JÖNKÖPING UNIVERSITY
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Investigating teacher-student interaction problem using video conferencing tools and its' effect on Students' motivation in online education

A prototype for showing solution

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Certificate of Completion

This final thesis has been carried out at the School of Engineering at Jönköping University within informatics. The authors are responsible for the presented opinions, conclusions, and results.

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Scope: 30/30 hp (first-cycle education)
Date: 2022-11-12

Attestation of Authorship

We hereby declare that this submission is our work, best upon research that we have conducted.

To the best of our knowledge and belief, it contains no material published or written by another person – except where explicitly defined in the Acknowledgements or listed in the References and properly cited.

Nor does it contain any material of ours that, to a substantial extent, has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

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Abstract

The worldwide crisis, Covid-19 had a tremendous influence on education system. Many higher education systems forced to change into emergency online education while challenges and problems facing in online learning process affected not only students' population but also lots of teachers. Video conferencing tools as a technology which help users to have virtual meetings need to be effective and user friendly to provide the learning process with the same quality as face-to-face education. The goal of this study is researching about one of the important problems in online learning process which is teachers-students interaction. The primary goal of this research is to find the pain points in students-teachers interaction and students' motivation and our secondary goal is investigating the effects of this interaction on students' motivation and providing a solution in video conferencing tools to solve this issue using a prototype.

We are using mixed methodology which is including both quantitative and qualitative methodology. Collected data from existing studies and literature review, surveys, and interview are methods which are used.

Based on our research questions and the methodology for collecting data the following are studied: 1. The pain points and challenges regarding teachers' interaction and students' motivation in online learning 2. The effects of studentsteachers interaction in students' motivation 3. The features in video conferencing tools which can improve this interaction. All the findings present in a prototype using Figma with the goal of improving user experience of video conferencing tools for online learning purpose and solve existing problems. This prototype presented to students and teachers to get their feedbacks through an interview.

With the importance of online learning in the future education, more research is needed to explore other aspects which has effect on students' motivation and presenting other solution or features or using another research methods will bring more value to this subject.

Keywords: Interaction, User Experience (UX) design, Online learning, Online education, Video conferencing tools (VCT), Student motivation

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1 Introduction

The pandemic Covid-19 has expanded over the world with a tremendous influence on global society and forcing human to maintain social distance. It has impacted over 4.5 million individuals globally (WHO, 2020). The virus's impact may fall in various areas, including social, economic, tourism, and education. (Oliveira et al.,2021). The education system which is a decisive factor in a country's economic success was one of the areas which received significant impact. Because since Covid-19 has been declared a worldwide pandemic, many higher education institutions forced to switch to the emergency online education process which was very fast and unplanned (Oliveira et al., 2021). These changes can have significant effects on students' mental health.

According to a UNESCO study, the Covid-19 outbreak, and schools and universities closure greatly influence more than 90% of the entire global student population including children and young people in mid-April 2020, which had been decreased almost 67 percent in June 2020. (UNESCO, 2020).

The Covid-19 pandemic have not impacted only students, but it has also affected over 120 million teachers worldwide (Jena, 2020).

Switching to online education led to all lectures and learning processes carried out at home and changed into online meetings, and online courses. Although nearly all of the world's population use online meeting or video conferencing tools, but it became a way for learning, educating and teaching every day.

Remote education technologies can affect educational process both from the usage of video conferencing tools and its' challenges side and also from the other side, the experience that teachers and students will have during online and distance learning. (Oliveira et al., 2021).

In addition, teachers and students must have unique skills to use online learning assistance tools such as teleconferences or video conferencing tools such as WhatsApp, Zoom, and others.

Video conferencing is a technology that enables users in various areas to have virtual meetings without having to relocate or meet in the same place. This technology can be comfortable and practical and may save time without dealing with travel obstacles, allowing them to accomplish their work while remaining secure in their homes. Online learning may be supported by a variety of media, including Google

Classroom, Emodo, Schoology, Zoom, and many more and instant messaging services such as WhatsApp.

Many educational institutions have expressed worry about the effective use of technology in teaching and learning (Njiku et al., 2019). By resulting in significant investment in educational technology facilities in many nations, they are allowing for their integration into the teaching and learning process. Many schools have outfitted with technology that can be used in the classroom. These initiatives are designed to assist instructors in incorporating technology into their teaching and learning processes. Unfortunately, in certain situations, technology in education has failed to alter instructional methods. It has been observed that some teachers utilize technology solely for administrative purposes rather than for teaching and learning activities. Instructors have used technology to support classical teaching methods (Njiku et al., 2019).

From the other aspect, considering Human E-learning interaction is essential and communication besides technology also should be applied to online learning process. It is important that academic managers and people who are in charge of making decision during online education consider instructional communication features in the process. (Farhan & Razmak, 2019)

Regarding to (Farhan & Razmak, 2019), In a typical classroom, successful teaching is dependent on interaction and communication, both between teacher and student and among peers. Similarly, academics acknowledge contact as a necessary element in reaching the goals of e-learning systems. Interaction is crucial because communication practice as a learning process represents an important stage in information transfer and boosting student engagement in educational activities. The field of instructional technology demonstrates how advancements in technology have increased the number of media carriers capable of facilitating interactive processes in instructional communication (Farhan & Razmak, 2019). Early learning environment study focuses on topics such as instructors' experience, education level, certification status, content, and pedagogical competence. Furthermore, instructors are now expected to have increasingly complex technological abilities to support online learning settings; basic skills, such as clicking buttons to send an e-mail or uploading an image on a webpage, have been proven insufficient in e-learning environments. Navigating the online environment has required teachers to move from a resource of

information for students to be managers, coordinators, and facilitators of this knowledge.

Another important element in online education is students' motivation and as much as levels of motivation increased among students, they will put more effort in learning, and it will result in better performance from them. (Meeter et al., 2020) In figure1, Tinto model (1975) one of the factors confirm that lack of social interaction that students have with each other and with teachers during online education make lots of challenges for them to continue and stick with this process.

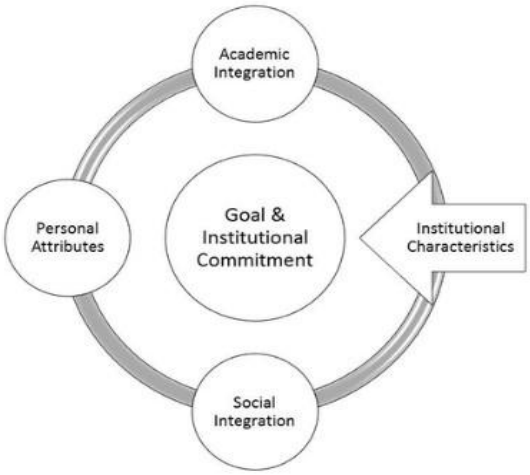

Figure 1: Tinto's Model of Student Retention

According to psychological research in the field of motivation needing the connectivity is a key point of motivation. So, it is obvious that students who have more interaction with other students or teachers reporting higher level of satisfaction and motivation. (Meeter et al., 2020)

1.1 Problem Statement

Online education and E-learning seems to be a new and usual way in the education system (Zou et al., 2020). In the survey Niche.com had done among undergraduate and graduate students in online classes, it is concluded that students believe that online classes are not as effective as face-to-face ones. As it is shown in figure 2 online education is not as satisfactory as campus-based education and students' motivation and active participation has descending process as online education continues (Meeter et al., 2020).

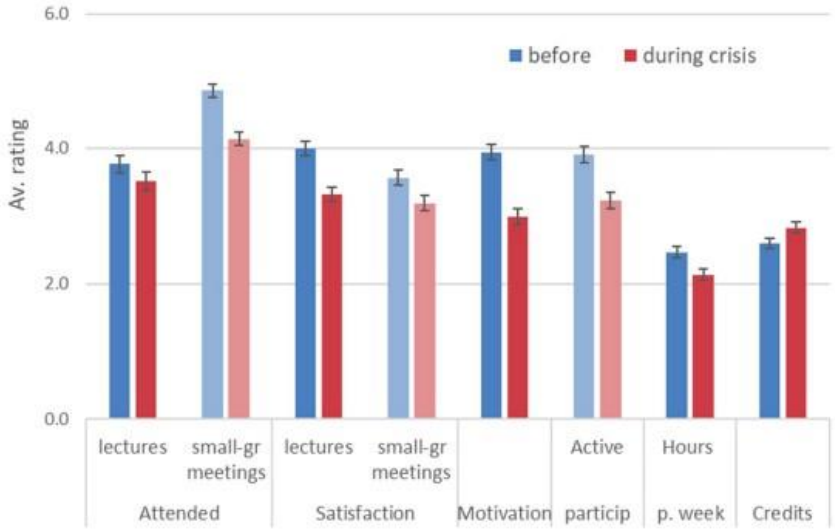

Figure 2: Comparing different aspects in learning process before and during COVID-19 crisis

So, it makes concerns and challenges for teachers and students (Zou et al., 2020). During pandemics and starting online education universities and institutions need to continue the study and find ways for having the best teachers and mentors in a new situation. So, studying in the field of teacher roles and optimizing teachers will be of big value.

According to Meeter et al., (2020) students were not satisfied with online education the same as campus-based education, and think their motivation decreased. One of the important things they have mentioned for this is the lower time which they spend for studying and less participation in lectures and small-group meetings. One of the challenges of video conferencing tools is to improve the interaction between teachers and students or even in some project works students with students and also the interaction of these two groups with video conferencing tools and content. (Correia, 2020)

There are a lot of studies on students' interaction with video conferencing tools but there is a need for stronger knowledge and views involving teachers and lecturers. It is very important that students and teachers interact with the e-learning system and use it more effectively so evaluation of their usages of this platform, advantages, and challenges is needed (Taat & Francis, 2019). According to König et al. (2020) there is also a need for research in the ways to educate teachers through making a better user experience and user interface and enhance their qualification and ability to handle the challenges with online learning platforms during the pandemic.

Video conferencing platforms such as Microsoft Teams and Zoom are not developed for e-learning purposes. There are lots of articles that are researching about advantages and disadvantages of common E-learning platforms but most of them have business users as a focus group, not higher education (Zou et al., 2020). The features which are used for business meetings are totally different with expected features which are needed in online learning. That's the reason we aim to focus on the group of students in higher education who are the big end-users of these platforms, especially during the Covid-19 pandemic.

Teachers also have the main role in technology engagement in education. Teachers' crucial role in the process of teaching and learning with technology and their opinion towards this technology and engagement makes it important to research about teachers' side in this process (Njiku et al., 2019). Teachers' willingness for accepting technology to make the online learning process easier and their motivation to interact with this technology can also be affected by opinions towards technology (Njiku et al., 2019).

With all the problems in this field that have been mentioned, We believe that teachers' interaction with VCT can strongly affect students and their motivation to continue studying with these platforms. There is a strong need for researching about the ways which can improve teachers' interaction and then enhance student motivation so compatibility with a new system will increase, and students can get the most use of the learning process.

1.2 Purpose and Research Questions

Following the problem statement, regarding teachers' pain points in interaction with video conferencing tools also low motivation from students, Consequently, our research is looking for filling this gap with presenting a prototype which show the feature for improving interaction of teachers and student motivation.

The connection of student-teachers' challenges with student motivation and exploring how solving this problem can increase student motivation is our main purpose in this study. This result can be achieved by finding the reasons they have a challenge with using these tools.

The results can be used to helps the designers and developers of these video conferencing tools to be aware of users' needs, especially on the teachers' side, and improve them to meet pedagogical needs. It can also decrease the effort that teachers

should put into supporting students in the online teaching process and help them to enhance student engagement and encourage them to participate in the lectures the same as before.

In order to fulfil the purpose of this research, four research Questions are defined: As we discussed, with increasing online education teachers face with challenges regarding interaction with video conferencing tools. Hence, the study's first Research Question is:

RQ 1: What are the pain points related to teachers' interaction with video conferencing tools in online learning environment?

Second problem is student motivation which face with challenges and make it difficult for students to study in online environment and take a most advantage of it.

Hence, the study's second Research Question is:

RQ 2: Which factors can affect student motivations in online learning environment?

Another problem is effect of teachers' interaction on student motivation for learning in an online environment and continue it Hence, the study's third Research Question is:

RQ 3: How teachers' interaction problem with students through video conferencing tools effect student motivation?

At the end, with increasing online learning and using more video conferencing tools in this area nowadays, there is a strong need for finding effective features that could be added to video conferencing tools to keep this form of education as efficient as normal learning. Hence, the study's forth Research Question is:

RQ 4: Which features could be added to video conferencing tools to help improving interaction between teachers and students and increase students' motivation?

1.3 Scope and Delimitations

This study is based on teachers-students interaction problems in video conferencing tools which affect students' motivation. For reaching the purpose of our research we needed to consider both students and teachers. First, the problems that teachers might have in interaction with video conferencing tools will be studied and then the factors

that may affect students' motivation will be identified. So, it will be easier to make a connection between these two results and come up with our final purpose of this study and solve the problems which comes with online learning with presenting better user experience.

Only teachers and students in Jönköping university were in our focus since it was not possible to send our surveys to students and teachers in other universities due to the short of time for finding their emails and sending out. Our results are limited to this small sample and the Zoom application which is used in all lectures in this university. We did not ask them in our surveys which video conferencing tools they used and have experience about interaction problems with since our main point was about all the challenges and problems, they feel in online learning with video conferencing tools without considering specific tools or feature. Another limitation is that there are other factors which could affect the teachers' interaction and students' motivation. We cannot conclude that online learning is appropriate way for learning only based on the features that video conferencing tools have. Hardware issues, internet connection problems, computer knowledge to use these tools without difficulty and even psychological issues with being disconnected from society and lacking communication with people are some of these factors which can decrease the motivation to continuing with online learning process.

1.4 Outline

The following is the paper's structure: Chapter 2, *Method and Implementation* discusses method choice, data collection, data analysis and some considerations in our process for collecting data. Chapter 3, *Theoretical Framework* outlined relevant sources and theories about online learning and our subject. In chapter 4, *Results*, all the results from literature review, surveys and interviews will be presented. Our results related to previous studies with implications and limitations will be described in chapter 5, *Discussion*. Chapter 6, *Conclusion*, includes the conclusion of this study and some suggestions for future research. All the references and appendices which are used in this research will be presented in chapter 7 and 8.

2 Method and Implementation

This section describes the process of this study and the methods which are used in detail. The first part will represent how and why these research methods are selected and in which way it can help to understand teachers- students interaction problems

with video conferencing tools that affect students' motivations. The second part will describe the research design techniques which are used in collecting and analyzing the data gathered from surveys and interview. It is followed by measures which is used to give more validity and reliability to our results. At the end of this section, some considerations we faced during our research will be presented.

2.1 Method Choice

This section will explain different kinds of methods which are carried out to answer the research questions and presented the reasons for selecting each method. One of the methods in this research is survey which is used in two parts from both students and teachers. The survey from teachers will answer research question 1 and the survey from students will bring insights for research question 3. The literature review method is used in this study to answer research question 2 and provide needed knowledge from the existing studies in this area. For answering the research question 4 a prototype is created and will be tested through an interview with teachers and students. With using the survey design and interview we are collecting data to answer the final question.

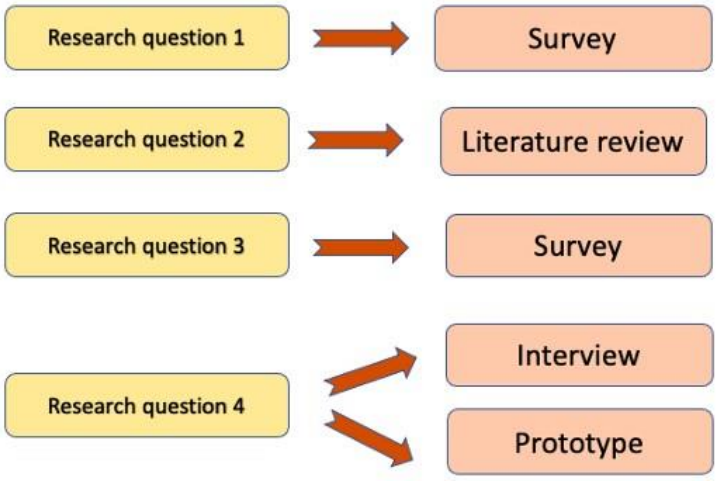

Figure 3: Thesis research methods

2.1.1 Literature Review

A literature review is “more or less systematic way of collecting and synthesizing previous research” specifically in the diverse areas relating to more than one branch of knowledge (Synder,2019). This method can highly detect areas which are needed more research and help to bring up research questions (Synder,2019). According to

Evans (2000) literature review is going through all the past research and give a final result through summarizing them so it is used by so many researchers as the initial research methods to start the study. Literature review can give ideas about research direction according to future works which are presented in different literature. In our study for answering research question 2, as motivation is a concept which is hard to understand and cannot be measured with a survey, it is needed to search in different articles which are done specially during the pandemic. So, the literature review method is being used for addressing students' pain points in motivation and the factors which can have impact on it. In past two years with increasing online education and effort for solving problems and increasing the quality of online learning the same as face-to-face education, a lot of research in this subject is conducted. It will be a good basis for our research to count on and find out the main pain points which students face with.

In the table below, the databases, search combinations and filters which are used to reach our goal in the process of literature review is summarized.

Search	**Database**	**Search combination**	**Filters used**
Search 1	Primo	"Teachers' interaction" AND "Students' interaction" AND "Students' motivation" ("video conferencing tools" OR "E-learning" OR "online learning") "Video conferencing tools" OR "Online user interaction" OR "Online students' engagement" OR "E-learning"	From 2015 to 2022 Sort by peer review English
Search 2	Google Scholar	"Video conferencing tools" OR "Online user interaction" OR "Online students' engagement" OR "E-learning"	Since 2015 Sort by relevance

		[All: "video conferencing tools in online learning"] AND [All: "user interaction"] AND [All: "Students' motivation"] "Teachers' interaction" AND "Students' interaction" AND "Students' motivation" ("video conferencing tools" OR "E-learning" OR "online learning")	
Search 3	ScienceDirect	[All: "video conferencing tools in online learning"] AND [All: "user interaction"] AND [All: "Students' motivation"] "Teachers' interaction" AND "Students' interaction" AND "Students' motivation" ("video conferencing tools" OR "E-learning" OR "online learning") "Video conferencing tools" OR "Online user interaction" OR "Online students' engagement" OR "E-learning" OR "Distance education"	2015 2016 2017 2018 2019 2020 2021 2022 Relevance
Search 4	ResearchGate	"Teachers' interaction" AND "Students' interaction" AND "Students' motivation" ("video conferencing tools" OR "E-learning" OR "online learning") "Video conferencing tools" OR "Online user interaction" OR "Online students' engagement" OR "E-learning" OR "Distance education"	English

Table 1: Search combinations

2.1.2 Survey

A set of information which is gathered from a sample of statistical collection through answering to some questions is defined as survey research (Check & Schutt, 2012). According to Ponto (2015), survey research has covered huge amounts of population-based data collecting. Getting information efficiently which is defining the characteristics of a large sample of selected individuals is the

major goal of this sort of study. These surveys were frequently distributed by mail and were used to provide descriptive characteristics of individuals or to gather opinions to build programs or products for a group of people.

The survey method gives knowledge from a sample of our population as a result to present the features that are important for our research. This method can help to answer research questions of " what‘, " who", " where" , "how much" and "how many". So, it is applicable in the exploratory and descriptive research (Saunders et al.,2016). This method is very popular but choosing the sample, the time and way of distributing it and pursuing the non-responders are needed to guarantee the reliable result and high-quality research process (Ponto ,2015). Different research strategies can be used in this method is including the quantitative strategy which is only focused on numerically information like questionnaires, the qualitative strategy using short or long answer questions like interviews and using both strategy as a mixed method (Ponto ,2015).

The survey will focus on the pain points of teachers in using online video conference tools environment based on teaching online and how students' interaction problems can affect teachers' motivation. In addition, collecting data from both teachers and students simultaneously can lead to a better knowledge of how to answer questions.

Teachers' surveys will start with questions 1 to 3 about personal perspectives, such as age, to get some background about the teacher. Moreover, try to achieve more data about how often they are using video conference tools, which will support in questions 4 to 7. Finally, from questions 8 to 13, we are trying to get more information from teachers about their motivation with video conference tools and compare with face-to-face lecturing and their pain points during this pandemic. Almost all universities had to perform the classes with online video conference tools therefore, the actual goal of the survey with teachers in this section is to collect as much data as possible about their concerns in interaction with students and their pain points with online education and using video conference tools compare to before the pandemic. Students’ survey also conducted the same way accordingly with purpose of exploring the pain points in students’ motivation.

2.1.3 Semi-Structured Interviews

Interview is type of data gathering procedure in social research that includes two or more persons sharing information through a sequence of questions and replies. A researcher creates the questions to gather information from interview participants on a given topic or range of topics. Interviews are often conducted inperson between two persons (an interviewer and an interviewee), although they do not have to be confined to two people or conducted in-person.

The interview with Jönköping university teachers and students will focus on testing the prototype with new feature in an online teaching environment and how it might impact student' motivation and students-teachers interaction. Moreover, the interview methods give us different view of the way teachers are integrating with these tools based on non-numerical data which can brought better understanding of the process of our research. (Questions are available to look at in Appendix A).

During the interview they are asked to work with prototype to find out their experience of using with new feature. Some questions are going to collect data from teachers or students' experiences. They may face many pain points and problems while pandemic forced them to switch into an online environment (such an unexpected evident) therefore, the interview plans to collect teachers and students suggestions and positive or negative opinions regarding feature for improving interaction. In addition, students' interaction while using these tools affected their teaching method, which can help us understand our result is acceptable or not.

2.2 Artifact Creation

According to surveys and literature review results, pain points and some ideas are gathered based on teachers' and students' behavior in video conference tools with a higher focus on Zoom.

These theories are proven first by focusing plenty of articles reviewed to increase our understanding of the research questions and further with the aid of the survey finding the more useful elements to interact with students with the use of online education tools. These findings aid us in developing a prototype with improved user experience

for testing the offered improvements, and they also aid us in reaching answering our questions through interview.

As a result, a prototype was created in Figma, to test our solution in a better user experience concept for the student's motivation and teachers-students interaction. The purpose of this prototype is to help having a better online education environment process where students can get a better opportunity to share their ideas about the lectures and get more involved and on the other side teachers have a chance to track students and their motivation for the better interaction during lecture.

2.2.1 Prototype

Regarding our results in surveys and interviews, we decided to present our solution for answering our research questions with the help of making a prototype that is more efficient and helpful in explaining the subject. But what are prototypes in different web environments in user experience and user interface design?

Design designers ' teams use a simulation or tested version of a finished product for testing before launch. In this case, we used it to show a user experience in our ‘Quiz’ feature, for adding into different video conference tools and we designed to transfer our concept to the teachers for testing. In addition, throughout user testing, prototypes are critical for discovering and resolving user pain points. Therefore, user experience design teams may visualize and improve the user experience by testing prototypes with real users during the design phase. Consequently, we chose Jönköping university teachers for the testing process.

Based on the limited timeline in our research and as we were supposed to interview teachers for the second time for this testing (prototyping), we achieved confirmation from teachers in this part of the interview with only three teachers out of 7 teachers which we had an interview in the first phase.

2.3 Data Collection

Several strategies were used to obtain data for this thesis. A literature review was conducted to collect information on teachers' pain points, areas, and needs. We also need to use a literature review to find students' paint points in motivation to answer research question 2. Following that, the data gathered from the literature review needed to be checked, so two surveys will be created using Google Forms and distributed to teachers and students separately. In addition, to answer question 3, we need to get information from teachers' interaction problems by observing one or two teachers during the lecture. After that, we plan to interview them and probably record the interview and write notes. Then we can analyse our data from the interview by

reviewing our records. We will mix our notes from the interview and our records together to write the results.

Research Questions	Literature review	Survey	Interview	Prototype
RQ1		✓		
RQ2	✓			
RQ3		✓		
RQ4			✓	✓

Table2: Research methods choice

2.4 Data Analysis

In this research we have three major result group of data that must be examined. First, to integrate the findings from the literature review, we aim to use text analyses and Statistical analysis to find information about teachers' interaction problems with video conferencing tools and student motivation from the previous study in this area. For analysing the data gathered from the interview method, we will use the Content analysis method. This method is the process of classifying verbal or behavioural data to categorize, summarize, and arrange the information.

At the end, we have the result from both surveys with teachers and students, which should be examined. For this purpose, we use the Likert scale scoring method for gaining a score from 1 to 5. This method is normally used by researchers to analyse the data from surveys in an easier way.

2.5 Validity and Reliability

Regarding Surucu (2020), the validity and reliability of the scales used in research are critical elements that enable the research to produce excellent outcomes. As a result, it is useful to understand how researchers correctly measure the scales' reliability and validity. Validity is concerned with measuring the intended behaviour or quality and a measure of how well the measuring instrument performs. Reliability is a measure of

the consistency of measured values obtained in multiple measurements under the same conditions with the same sensing element.

In summary Concepts like validity and reliability are used to assess the grade of research. They demonstrate how effectively a methodology, method, or test measure something. Validity is concerned with a measure's correctness, whereas reliability is concerned with its consistency.

Based on research questions 1and 3 which is about pain points related to teachers-students interaction with online video conference tools, several pain points have been published by doing survey and interview with teachers and students with different perspective. Therefore, results have been supported by many different ideas and perspectives and analyzed. So, reliability and validity been recognized by comparing different answers. We believed different answers increased reliability and validity of this research question.

Research question 2 is using literature review to provide answer and information for the motivation concept which cannot be studied in other ways with needed reliability and validity. So, we can confirm that results gathered for this research question is valid and reliable since it is achieved by previous studies and researches in this subject.

On the other side research question 4, the interaction has been tested and analyzed by teachers and students with the prototype that has been designed to test Quiz feature. This feature has been created and designed to test between teachers and students for making sure about the usability and validity of this feature. Hence, by doing the interview with them and asking to test the prototype using the user flow given to them we increased our reliability and validity with testing this feature between a few teachers and students in Jönköping university.

2.6 Considerations

The only personal information that participants are asked for during the survey is their age or university subject or nationality if they are Swedish or international student which are quite general information from students. On the other side for teachers we do the same in order to protect their rights under ethical research practices. Before interviews, participants are also assured that their names or personal information won't be used in the study. In summary, we did not publish any personal information

that we received by any chance from students and teachers for keeping their privacy safe and secure.

3 Theoretical Framework

3.1 Video Conference Tools

Video conferencing software is a program that allows two people to interact via video and audio over the Internet. It allows the parties to begin and perform live conferences and distant meetings by sending audio, video, and text. The COVID19 pandemic epidemic has had a significant influence on daily life in a variety of areas, including fundamental hygiene, medicine, health science, economics, politics, and society. It had a significant impact on how individuals communicated with their families, friends, and workplaces or even buying food from grocery stores. The hunt for new methods to interact, learn, enjoy birthdays, and even visit with parents and grandparents stemmed from social alienation. One of the most common alternatives that has evolved is the usage of video conferencing software such as Google Meet, Microsoft Teams, and Zoom. People have begun adopting video conferencing programs to substitute face-to-face meetings at schools, businesses, and social gatherings with virtual meetings during the COVID19 epidemic and concomitant stay-at-home quarantine methods (Kagan et al.2020).

Furthermore, video conference tools act huge responsibility in education system for students and teachers therefore, Yelis state that in 2018 the benefits of video conferencing include the power to interact teachers and students where they are, the ease of accessing lessons with teachers individually, the type of motivation, and the enhancement of teachers' roles, involvement, innovation, and students' insights and learning experiences using new learning systems, as stated by one of the group interviewees: ‘’ We can add encouragement since there is a lot of technology that can be applied to study, and video conferencing adds to our experience’’. Furthermore, there are some kind of issues when using video conference includes flaws or drawbacks such as interaction constraints, unstable internet connections, unclear sounds, video delay, and background noises, as another group stated: "Sometimes there is a bothersome sound from the instructors' camera, and it disturbs us’’. It should be mentioned that today's learning and teaching processes can be supported from the use of video conference as a distance learning tool or media that instructors can use to improve their productivity, as well as substitute for teachers' absences in the school environment, so that learning can take place and tutor efficiency can be kept up wherever they are. (Yelis,2018).

In addition, video conferencing is a program that allows two or more participants to connect through a broadband internet network. The idea behind video conferencing is to employ sound transformed by a microphone into a sound signal and picture transformed by a camera into an image signal. The two signals are then compressed with the help of a device known as a codec. The compressed signal is then distributed via the internet, in this example via IP, so that it may be delivered and received to the intended destination. During the Covid-19 epidemic, online learning with video conferencing had a positive influence on enhancing students' mathematical problem solving ability. This outcome is consistent with the findings of (Marhami et al. 2020), who discovered that utilizing a video conferencing platform improves students' mathematical challenge ability and the quality of online learning. Moreover, these studies show that with the use of video conferencing, distant learning becomes more participatory, allowing students to be more active and driven in their learning (Marhami et al. 2020), Using video conferencing, professors and students may engage as if they were in the same room, even if they are separated by a vast distance. This assists pupils in better comprehending and mastering the topic being taught. Furthermore, pupils can be actively helped in planning/formulating methods to address the difficulties presented.

3.2 Online learning

Web-based learning is now being used as a substitute for face-to-face education. According to El-Seoud el at. (2014), online learning (also known as e-learning) is "any learning that involves the use of the internet or intranet." This technology is utilized in nearly every international university on the planet. The letter "e" in elearning is most commonly interpreted as an abbreviation for "evolving, enhanced, everywhere, every time, and everyone" (Jaggars & Xu, 2016). More effort has been put into technological advancement than ever before. There are two types of online learning, according to Zou et al. (2020): synchronous and asynchronous. Virtual classes that use VC are referred to as synchronous. These classes are live and scheduled, and they are influenced by three factors: the classroom, the media, and the instructor.

3.3 User experience design

User experience design is a concept that describes how people engage with a platform and how to make it more user-friendly to improve human-computer interaction. A good user experience should be simple to answer to all of the user's requirements.

According to Garrett (2010), a growing number of companies are realizing that delivering a great customer experience is a key, long-term, and competitive advantage in all sorts of services. The user experience of an offering platform shapes a user's view of it and determines whether or not they will return to utilize it. Even little features like a button or color might have an impact on the user's experience during this procedure. The term "user experience design" refers to a series of iterative judgments.

3.4 Interaction Design

Interaction design is the process of researching the behavior and structure of interactive systems and applying them in order to create meaningful digital content. In other words, interaction design is the relationship between a user and a product or service. The goal of interaction design is to provide a positive user experience. As a result, most User Interface disciplines need a comprehension of and hands-on experience with interaction design concepts. After all, it is about designing for the complete linked system, including the device, interface, context, environment, and people. Interaction designers attempt to establish meaningful connections between people and the goods and services they use. Computers, mobile devices, gadgets, appliances, and other electronic equipment may be included. The interaction design, as well as the word itself, is primarily focused on the interaction between human and computer - what answer will the system offer in response to user demands. There are several parallels between User Experience Design and user Interaction design. The commonality is that research their target audience. The distinction is that interaction design is a subset of user experience design and is not concerned with all elements of the system or software as viewed through the eyes of the user, but just with the interaction between human and technology. In addition, video services do not know the characteristics of its customers, they do give them with an ID (username) and track their actions, such as viewing, like, sharing, downloading videos, adding films to the watchlist, and so on. The last four actions on the video might express

the user desire and are referred to as explicit feedback. The observing behavior, on the other hand, is known as implicit feedback. Furthermore, Yimin (2022) discover that interactions between users and videos are limited, with implicit feedback far outnumbering explicit input.

4 Results

In this section we are aiming to present the results of literature review, survey, and interview. The findings of literature review are listed in two sections and emphasizes the pain-points related to students' motivation and the way interaction with teachers can help to improve or solve it.

For confirmation the data which gathered from literature review and increasing the validity the survey method was used and additional problems regarding students' motivation is also added by respondents. In addition, the data gathered from teachers' survey will be presented which mention the teachers' challenges in interaction with students through video conferencing tools in online education system. The last part presents the interview results after applying findings from last methods in a prototype.

4.1 Literature review data

As mentioned in the last sections, motivation is a concept which is dependent on different aspects, and it is a multidimensional concept based on psychology, behavior, and personality. As finding a method to understand and measure the amount of motivation among online students and items which has impact on it is difficult, we will use literature review to find result in this area which are focusing on the ways to improve this motivation among online students

Findings what motivates online students is very important as motivated students are more likely to accept, participate and be successful in the online learning process. Loss of motivation is the main challenge which online students experience (Teodorescu et al. ,2022). We collected this data from different articles related to teacher interaction, student motivation, online learning, and video conference tools.

4.1.1 students' motivation during online learning

One of the important factors from literatures which we reviewed was technical and motivational support from teachers and it shows teachers and instructors plays an important role to increase or decrease the students or learners' motivation. In the study that Selvi (2010) had done many years ago mentioned some themes like the role of teachers and the process of learning-teaching, the amount of participation and attention, online learning environment and the management of time and called them as themes that affect motivation. He recognized the roles of teachers as the most

important factor. According to Kelly (2012) five main factors are highly related to online student motivation: eMpowerment, success, usefulness, interest and caring. In one research on 609 online students in higher education caring was the most important factor and shows that if the teachers care that students understand the lectures and have a proper learning process their motivation can increase.

Motivation can be defined as internal or external. The internal one is related to personal energy for each student but the external one is related to some factors which comes from environment and motivate or demotivate them (Aduayi et al., 2017). The external factors which have the most impact is teachers' behaviour, interaction between teacher and students and the learning material (Aduayi et al., 2017). There is a need that teachers in online education provide effective content for students that match with an online learning system and provide support for students to motivate them in this process. (Farhan et al., 2019). How much instructors try to practice instructional process in online education environment and try to improve the teaching quality and technology barriers has impact on students' motivation (Teodorescu et al., 2022).

Kadiresan et al. (2021) also studied about online students' motivation and used factors which Selvi (2010) presented as a theoretical framework and examined the relationship between them. This study also confirmed that motivated students will be engaged more actively and feel satisfied with learning process. Students' participation and the role of instructors was two factors that is pointed out as the motivation factors.

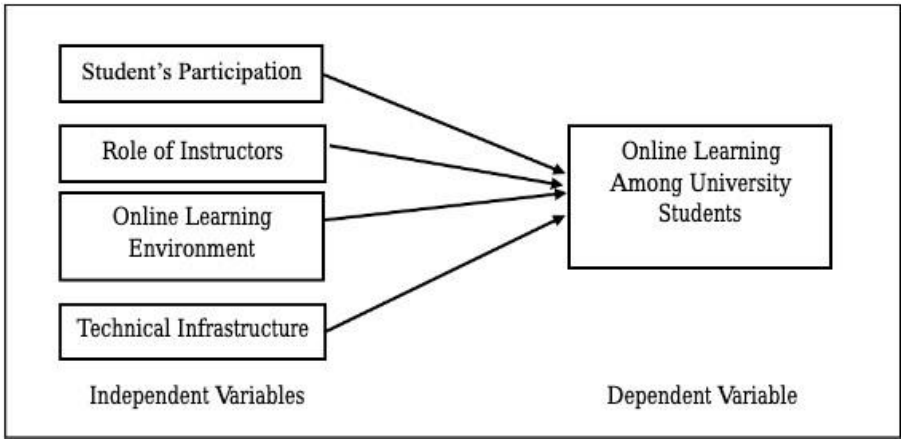

Figure 4: Proposed theoretical framework by (Kadiresan et al., 2021)

As we explored among different research during the years it is obvious this issue in online learning is still unsolved and effected students and learning process in online environment.

In the table below all the research mentioned above and factors which affect motivation are summarized.

Researcher	Year	Factors effected motivation
Selvi	2010	-Roles of instructors -Participation and attention -Online learning environment -Time management
Kelly	2012	-eMpowerment -Success -Usefulness -Interest -Caring from teachers
Aduayi et al.	2017	- Teachers' behaviour - Interaction between teacher and students - Learning material
Farhan et al.	2019	-Technical and motivational support from teachers
Teodorescu et al.	2022	-Practice instructional process
Kadiresan et al.	2021	-Students' participation -The role of instructors

Table 3: Factors identified affected online students' motivation

4.1.2 Teachers-student interaction during online learning

As it is figured out from the first part of our literature review, Students' motivation is highly dependent on role of teachers in support and have a good interaction with them. The social communication is missing in this interaction and other aspects should be strengthened to compensate this issue. This part of our literature review is focusing on teachers' interaction with students and pain points in this process.

Interaction between students and teachers becomes an essential need during covid-19 in online learning and students stated the need for interaction with their teachers. Students stated that difficulty to have facial expressions, infeasible to ask questions or chatting between lessons are some issues they faced in interaction. Instructional support from teachers with comments and feedback is another thing students mentioned that impacted interaction (Sason et al.,2021).

To ensure the quality and effectiveness of online education the same as face-to-face ones, teachers need to have the chance to interact with students, involve them in the learning process, discuses with them and monitor their improvement. Another issues

mentioned by Krishnamurthi (2000) in this interaction is the communication tools like video conferencing applications used and the education and instruction for using them.

According to (Sun,2022), psychological atmosphere and learning engagement has also big impact on students-teachers interaction. This interaction which is directly related to students' satisfaction of learning process is closely related to students learning experience, satisfaction, engagement and learning effects.

Changing the learning materials from printed one to sharing on internet made a big change in the interaction. Progressing communication technologies can clearly increase or decrease the quality of interaction between teachers and students (Terzi,2005). While there is no guarantee that Online learning could be a better choice for learning in education system, but possible innovative E-learning technologies can help to improve users' interaction and motivation (Farhan et al., 2019).

If the basis of students' knowledge was set properly and they get support from both learning and feeling the interaction between teachers and students will improve (Miao,2022). Communication channels, support and encourage students with giving them feedback time to time are some factors which Martin et al. (2018) mentioned in his study as a way teachers' can do to fulfill students' needs and improve their involvement.

Researcher	Year	Factors effected StudentTeacher interaction
Krishnamurthi	2000	-Communication tools -Education and instruction for using these tools
Terzi	2005	-Progressing communication technologies
Martin et al.	2018	-Providing communication channels -Encouragement -Feedback -Support
Farhan et al.	2019	-Innovative E-learning technologies
Sason et al.	2021	-Difficulty to have facial expressions -Infeasible to ask questions or chatting between lessons -Instructional support with feedback and comments

Sun	2022	-Psychological atmosphere -Learning engagement -Students' experience - Satisfaction -Learning effects
Miao	2022	- Supporting students' knowledge -Support and improve emotional

Table 4: Factors identified affected student-teacher interaction

4.2 Survey data

4.2.1 Student survey

For better understanding and answer our research question regarding to 'how teacher's interaction problem effect student motivation? We come up doing survey between students therefore, survey was completed with help of 23 students from Jönköping university. In addition, the survey has been designed and prepared online with Google form which is a survey administration software for higher quality in statistics results.

Age

1. What age group do you belong to?

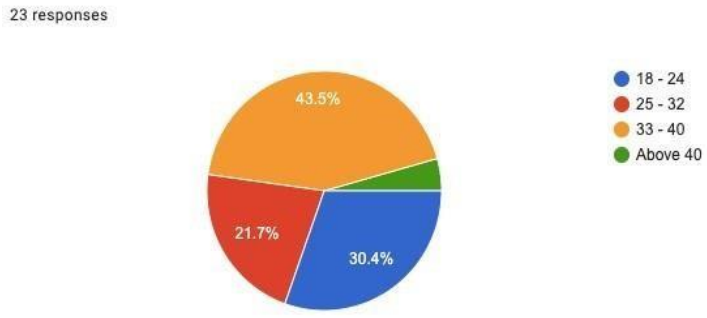

Figure 5: Age chart between 18 to above 40 years old

The result shows from 23 students who participated, 43% are between 33 – 40 while 30% are between 18- 24, and 21% are between 25- 32 years old so, we could say we are faced with a young group of students.

Age	percent	position
18-24 years old	43.5%	First position
25-32 years old	21.7%	Third position
33-40 years old	30.4%	Second position
Above 40	4.6%	Lowest position

Table 5: Age description

Nationality

2. Where do you come from?

In terms of being international or Swedish student we have 100% of our participants were international students.

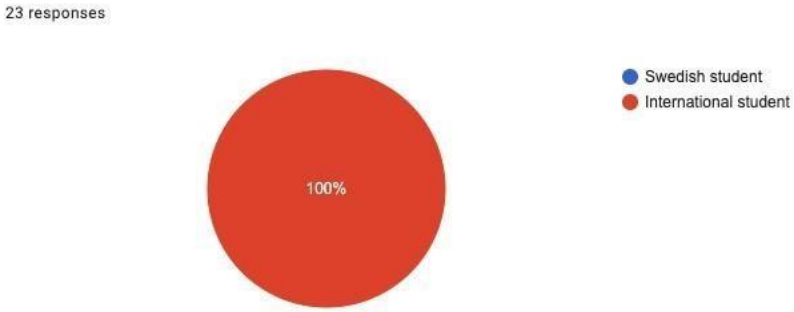

Figure 6: Students' nationality

University Major

3. Which school are you studying in?

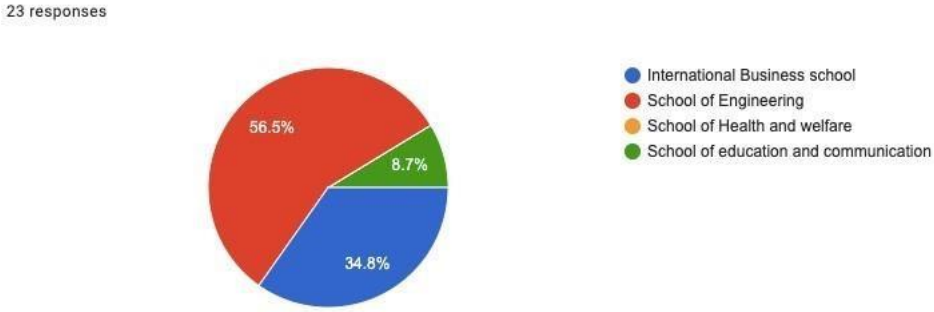

Figure 7: students' school

In addition, 56% from the school of Engineering participated survey while 34% from the Business school and only 8% from the school of education and communication filled out the survey.

On the other side of the survey part of the characteristic, we focused on collecting information about the student department at Jönköping university, including around 57% of engineering schools. However, 34.8% of international business schools and almost 9% of the school of education and communication participated. The result shows the school of engineering where more interesting departments to participate in our survey and probably faced with the more technical participant in this survey.

Major department	percent	position
Business school	34.8%	Second position
Engineering school	56.5%	First position
Health and welfare school	0%	Last position
Education and communication school	8.7%	Third position

Table 6: Student major distribution

Students' experience with video conference tools

4. What is your main purpose for using video conferencing tools?

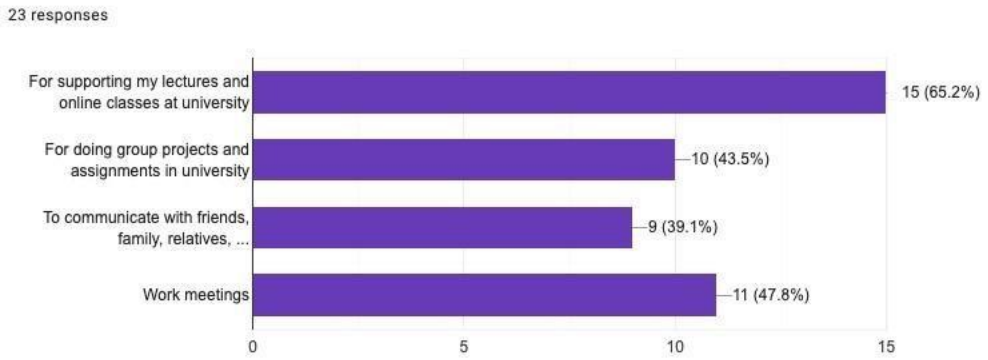

Figure 8: Different purpose of using different video conferencing tools

According to responses, more than 65 percent of students use these tools for educational purposes, such as attending lectures or classes, while 39% of these participants only use these tools to communicate with each other, family, or relatives, indicating that these tools are not attracting students to use them for other purposes as they should.

Students' usage with video conference tools

5. How often do you use video conferencing tools for different purpose regarding online learning in university?

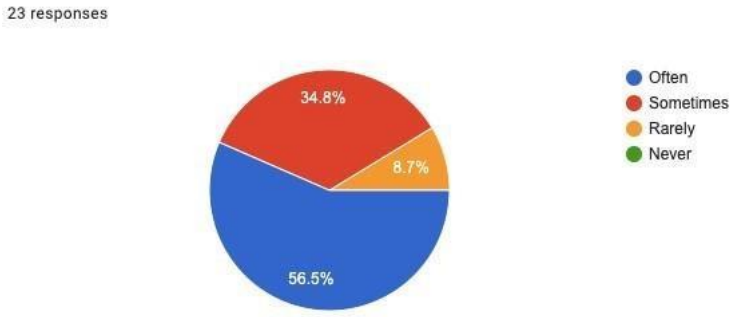

Figure 9: How often students use video conferencing tools

6. How satisfied are you with using video conference tools for supporting universities tasks and lectures?

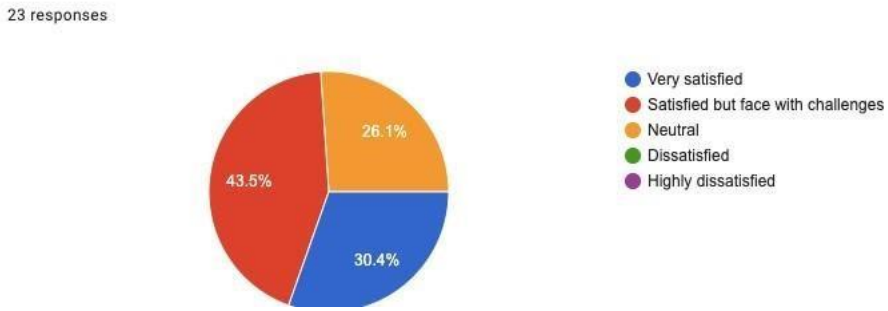

Figure 10: Students' satisfaction about video conferencing tools

The next part of the survey will focus on asking students about how they deal with different video conference tools in their daily life. Therefore, more than 65% of students use video conference tools to support their classes and lectures at the university of Jönköping. Still, because of challenges in using these tools, 30% are satisfied in this way and approximately 43% are facing challenges. Moreover, of 23

students who participated in this survey, 56.5% often use video conference tools for different purposes, 34% sometimes use them, and almost 9 % use them rarely.

Students' usage	percent	position
often	56.5%	First position
sometimes	34.8%	Second position
rarely	8.7%	Third position
never	0%	last position

Table7: students' usage of video conference tools

Students' satisfaction	percent	position
Very satisfied	30%	Second position
Satisfy with challenges	43.5%	First position
neutral	26.1%	Third position
dissatisfied	0%	Last position

Table8: students' satisfaction about video conferencing tools

Students' recommendation

7. Do you feel that video conferencing tools should be more involved with the educational system?

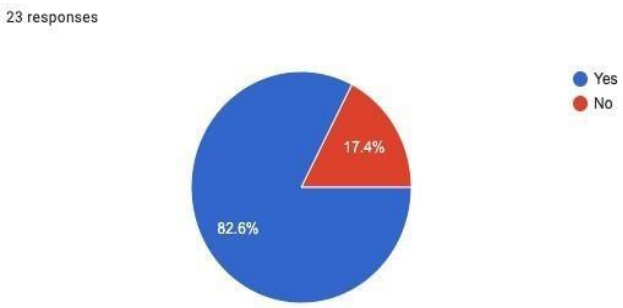

Figure 11: Is video conference should be more involve?

Furthermore, we have 82.6% of students who recommend video conference tools should be more involved with the educational system. Therefore, we can understand most students at Jönköping university are looking for more involvement with these tools for their educational system and learning system.

8. How efficient is using video conference tools for learning at university instead of face-to-face one?

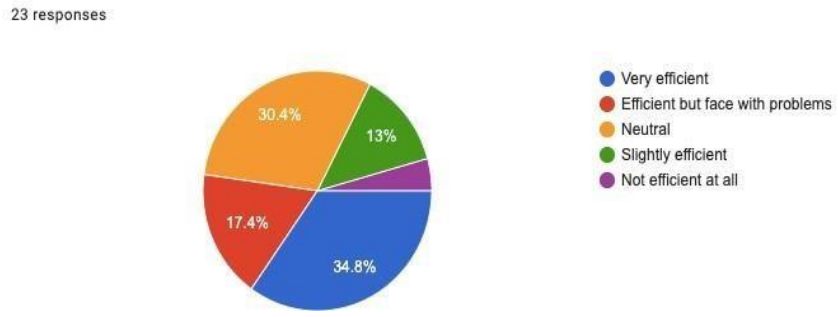

Figure 12: How efficient is video conference tools compare with face to face Then we found out from 23 students at Jönköping university who participated in the survey that almost 35% think using video conference tools could be more efficient than face-to-face. However, 17.4% think the same they believe that using these tools consists of some challenges still. In contrast, less than 5% of participants believe that face-to-face learning could be more efficient.

9.How organized are teachers during the lectures and teaching process in terms of interaction with video conferencing tools at university?

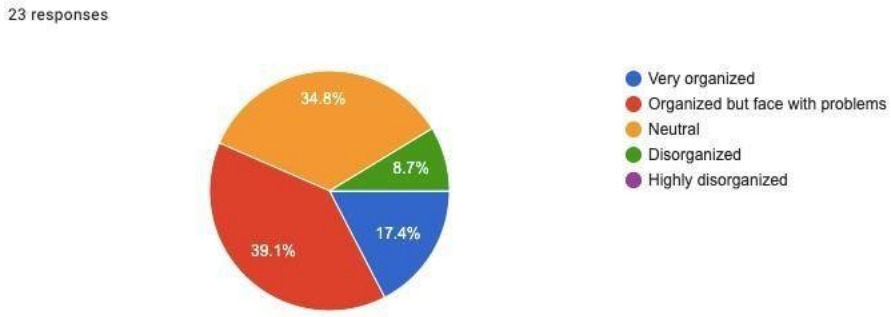

Figure 13: How organized are teachers during the lectures and teaching process This part of the question will inform how much teacher interaction can affect student motivation.

The first question is 'how organized are teachers during the lectures and teaching process in terms of interaction with video conference tools?

Based on the results, most students are satisfied with the teacher's interaction with video conferences at Jönköping university. However, many students still believe in facing some challenges and problems.

Teachers how organized	percent	position
Very organized	17.4%	Third position
Organized face with problems	39.1%	First position
neutral	34.8%	second position
disorganized	8.7%	Last position

Table9: How organized are teachers with video conference tools

Learning quality with video conference tools

How can fluency in lecturing and teaching effect on online learning and increase its' quality? Mention your thought about it.

Here we discuss how fluency in lecturing and teaching affects online learning and increases student learning quality. We discovered different opinions that most of them agree that the interaction of teachers is highly effective and can improve students' motivation and help them understand subjects more efficiently.

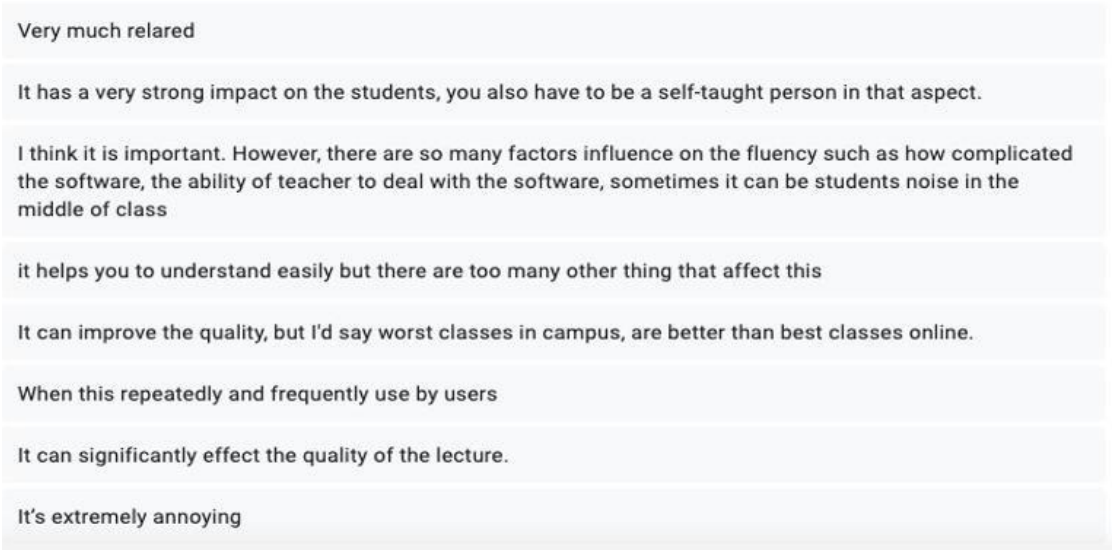

Figure 14: The effects of teachers' influency on online learning

I think fluency can help motivation of students and being creative somehow

i donw now

It shows the overall control of the teacher over the lecture which means that the lecture is being taught the best way.

idont now

Obviously using online learning tools could be challenging for lecturers at the beginning. They would need to learn how to work with the software, learn how to manage the class and they need to get along with talking to screen and sometimes not getting any interaction back.
For some lecturers, teaching using online learning tools might be easier while for some might be challenging for instance they could explain better in person

Concentration in face to face learning is more than video conferencing. On the other hand, in video conferencing more time is saved.

Concentration in face to face learning is more than video conferencing. On the other hand, in video conferencing more time is saved.

It can effect on the process of learning and make it simple or complicated

In such environments, the teacher must have a high level of fluency in lecturing to increase the student's interest in the subject

Figure 15: The effects of teachers' interaction quality

Besides teachers' interaction, students' motivations are critical in analysing the effect of video conference tools' revolution in the education system. Therefore, this part of the survey will investigate students' motivations. **Students' participation with video conference tools**

10.Are you participating actively in the courses before the pandemic?
First, we asked participants, 'Are you participating actively in the courses before the pandemic?' to compare students' motivation before and after the pandemic.

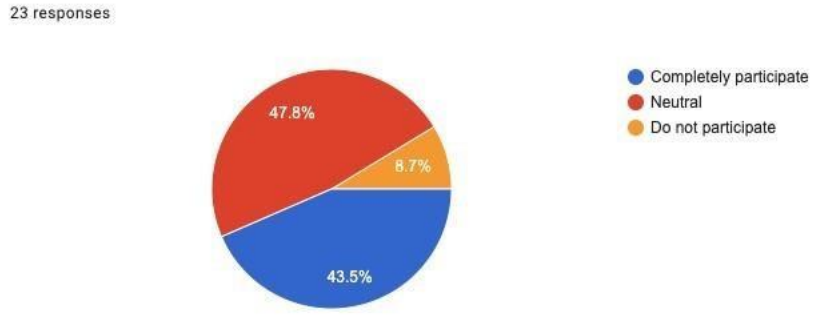

Figure 16: Students' participation before the pandemic

11.Are you participating actively in the courses using video conferencing tools during and after the pandemic?

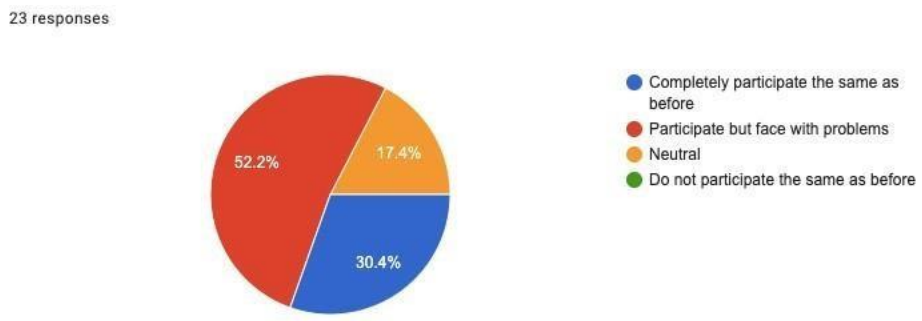

Figure 17: Students' participation during and after the pandemic

based on student's motivation which consists of challenges and problems in using different video conference tools for lecturing and attending classes, we come up to ask them, what are the first things that come to your mind about challenges and pain points during online lecturing with video conference tools? Therefore, we have several answers that talk about bugs, errors, connection problems or they believe still users are not adapted perfectly with these tools.

Students' participants before pandemic	percent	position
Completely participated	52.5%	First position
neutral	47.8%	Second position
Do not participated	8.7%	last position

Table10: Students' participation before the pandemic

Students' participants after pandemic	percent	position
Participated with challenges	43.5%	First position
Participated same as before	30.4%	Second position

neutral	17.4%	last position

Table11: Students' participation after the pandemic

12. What is the first thing that come to your mind about challenges and pain points during online learning with video conferencing tools?

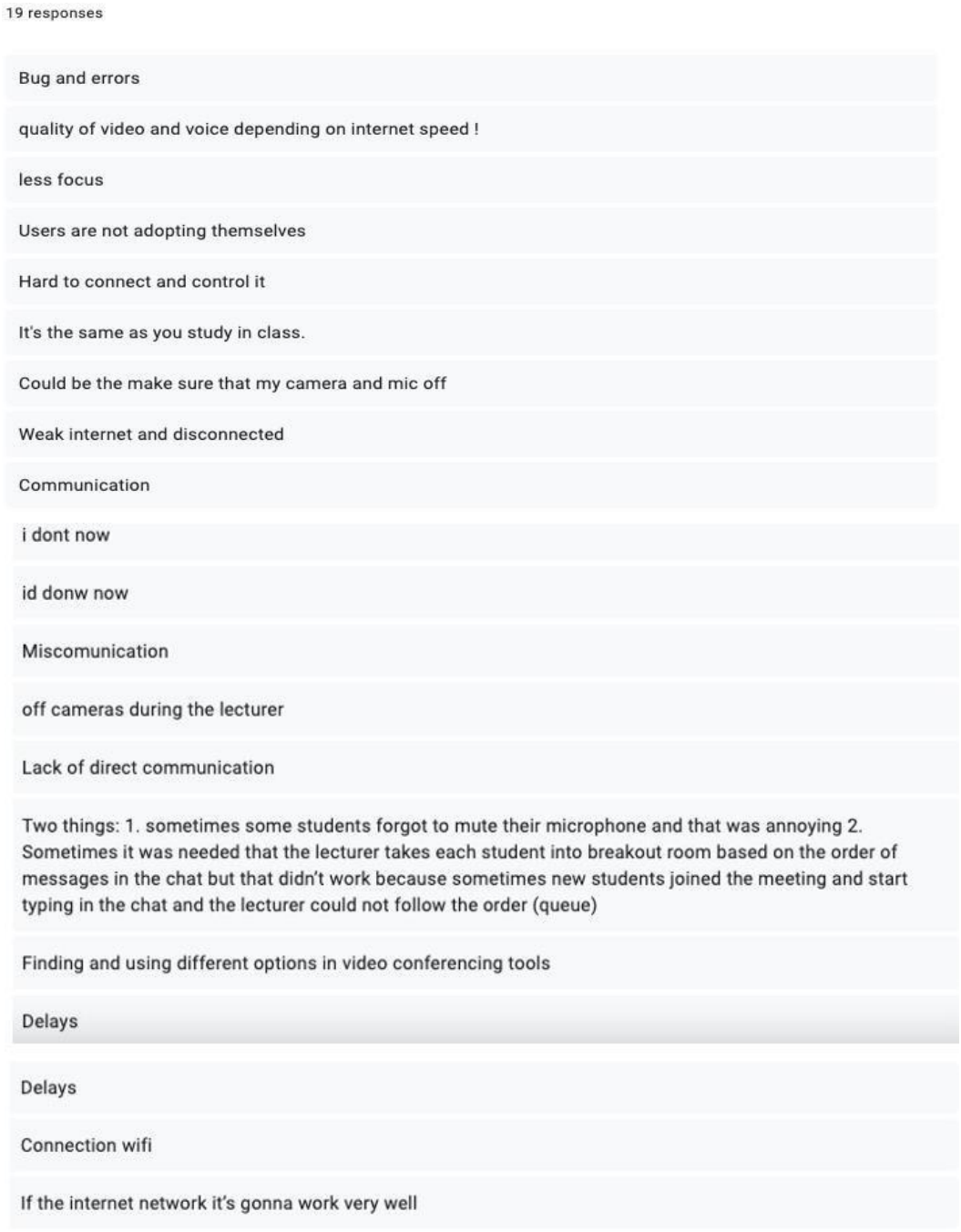

Figure 18: Students challenges with video conferencing tools

next part of the survey, based on student motivation, we asked them how their motivation in online learning was affected by challenges, pain points, and somehow technical issues with different video conference tools?

13. How your motivation in online learning effected by your challenges, pain points and technical issues with video conferencing tools?

In this way, we analysed that most students believe that challenges damage their motivation. As the graph shows, approximately 80% of participants believe in that issue.

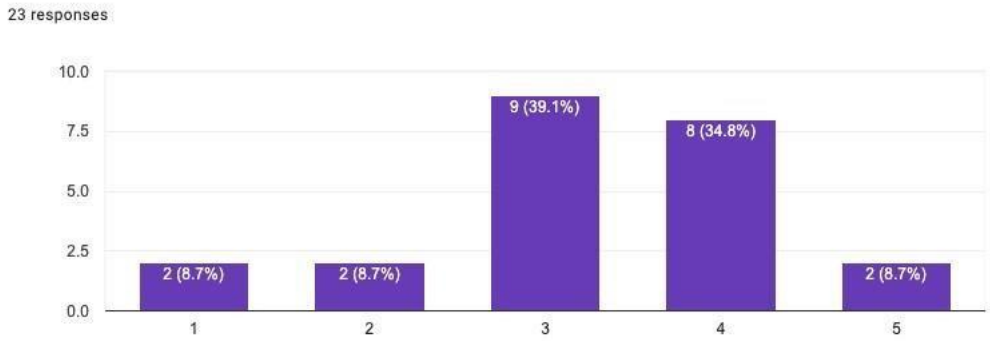

Figure19: Effects of students' challenges on their motivation

Another aspect of student motivation will depend on the teacher's interaction. Based on this fact, we asked participants, how is your motivation in online learning affected by teachers' interaction problems with video conferencing tools?

14. How your motivation in online learning effected by teachers' interaction problems with video conferencing tools?

The graph shows that over 60% of students agree that teachers' interaction problems can impact student motivation. In addition, we will also ask participants what motivates them, mostly with online learning using video conference tools to make a connection between students' motivation and teacher interaction and fill the gap.

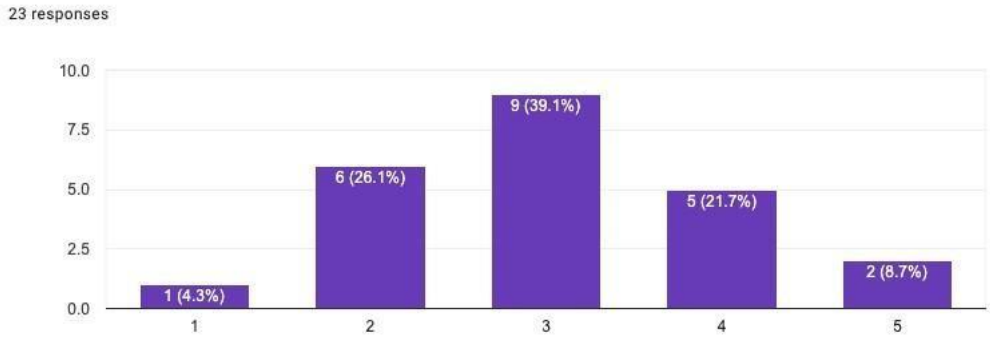

Figure 20: Impact of teacher's challenges on students' motivation

15. What motivates you with online learning using video conferencing tools?

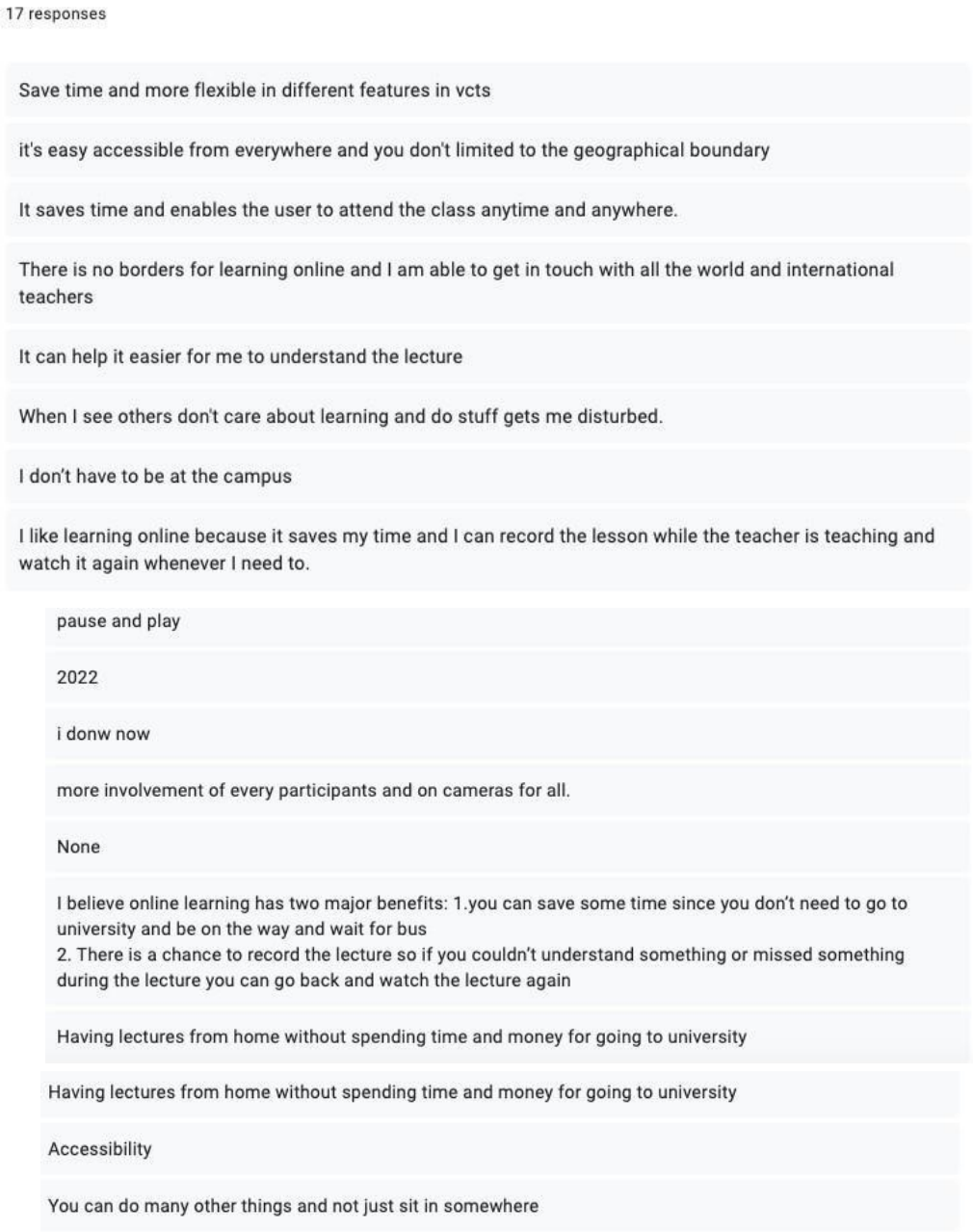

Figure 21: How students motivated for using video conferencing tools

4.2.2 Teachers survey

By doing a survey from our teachers' side, we are looking for proper answer for research question 1, regarding to pain points related to teachers' interaction with video conference tools in an online environment. Therefore, our answers from 19 teachers and keywords are important aspects to answering the question during the survey from our teachers' side.

Age

1.What age group do you belong to?

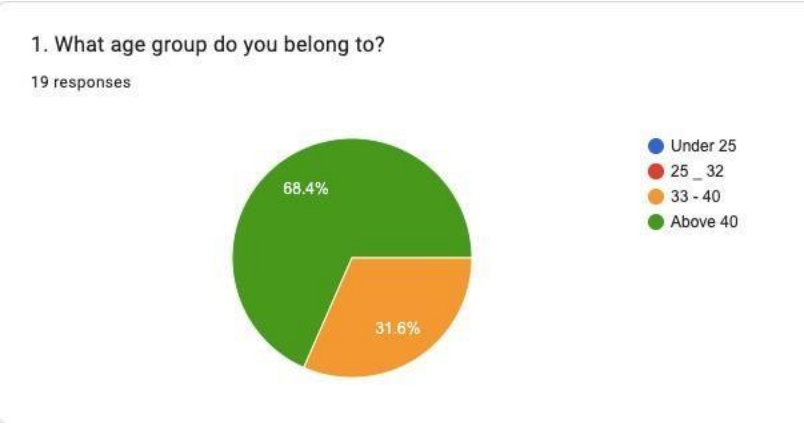

Figure 22: Teacher's age range

Our teacher side survey was completed with help of 19 teachers from Jönköping university in Sweden and according on the first two questions in our survey, we seek to learn more about teacher who participate personalities in terms of age and topic of teaching. Participated result shows from 19 teacher who responded 69% are above 40 years old while the rest are between age 33 to 40 years old. Therefore, we are face with more experienced and more valid in this survey.

Age	percent	position
Under 25 years old	0%	Last position
25-32 years old	0%	Third position
33- 40 years old	31.6%	Second position
Above 40	68.4%	First position

Table12: Teachers' age range

Teachers' school department

2.Which school are you teaching in?

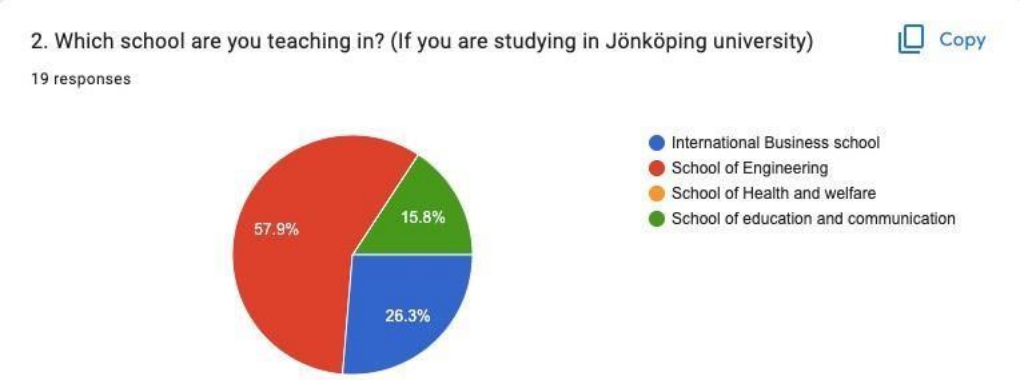

Figure 23: Teacher's school department

In addition, teachers who participated were approximately 58% from the engineering school and 15.8% from international business; therefore, we faced more technical teachers in this survey.

Major department	percent	position
Business school	26.3%	Second position
Engineering school	57.9%	First position
Health and welfare school	0%	Last position
Education and communication school	15.8%	Third position

Table13: Teachers' School department

Purpose of using these tools

3.What is your main purpose for using video conferencing tools?

After getting to know more about the participants, the next question will be: What is the primary purpose of using the video conference tool? This matter can help determine for what purpose teachers in Jönköping university are using video conference tools.

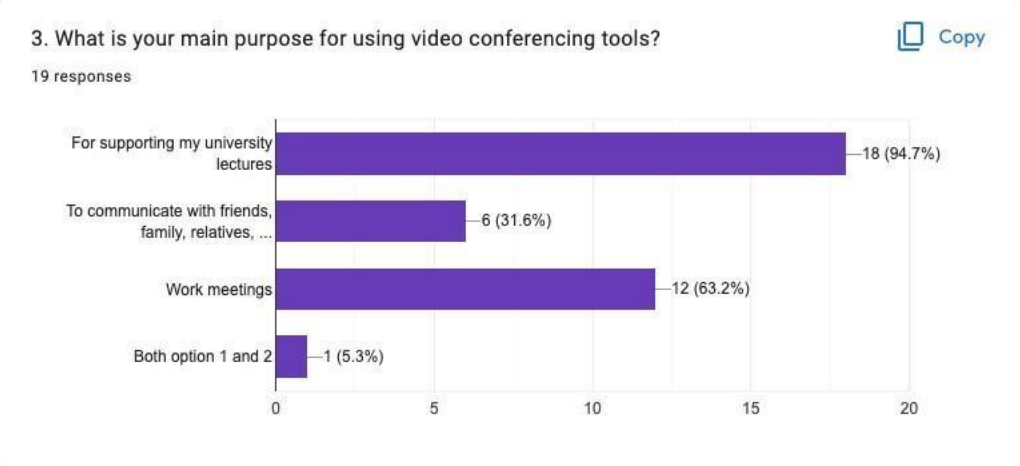

Figure 24: primary purpose of using video conference tools

As the graph shows, using video conference for 'work meeting' is bolder compares students survey therefore, besides using different video conference tools for supporting lectures in the university, they use it for their work meeting and a beneficial.

How often they use

4.How often do you use video conferencing tools for different purpose regarding online learning in university?

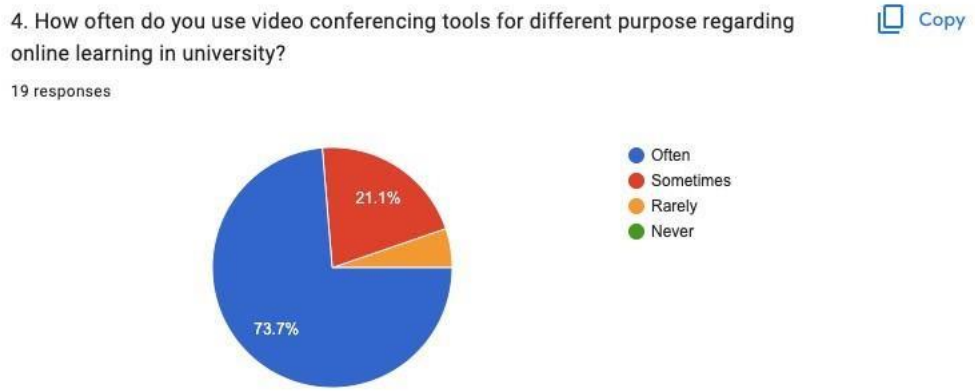

Figure 25: how often teachers using video conference tools

Regarding the student survey platform, we asked teachers also how often they use video conference tools for different purposes to support their online teaching tasks at Jönköping university.

Therefore, we have almost the same percentage among teachers who often use video conference tools, and about 74% use video conference tools frequently.

Teachers' usage	percent	position

often	73.7%	First position
sometimes	21.1%	Second position
rarely	8.7%	Third position
never	0%	last position

Table14: How often teachers using video conferencing tools

Satisfaction

1.How satisfied are you with using video conferencing tools for supporting universities classes and lectures?

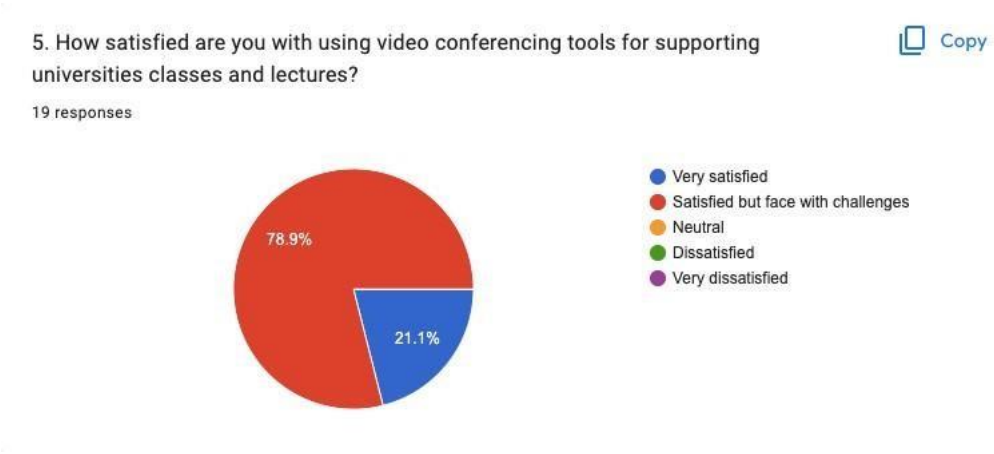

Figure 26: Teachers' satisfaction using video conference tools

Another critical point that we find out between surveying teachers in Jönköping university teachers who participated in this survey said they are satisfied with using video conference tools for supporting universities, but they faced challenges. Therefore, we can ensure that this gap needs a solution solved in video conferencing tools.

Teachers satisfaction	percent	position
Very satisfied	21.1%	Second position
Satisfy with challenges	78.9%	First position
neutral	1.1%	Third position
dissatisfied	0%	Last position

Table15: Teachers' satisfaction using video conferencing tools

Encouragement video conference tools

1.How much did you encourage your students to use video conferences tools during the Pandemic?

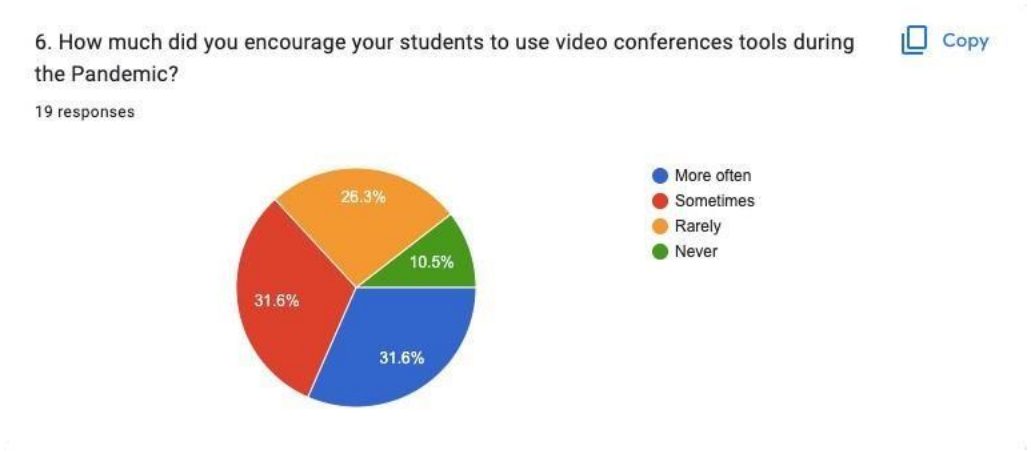

Figure 27: Teachers encouraging students amount to use video conferencing tools

While 100% of teachers were satisfied with using video conference tools to support their university lectures, we asked them how much they encouraged students to use video conference tools, especially during the Pandemic. Based on this idea, we achieved almost 31.6% of teachers more often encourage students to use different video conference tools, and in contrast, 11% never encourage students. Based on this result, we can understand that most teachers are satisfied with using video conference tools compared to face-to-face lecturing specially in pandemic duration.

Encourage students	percent	position
More often	31.6%	First position
sometimes	31.6%	First position
rarely	26.3%	Third position
never	10.5%	Last position

Table16: How teachers encourage students to use video conferencing tools 1.How did you encourage your students to use video conferences tools during the Pandemic?

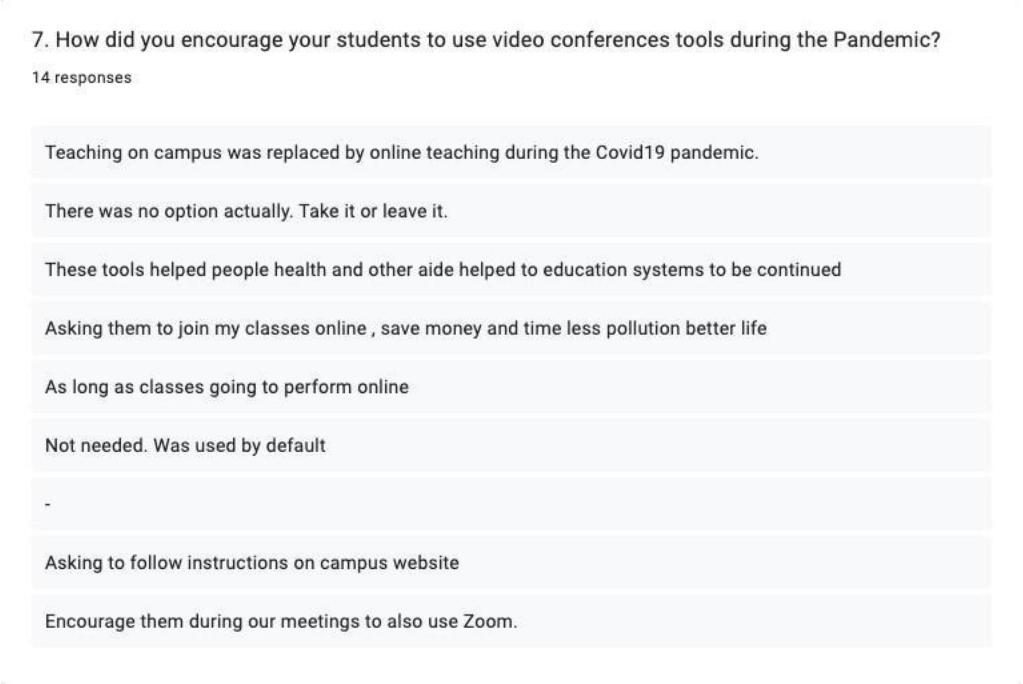

Figure 28: How teachers encourage students using video conferencing tools

1.Do you feel that video conferencing tools should be more involved with the educational system?

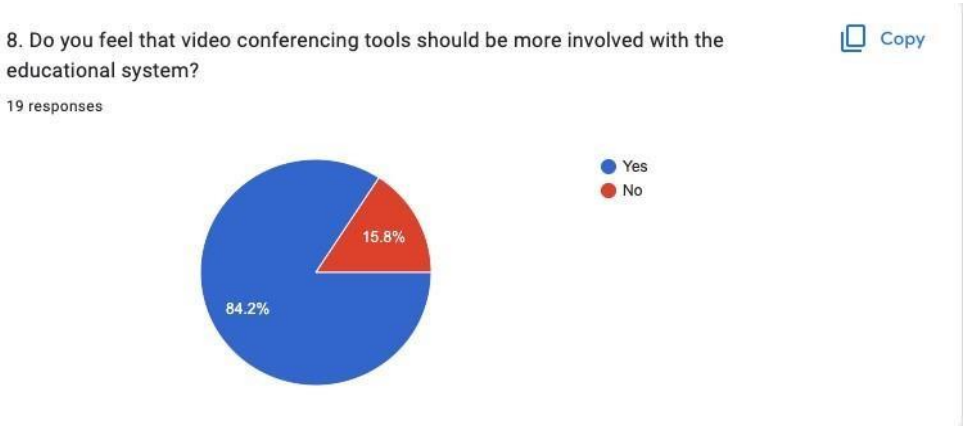

Figure 29: teachers' opinion for involvement more with video conferencing tools In addition, to this satisfaction among teachers at different university, we decided to find out more about this encouragement between teachers by asking, Do you feel that video conference tools should be more involved with the educational system? Regarding the previous result from teachers' video conference tools, challenges to using video conference tools in lecturing between teachers are about 85% of teachers in Jönköping university answered slightly applicable. They don't think online learning could be a better choice of teaching method in the future, and these are all related to those challenges of using video conference tools nowadays.

1.How applicable is using video conferencing tools for lecturing in universities instead of face-to-face lecturing? Do you feel online learning could be a better choice of teaching method in the future?

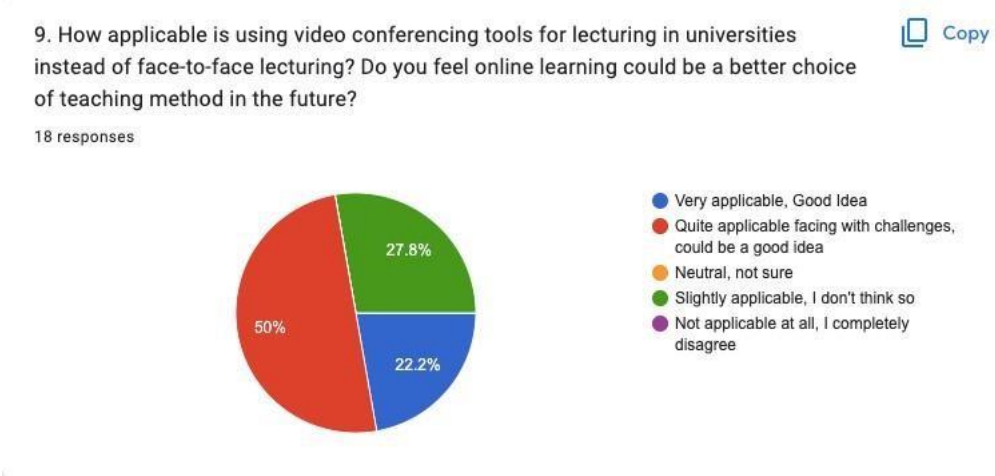

Figure 30: Is video conference tools a better choice?

After this we are going to target student interaction and performance during the lecturing with different features in the view of teachers with various video conference tools. This question helps us get some background about student interaction in the sight of teachers. Regarding to what we understand from our results almost 50% of our teachers believed using video conference tools are good choice to use for their lecturing system but these tools are faced with challenges while they are using it.

VCS'S better choice?	percent	position
Good idea	22.2%	third position
Good idea but face with challenges	50%	First position
I don't think so	27.8%	second position
Not applicable	10.5%	Last position

Table17: Is video conferencing tools are a better choice? 1.How organized is the students' performing during the lectures in terms of interaction with different features of video conferencing tools?

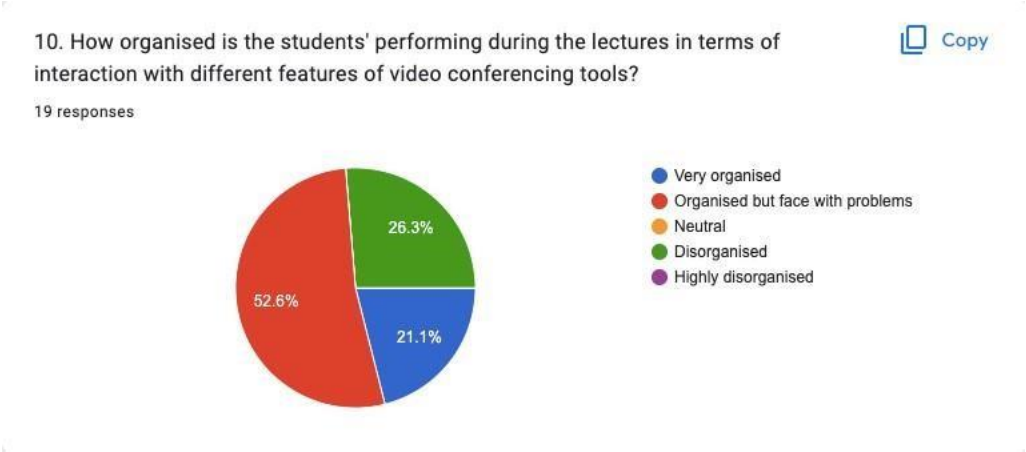

Figure 31: How organized is students interaction using video conferencing tools

Teachers how organized	percent	position
Very organize d	21.1%	Third position
Organized face with problems	56.2%	First position
neutral	0%	last position
disorganized	26.3%	second position

Table 18: How organized is students interaction using video conferencing tools What is the first thing that comes to mind about challenges and pain points during online learning with video conference tools? We believe this question in our survey can help us find gaps and problems in using video conference tools in the way of student's interaction problems.

1.What is the first thing that come to your mind about challenges and pain points during online learning with video conferencing tools?

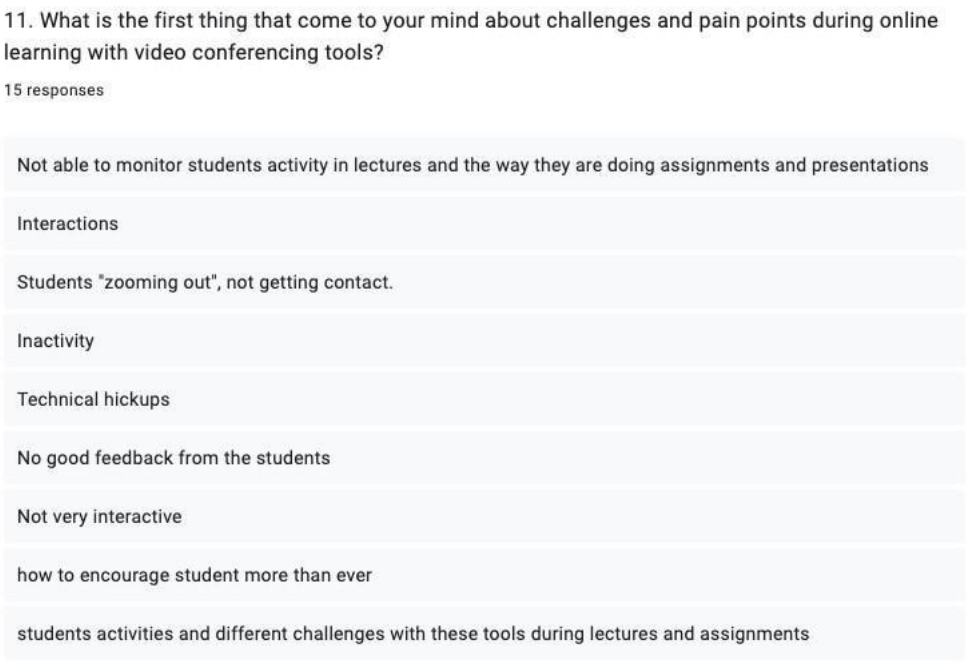

Figure 32: Teachers' opinion about video conferencing tools problems

In our survey, the next part of student interaction in the view of teachers will be 'How is your teaching in online education affected by your challenges and pain points with using video conference tools? We asked teachers to rate this question from 1 to 5 with adverse to positive answers.

1.How is your teaching in online education effected by your challenges and pain points with using video conferencing tools?

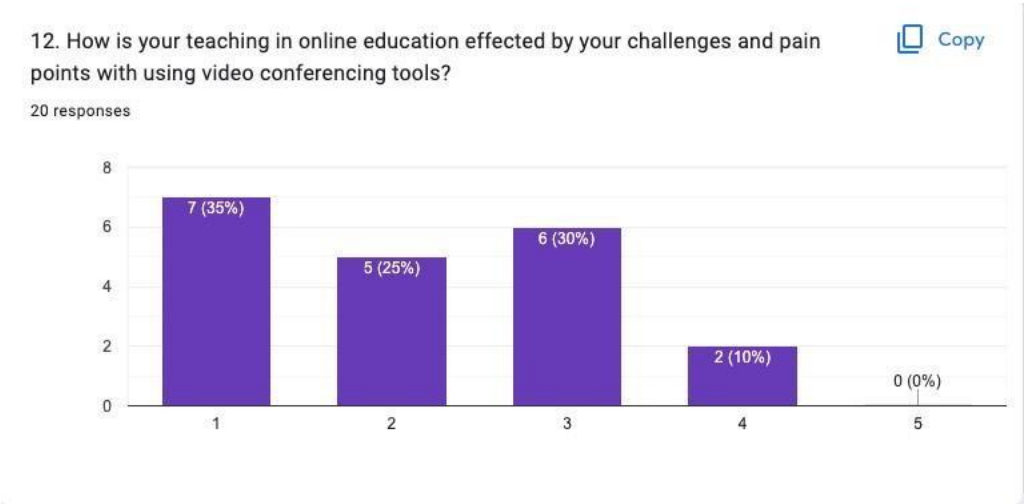

Figure 33: Effects of teachers' challenges on teaching style

And on the other side, we asked 'How is your teaching in online education affected by students' motivation with using video conference tools?

2.How is your teaching in online education effected by students' motivation with using video conferencing tools?

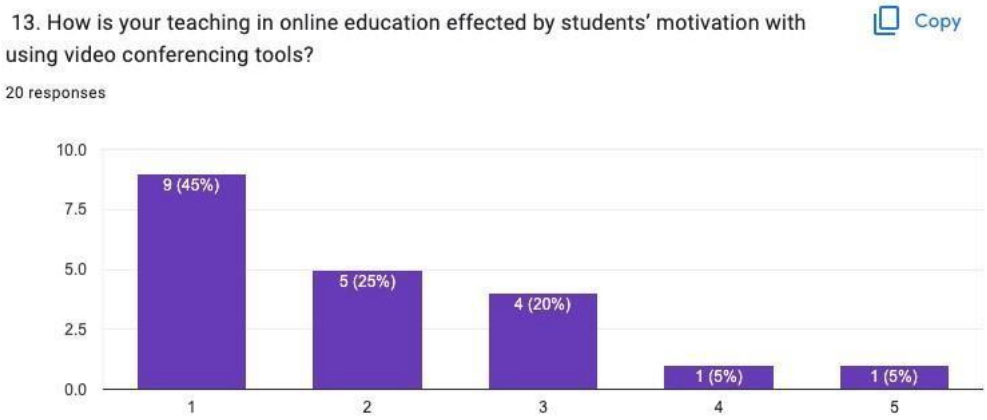

Figure 34: Effects of students' motivation on teaching style

Some suggestions and hopefully guidelines that can help us find a solution for fixing using video conference tools challenges asked teachers at Jönköping university how can fluency in lecturing and teaching affect online learning and increase its quality?

1.How can fluency in lecturing and teaching effect on online learning and increase its' quality? Mention your thought about it

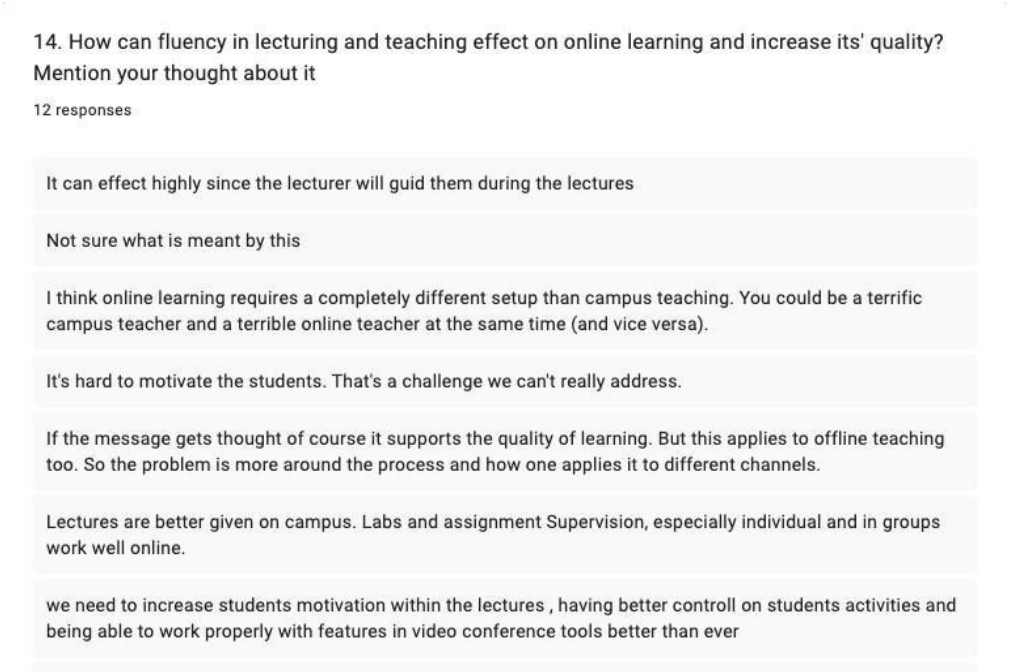

Figure 35: Effects of teaching fluency on video conferencing tools' quality Data from survey

participants bring important information that helps us have a better understanding of users' expectations, therefore, for answering the questions we needed to focus on a specific online conference tool that has been used most in Jönköping university where we have done our survey between students and teachers. Zoom video conference tool is the one we needed to have a clear understanding of how it works clearly and what are the main points and weaknesses.

During our research and testing of different features and abilities in Zoom we come up to design a feature that can fill this gap by targeting student motivation with help of teacher interaction.

Based on a face-to-face lecture, mostly teacher are trying to create different questions to ask students between or after a specific topic to make sure about their understanding and let share their opinion to motivate them to a deep understanding of the topic it is obvious that asking the question from students about the topic among the lecture can improve students' motivation and makes cooperation between other students, therefore, we helped this important by designing a feature that could add into Zoom video tool to improve students' motivation during lectures. Quiz is exactly a feature that can help teachers to create quizzes or would say questions for asking anytime in the lecture to simulate the same action in a face-to-face lecture.

For having a better understanding of the design process, we did complete research about the different available feature in Zoom that makes this chance for teachers. There are some possibilities in Zoom that could bring users into the same flow but based on our understanding and experience working with them, they are different and have been designed as a plugin and not a feature which users need to install and connect with Zoom.

What makes Quiz special and different from those plugins is that user can have easy access to the feature during the lecture with just one click on the main page. As a UX designer is important to reduce the number of clicks therefore, we have done is easy access with a minimum number of clicks for using the feature inside the Zoom video conference tool without any installation or switching between other browsers to have this feature.

On the other side, what is available is not easy to use and needs installation which is not an easy process for non-IT teachers and students but Quiz doesn't need any preparation or installation. Quiz will perform the quiz action on the main page of Zoom

in lectures (modal component base) while other plugins will need extra space or other browsers to control.

To sum up, the Quiz feature has been designed for testing between students and teachers to make sure we are on a right track and have a better understanding of how the feature is user-friendly for any kind of user and what has been designed in the prototype can develop with developers and idea is applicable even to the other video conference tools.

4.3 Interview data

Our interview information was gathered from 4 teachers and 7 students at Jönköping university in Sweden. Interview been designed after receiving and analyzing surveys between teachers and students to be able to have a better understanding of Quiz feature that been designed for answering research question four which is ‘which features could be added to video conferencing tools to help improve interaction between teachers and students and increase students' motivation?’

Analyzing and interpreting surveys helped us to design a prototype that can help students' motivation and teachers' interaction in an online education environment therefore we designed this prototype to test it with a specific scenario test it between our teachers as an interview to making sure about the quality and efficiency of this feature.

Scenario presentation

The scenario of this interview been designed based on a prototype which the flow is:

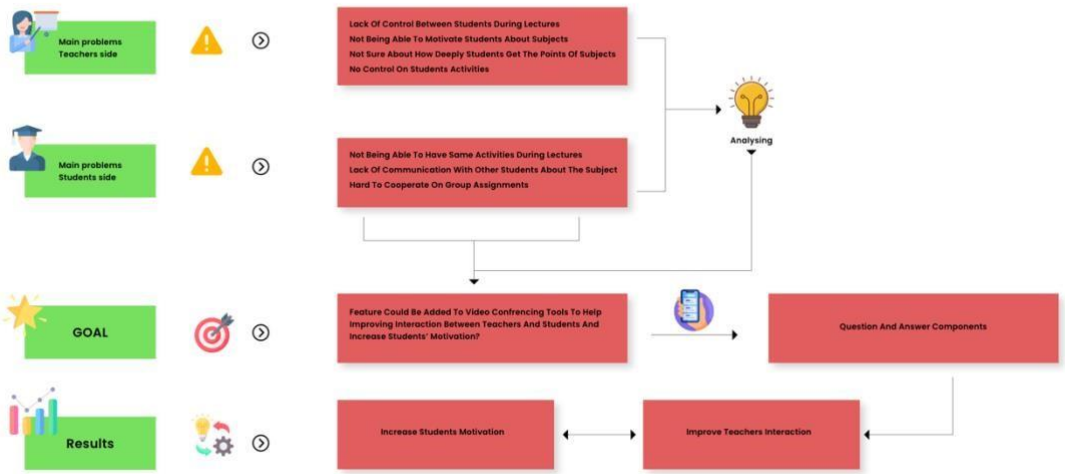

Figure 36: Interview scenario diagram

In this prototype we were trying to ask teacher to focus on a feature that been targeted to make a better communication between teacher and students therefore first step of testing asked teacher to activate the feature. Figure below shows the feature position that been designed to added into zoom video conference tools.

Figure37: Prototype of suggested feature location

For better understanding in our interview and testing we asked teachers to create an imaginary question based on the subject during the lecture. As figure 38 shows teachers' options to create different kind of question and type of data for creating their questions as quiz.

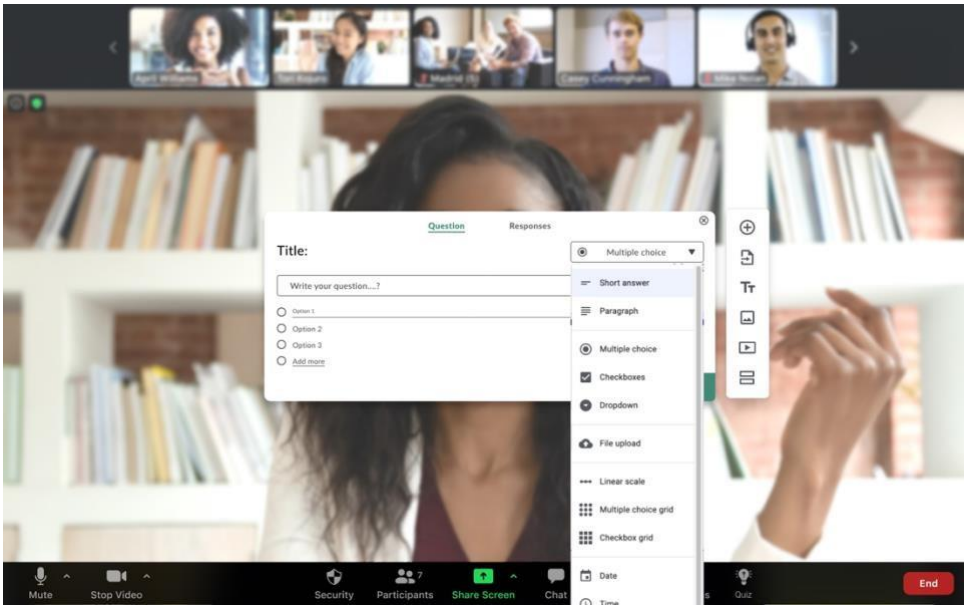

Figure 38: Prototype of suggested question type

Quiz will be shown on students' computers as a notify therefore everyone will get involve thinking and answer the question in that message box. figure number 39 shows this step clearly.

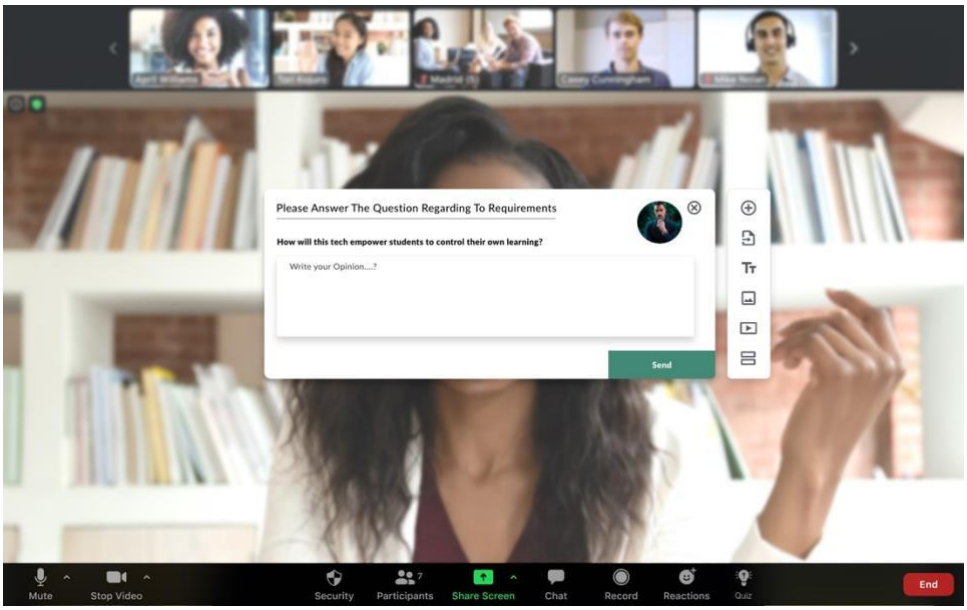

Figure 39: Prototype of notification for student

Students' results been listed for teachers as a complete report from how and who answered the question in quiz.

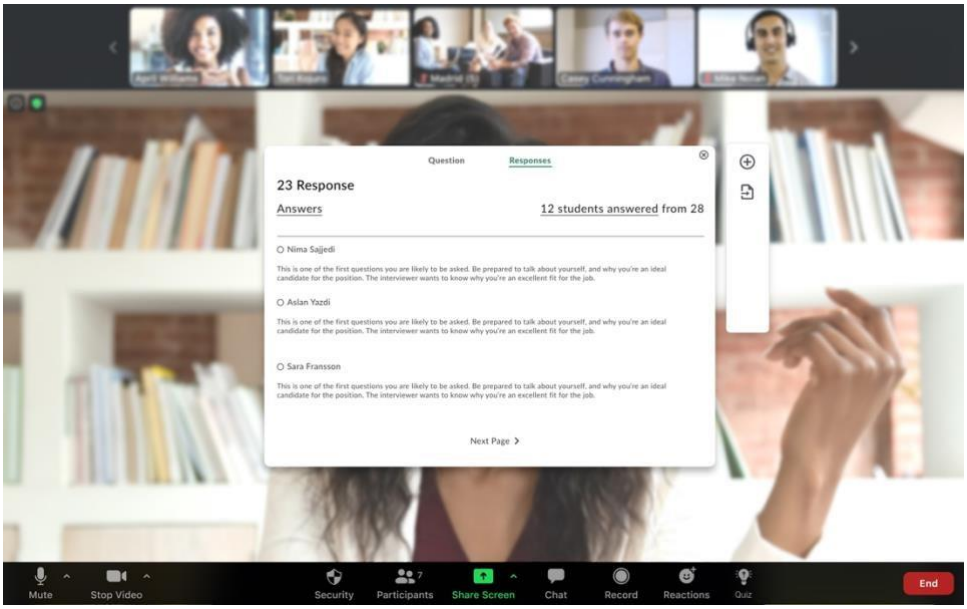

Figure 40: Prototype of question result gathered by teacher

4.3.1 Interview result

Every response of the interviewees has been recorded and analyzed in the form of quantitative data. In this interview we helped teachers to follow up on our user flow to track their actions therefore, we describe each important action below.

Overall structure

In this user testing as an interview with Jönköping university teachers, the main sections consist of user experience design that has been customed based on students' and teachers' actions during online classrooms, user interface design regarding the most useful video conference tool in Jönköping university classes called zoom, Wireframes that been basic concepts steps to reach the final design.

This user experience flow been categorized between two sections:

- Student ’user’ experience design: (Student response) one part of the scenario has been designed for students that appeared by creating teachers creating questions or we would say a notification that comes to the screen as modal components. Students are faced with a mandatory action to communicate with teachers and other students to show their motivation in the face of lecture important sections.
- Teacher ‘user’ experience design: (teacher request) on the other side of this scenario we have teachers' tools that could prepare Quiz service. What they need is to click on the feature button and easily create a question based on their need and the subject of the lecture and post it to the other students in the online classroom. In addition, teachers can see the results from students one by one with full details of students' personal information and their results.

During our interview, we received many positive comments from teachers and are quite positive and satisfied with this creativity. We believed this ability in different video conference tools will help students and especially teachers to have better control over their teaching and understand better and better topics as we have received these positive responses from teachers as well.

Convenience to use (CU)

The ability to connect with teachers in this interview quickly and readily and have a high level of user engagement with help of clear user flow in this prototype are both components of usability. It is simple to use and has been practiced leading teachers perfectly as possible.

- (Modal design): the component that has been used the most in user interface design to present the feature while we believed modal has been chosen smart choice to use to present the idea in Zoom video conference tools. Every aspect has been presented carefully and is performable and able to develop in a reality, therefore, we believed in our chosen and kind of component.
- (Optional text edition): multiple question type and multi type of data for creating a question is another ability in this feature for teachers to being able present their thoughts. Although students have different options while they are answering the questions in quiz.
- (Notifications system): Teachers can customize their notification system to notify students, therefore, important questions could be mandatory to reply to, and students can not reject and remove the question until the end of the lecture. This feature helps teachers to have better control over students' motivation for those who are not available or not willing to being active during lectures.

During the interview, we have concerns regarding different settings and types of data that had been prepared for the teacher side, but after the onboarding section in the interview we had positive responses for what we designed in those sections as well.

Focus Attention (FA)

Focus attention, which was the final theme been found, enables teachers to concentrate on how they interacted with this feature on zoom video conference tool.

- Teacher interaction: the main focus of attention on the teacher side belonged to improving the teacher interaction with video different video conference tools during using them this extra feature had the main attention to attract their interaction and we had a positive reaction from all our interviewees in this research.
- Students' motivation: the other focus of attention belongs to increasing students' motivation based on teachers' interaction with the video conference tool regarding teachers' feedback we had positive answers from teachers based on their experience during online classes therefore, these two-focus attention had a great impression on our interviewees.

5 Disscussion

In this section, we discuss the results of our study and method which are used to answer our research questions and look at them from the reliability and validity according to previous studies in this area. The limitations and implications of this study will be presented afterwards.

5.1 Result disscussion

The purpose of this research aims to motivate students in online education using video conferencing tools through creating better student-teacher interaction. To be able to answer our research questions, we analyzed our interview and survey results. We tried to fill students' motivation gap based on video conference tools problems, which became a trending subject by starting the pandemic as an unexpected situation in education process.

The Quiz feature is not a plugin that has been connected from external website or application to the video conference but also is a feature that has been designed to add to the environment of this tool. With this feature teachers can ask a question and expect students to answer so it is more like a short quiz after a lecture than a chat platform for question and answer. This feature let teachers to force students answer the question to prepare a better interaction and motivation at the same time for students and teachers. In this way students become aware of teachers' attention and care for their quality of learning. We believe this feature which is presented as a modal component base could provide more user friendly with more usability environment.

Based on teacher-students interaction pain points while working with video conferencing tools we found out these tools in some cases, which are the main area of this research, are faced with lack of ability to motivate students. With help of asking questions in a quiz from students during or after lectures same as face-to-face ones, teachers will be able to solve this issue. On the other side after the quiz students and teachers can discuss about questions and their answers which make it possible to share more thoughts between other students and teacher and reviewing the main points of lecture to increase understanding of topic. It is the main reason, we come up an idea to design a Quiz which can be added to all video conferencing tools.

Another important problem in video conference tools regarding teachers' interaction and students' motivation is the lack of commutation between students and teachers during the lectures. In this way, Quiz can help teachers to motivate students for having more chances to communicate with the teacher by making quizzes during the lecture.

Tracking students' motivation by teachers during the lecture is another aspect of designing the Quiz feature. Regarding our survey and interview results, lack of control over students' motivation can also affect teachers' interaction, therefore, we came up with a design of an environment that makes teachers better control students' activity by listing students' responses to the quiz. Every response consists of the full name of the students and the time of response which will cause better control over students' quizzes.

In summary, the Quiz feature could be a modal component that can add in different video conference tools as a helpful feature to motivate students and transfer better feeling for teachers to make sure students are following up and get the points on the topic.

5.2 Method disscussion

This part is a discussion for the methods which are used in this study and their reliability and validity. The limitations that we faced during these methods brought some implications in our research which are also discussed.

5.2.1 Literature review

As it is mentioned in the method section for answering research question 2 this method has been used. Regrading to our literature review, we targeted those articles and literature which looked at problems of video conferencing tools in online learning and its effects on students especially during pandemics that forced this way of education. We found literature review the best method for finding the reasons and factors which effect the students and their motivation in this process. Motivation is a concept which is more related to psychological aspect and reviewing previous studies in this case helped us to gathered useful results which was not possible without this method. It was one of the strength points of this method as other methods like survey and interview could not provide reliable knowledge in this case. Although some factors of high motivation are obviously common and confirmed in all research, there

are some factors which are highly related to personality of students or linked to other aspects and it makes challenge to expand it to all students. As a general result, student-teacher interaction and student-content interactions are significantly affecting the satisfaction and increasing the motivation. We found some sources considered video conferencing tools in other areas not specifically in online learning, and some outdated ones which we tried to filter them by using search combinations and filters in our search.

5.2.2 Survey

Two surveys conducted from both students and teachers to answer research questions 1 and 3. The teachers' survey consists of 14 questions with focusing on teachers challenges and problems with video conferencing tools and students' survey consists of 14 questions with focusing on effects of teachers-students interaction problems on their motivation. The surveys is mixed of multiple questions and open-ended questions. Some information from literature review data helped us to structures our questions and Google forms was used to conduct this survey because it is easier to send and share it through email. We send them for 3 to 4 days to teachers and students in Jönköping university and compare the results with findings from literature review to accept or reject them. Participation in the survey was voluntary and before survey we presented an explanation about the questions and goal of this research. 20 teachers and 23 students were responded to the survey which is noticed sufficient and presented the challenges and needs of teachers and students in online learning with video conferencing tools which is identified in previous research still exists and remains unresolved. The result is simply presented in pie charts and bar charts which make the analysis faster and more understandable. According to the result gathered from teachers, one of the big interaction problems with video conferencing tools is difficulty to track students during lectures and finding out if they are following the lecture or not and it can effected the interaction. Students also agreed that loss of communication and indifference about learning is a big problem which makes students unmotivated. Using technology as a base of this way of learning makes some challenges but is not a barrier for interaction with video conferencing tools. We are only focusing on teachers' interaction with students and technology barriers or other aspects is out of the scope of this research. The prototype is designed according to the

issues which teachers' mentioned related to interaction with students or students pointed out regarding their motivation.

5.2.3 Interview

We came up with a prototype to present our answers more efficiently and answer research question 4. The interview carried out supposing to get feedback and comments from teachers and students to see if our solution makes a better user experience and at the end user interaction for them. 4 teachers and 7 students were interviewed. At the beginning interviewees are justified with the purpose of interview and our research as well as our information desire. Then a short instruction about the process of testing the feature on the Figma, thinking load and tell everything which comes to their minds, and giving comments, answering some questions and free discussion was presented. It is important in our study to know what their first impression is and thinking. The interviewers' phone was given to interviewee, and they could access to prototype through Figma mirror. Through whole process we recorded the interviewee comments and took notes and monitor his acting with screen recording on phone. The interviewee was informed about it. During the session we asked them to imagine they are in an online lecture and tried to avoid saying anything which can affect the result.

For some participants who have no idea about user experience and interaction, it was challenging to consider our purpose and help us with giving some feedbacks we need and sometimes we needed to remind them thinking loud and provide us with the closest answer we were searching for. It is also important if they were stocked in one part or take it time to find out the process, then we will know whether this feature is helpful and user friendly or not.

6 Conclusions and Further Research

6.1 Conclusions

During pandemic, many students and teachers had to migrate to using different video conferencing tools for their education and present lectures. This new way of education and learning process makes lots of challenges for both students and teachers that can affect the

quality of online learning and make it less effective than face to face education. Therefore, as summery, we come up to investigate challenges and gaps in this field and try to find a solution to have a better teacher-students interaction. Furthermore, by receiving results from our selected methods, we found out one of the most challenges could be that teachers cannot track students' activities in online education. In conclusion, our designed modal component base feature helped them to have a better control over students' activities and motivate them in a more efficient way. Through the Quiz feature, which simulated quiz the same as live quiz in a face-to-face lecture. As we researched on limited teachers and students in Jönköping university, therefore, broader results can be future work.

6.2 Further Research

Our research is based on teachers' interaction problem with students and its' impact on students' motivation. We aimed at improving this interaction by giving some solutions or features in the form of prototype. The feature in prototype is designed with focusing on results we got and most important problem in teacher-student interaction and try to solve and decrease students' frustration. As online learning will have a big place in the future of learning environment and students' motivation is the main aspect of usability and effectiveness of this area, more research is needed to consider other aspects which has impact on students' motivation. It will make value if other solution or feature regarding feedback from teachers and tracking students presented. Due to our limitation in time, our sample is small and future studies should use more respondents in a bigger sample and in other universities around the world with different way of teaching. Using another research methods and data collection techniques like interview can broad the result of this study. In one university with the same rules and specified learning process each of teachers use individual way of teaching and it will affect on interaction. Pedagogical research is also needed to explore in this area and examine different way of teaching and behaving in the same video conferencing tools with same features to see the impact of behaving and teaching styles.

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8 Appendices

Appendix A: Students' survey

https://docs.google.com/forms/d/13xVe9aVPNPsj_5FUh4fuMyy4WFgZd6cuw5UY2wdZ9PA/edit#responses

Appendix B: Teachers' survey

https://docs.google.com/forms/d/117FKY6XX-gj6mAwNe77TYYdlVqDjaBtpILvnBarkMA/edit?pli=1#responses

Appendix C: Students' Survey

1. In what age group are you in? ○ Youth (15- 24 years old) ○ Adults (25-64 years old) ○ Rather not to say
2. Are you a student who study at ○ International Business school ○ School of Engineering ○ School of Health and welfare ○ School of education and communication
3. How often do you use video conference tools for different prepose?
   - Almost everyday
   - 4 to 5 days a week ○ Sometimes ○ Rarely ○ Never used it
4. What is your main purpose for using video conference tools?
   - For supporting my university lectures ○ For communicate with friends, family, relatives, .. ○ Option 1 and 2 together ○ Rather not say
5. How satisfied are you with using video conference tools for supporting universities tasks and lectures? ○ Very satisfied ○ Somewhat satisfied ○ Neutral ○ Dissatisfied ○ Highly dissatisfied
6. Do you feel that video conferencing tools should be more involve with educational system?
   - Yes ○ No
7. How helpful is using video conference tools for lecturing in universities instead of face-to-face lecturing? ○ Very helpful ○ Quite helpful ○ Neutral ○ Slightly helpful
   - Not helpful at all

8. How clear is lecturing and attending classes with video conference tools in your university?
   - Very clear ○ Somewhat clear ○ Neutral ○ Unclear ○ Very unclear
9. How organized was the teachers performs in terms of the interaction during lectures with different video conference tools in your university?
   - Very organized ○ Somewhat organized ○ Neutral ○ Disorganized
   - Highly disorganized

10. Did you participate actively in the courses with video conferences tools same as before Pandemic with face-to-face courses?
    - Very well ○ Somewhat well ○ Neutral ○ Not at all
11. Overall, how would you grade based on your pain points and challenges related to your motivation while using video conference tools for lecturing and courses?
    - 1 (A) ○ 2 ○ 3 ○ 4 (C)
12. How would you grade based on teachers' interaction problem affected your motivation in Jönköping University during using video conference tools?
    - 1 (A) ○ 2 ○ 3 ○ 4 (C)

Appendix D: Teachers' survey

1. In what age group are you in? ○ Youth (15- 24 years old) ○ Adults (25-64 years old) ○ Rather not to say
2. Are you a teacher who teach at
   - International Business school ○ School of Engineering ○ School of Health and welfare ○ School of education and communication
3. How often do you use video conference tools for different prepose?
   - Almost everyday

- 4 to 5 days a week ○ Sometimes ○ Rarely ○ Never used it

4. What is your main purpose for using video conference tools?
   - For supporting my university lectures and classes ○ For communicate with friends, family, relatives, .. ○ Option 1 and 2 together ○ Rather not say
5. How satisfied are you with using video conference tools for supporting universities classes and lectures? ○ Very satisfied ○ Somewhat satisfied ○ Neutral ○ Dissatisfied ○ Highly dissatisfied
6. Have you encourage your students to use more often video conference tools before pandemic? ○ Always ○ Sometimes ○ Rarely ○ Never
7. Do you feel that video conferencing tools should be more involve with educational system?
   - Yes
   - No
8. How helpful is using video conference tools for lecturing in universities instead of face-to-face lecturing for students? Do you feel video conference could be a better choice of teaching method in future? ○ Very helpful, Good Idea ○ Quite helpful, could be a good idea ○ Neutral, not sure
   - Slightly helpful, I don't think so ○ Not helpful at all, disagree
9. How clear is lecturing and performing classes with video conference tools in your university?
   - Very clear ○ Somewhat clear ○ Neutral ○ Unclear ○ Very unclear
10. How organized was the students performs in terms of the interaction during lectures with different video conference tools in your university?
    - Very organized
    - Somewhat organized ○ Neutral ○ Disorganized ○ Highly disorganized
11. Did you participate actively nowadays with video conferences tools same as before Pandemic with face-to-face courses?
    - Very well ○ Somewhat well ○ Neutral ○ Not at all
12. Overall, how would you grade based on your pain points and challenges related to your motivation while using video conference tools for lecturing and courses?
    - 1 (A) ○ 2 ○ 3 ○ 4 (C)
13. How would you grade based on students' interaction problem affected your motivation in Jönköping University during using video conference tools when you have lecture or tasks to do while lecturing? ○ 1 (A) ○ 2 ○ 3
    - 4 (C)