them digital skills, such as digital collaboration or presentation in online meetings.

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