The Future of Lecture Rooms in Higher Education: A Study on the Essential Components of Successful Hybrid Learning Spaces

Daniel Sjöberg

Master Thesis

Media Management

2023

Degree thesis

Daniel Sjöberg

The Future of Lecture Rooms in Higher Education: A Study on the Essential Components of Successful Hybrid Learning Spaces.

Arcada University of Applied Sciences: Media Management, 2023.

Identification number:

9098

Abstract:

During the Covid-19 pandemic, a lot of trials and errors have been made when universities around the world have tried to accomplish a decent hybrid lecture room experience. This thesis implements a survey study with the research question “What is needed to build an optimal hybrid lecture room in Higher Education?”. The survey will investigate the experience and feedback from the hybrid lecture room users at Hanken School of Economics. The result is compared and analyzed with the current situation at Hanken and how other universities have built their hybrid lecture rooms. Research that has been made earlier around the topic of hybrid learning is presented and analyzed as well. The research is made with four main areas in consideration: Technical issues, user issues, support challenges and pedagogical challenges. The conclusions are, to build and prepare an optimal hybrid lecture experience, both the technical setup and the course structure needs to be optimized for the hybrid lecture purpose. The theories and guidelines need to be implemented for one optimized room, trying to make several rooms on a decent level is not recommended. Several screens, cameras and ceiling microphones are crucial as well as a room system to control all the equipment. The hybrid lecture room needs either a hired technician to manually control everything or an advanced automated system probably based on AI or Machine learning.

Keywords:

Hybrid lecture, hybrid learning, education, video, technology

Contents

1. Introduction

1.1 Background

I work as a Media Producer at Hanken School of Economics in Helsinki, Finland. Hanken School of Economics is a university with over 100 years of experience in education and research in business administration and economics (Hanken School of Economics A, n.d.). The responsibilities as a Media Producer include different types of video production, live streaming, video platforms, technical planning of the lecture rooms and more.

Like many other universities, Hanken has been focusing on producing video content for online learning, publishing MOOCs, building recording studios and recording video lectures for online use. The digitalisation of education is not really a new thing and has been going on for a while but, then something happened that probably no one was prepared for. During the Covid-19 pandemic, all universities had to figure out how to continue with their education. Some universities decided to go fully online while some, like Hanken, decided to focus more on hybrid lectures as long as possible. The hybrid setup was chosen so the students and teachers that wanted to attend in the classroom could do that, while those who didn't feel comfortable leaving the home could still attend the lectures online. Hanken did a big investment and prepared all the classrooms with a decent level of technology for the hybrid lectures. Two rooms were also equipped with an extra screen and Teams Room System for an even better experience. Now that the pandemic is over, and life is slowly starting to get back to normal it's important to pause, reflect and investigate for the future. What went well, what could have been done better and how will hybrid lectures evolve in the future, or was it never meant to be?

1.2 Definitions

Before moving forward, it is important to define a couple of things. In this thesis, “hybrid lecture” refers to when the lecture is held in class and online simultaneously. The teacher is in class with a few students and the rest of the students attend from home, following the lecture stream with a video conference platform like Microsoft Teams. The goal of this thesis is to find the optimal solution for hybrid lecture, but what does optimal mean? It can be described shortly as when everything works smoothly. When the technical setup is of high quality both picture and audio-wise. The teacher can focus on the teaching without any disruptions and can give attention to both the in-class and online groups. The engagement from the students both in class and online are satisfying for all participants. This describes an optimal hybrid lecture experience. (Schiano, 2021)

1.3 Motivation

Hanken has requested an investigation to be made about how the room setups for hybrid lectures could be developed to serve education more efficiently. Because I work at Hanken School of Economics in the IT department and together with TeachingLab, which is the group at Hanken that is working for the teacher’s interest, it is in my great interest to investigate the hybrid lecture possibilities further and hopefully be able to develop the rooms technical setups better at Hanken. The research will be conducted and elaborated with a focus on higher education but will be beneficial for other fields as well such as media production. When looking through the current research that is partly presented in the theoretical framework chapter, there is a lot about “flipped classroom”, online versus in-class and some about actual hybrid learning from different research angles. However, what is missing is research about the actual room equipment and what is needed to support the hybrid learning experience technology, service, and resource vise.

1.4 Research question

The research question for this master's thesis is "What is needed to build an optimal hybrid lecture room in higher education?". Some people seem to think that hybrid lectures are the future, at the same time, even more people seem to not enjoy hybrid lectures at all. During the Covid-19, Hanken has been focusing on developing the classrooms so they would work well for hybrid lectures. It seems to be a challenge to get the rooms working smoothly, especially for the teachers that are the main users of the rooms. The conclusions from the research will benefit the future planning of the rooms at Hanken, and other universities as well.

1.5 Limitation

The research question is phrased open and general to find challenges in different areas of hybrid lectures like technical, pedagogical, support etc. This research could cover the whole world or several universities however, to not make the research area too wide, the research will focus on Hanken School of Economics. The survey will be sent out only to the teachers and therefore, students and staff are excluded from this work. We are not trying to develop the current setup of education, instead, we are focusing on the current setup and how to optimize it.

1.6 Methodology

To be able to research the user experience at Hanken, the chosen method for this master thesis is to implement a survey. A survey is an effective method to collect data from many people in a relatively short amount of time, the goal is to collect data from a broad range of individuals. Surveys are also cost-effective and flexible, the survey can be sent out in a variety of ways, including e-mail, in-person or online. Typically, surveys are easy to analyze because the data is usually in a structured format (DeFranzo, 2022). It will be created with an internally used survey platform at Hanken and therefore the personal information is taken into consideration. The survey will be sent out with the TeachingLabs newsletter that reaches a broad amount of the teachers at Hanken. Research has been made, mostly from SurveyMonkey on how to make a successful survey with an optimal layout and a number of questions. Then we can ensure that we gather as many answers as possible to get the best possible picture of the current situation.

1.7 Purpose

This article will gather information from the main users, the teachers, and their experience from around 2 years of hybrid lecture usage. The results are analysed to gather insight into the hybrid lecture experience. The purpose is to understand what components work well and especially, what has not been working optimally when it comes to the current setup of the hybrid lecture rooms. And with this information compare the feedback collected from the users with the solutions and experiences from other universities. This will give us a good understanding of the future of hybrid lectures. Hopefully, we come closer to the answer if hybrid lectures can work optimally enough to be successfully used in the education at Hanken School of Economics and other universities as well.

1.8 Terminology

Hybrid Lecture:	Where there are participants both in class and online during a lecture.
FTF:	Shortening for face-to-face, for example when participants meet face-to-face in the classroom.
PTZ Camera:	A Camera that can pan, tilt, and zoom with help of a motor.
Ceiling Microphone:	In this thesis, it's a Sennheiser TeamConnect Ceiling 2 Microphone attached to the ceiling.
Panopto:	Online video platform especially suited for education.
Microsoft Teams	Collaboration platform and video conference tool
Teams Room System:	A computer that handles the Teams conference call.
MOOC:	Massive Open Online Courses are free online courses available for anyone to enrol.
Wooclap:	Interaction tool with quizzes and more.
Webropol:	Survey platform based in Finland.
Blackmagic ATEM Mini:	A common model of video mixer.
Video mixer:	Usually (but not always) a hardware unit where you can input several video signals and cut in between them.
Moodle:	Learning management system used at Hanken.
Wide angle camera:	A camera that shows a wide view, usually 64° and 84°.
AEC:	Short for Automatic Echo Cancellation. Usually, a hardware unit reduces the echoing heard online by preventing speaker audio from coming into the microphone in the same room.
AI:	Short for Artificial Intelligence. Computer programs or hardware that imitate human intelligence.

2. Hybrid learning at Hanken

During the pandemic, Hanken had to develop several hybrid solutions that would support teachers and students. Below are the different hybrid setups presented at Hanken with pros and cons from Hanken's official hybrid document. The main equipment that is available in most classrooms includes a ceiling microphone, PTZ camera, projector or big touch screen, classroom computer and the option to connect own laptop. Students can attend from home either live through Microsoft Teams or on demand with Panopto recordings. Wooclap is a tool provided by Hanken that can be used to engage students. By using Wooclap in education it's possible to engage students both in class and online with quiz games, live survey questions and more. The platform integrates well with the existing ecosystem like Moodle and Microsoft Teams. Hanken has four main hybrid learning solutions that are presented below (Hanken School of Economics B, 2022).

2.1 Hybrid sync 1 – teachers in class + co-host

The first hybrid setup from Hanken is called Hybrid sync 1. In the classroom, there is a teacher, some students, and optionally a co-host that is physically in the class. The co-host is focusing on the online students from their laptops. Online are some students, the co-host can as well be online. When the co-host is online, he or she will only interact with the online students compared to if the co-host is physically in the classroom. The co-host can help the online students interact with the students physically in the class. The pros are that this setup engages students in the classrooms, and the main con is that it is heavy on the teacher without a co-host. (Hanken School of Economics B, 2022).

2.2 Hybrid sync 2 – teachers from home + co-host in Class

The second hybrid options mainly differ from Hybrid sync 1 in the way that the teacher is online, in other words: at home. Some students are in class, and some are online. Because the teacher is online, this setup requires a co-host that is in class and opens the door, turns on the equipment, login to the Teams meeting and facilitates in-class activities like student questions etc. The main pro of this setup is that it has been safe for teachers during Covid-19. Also, there is a possibility for classroom engagement if the co-host takes care of it. And because of the ceiling microphone, it's easy for the teacher to engage with the students. The cons include that the teacher's engagement is not as smooth as it is in class, also the co-host has an important role, so a lot of responsibility is on that person. (Hanken School of Economics B, 2022).

2.3 Hybrid 3 async – lecture recorded in class

The teacher and students are in class, and the lectures are recorded but not live-streamed, therefore only live interaction with the teacher is in class and those who participate online afterwards have limited options to engage. The main pro is that the teacher only must focus on one media, in-class teaching and therefore the load that the other hybrid options come with has been reduced. Another pro is that the lectures are still available for students who can't participate even if it is not possible to participate and engage online. The cons on the other hand are that there is no interaction with students at home, also the course can become a self-study course for some students. (Hanken School of Economics B, 2022).

2.4 Blended learning

Blending learning (also called flipped classroom). The teacher/co-host and the students are participating in class. During class, there are small group assignments and exercises led by the teacher or co-host. Online, there are pre-recorded lectures and self-study material. Certain assignments and exercises can also be held in small groups online. The big pro with this setup is that it uses the best of both worlds. The main con on the other hand is that it's quite heavy to prepare and needs to be taken into consideration in course design from the beginning. (Hanken School of Economics B, 2022).

2.5 Hybrid lecture rooms at Hanken

In all the rooms at Hanken, it's possible to either record with Panopto or teach hybrid with Teams. Below, two medium-sized rooms will be presented that are specially equipped so also in class students' interaction can be heard easily (Hanken School of Economics C, n.d.).

2.5.1 Hybrid room example 1 – basic room setup

All medium-sized rooms at Hanken are equipped with a ceiling microphone and a camera. The microphone will make it possible for both the teachers and students in the class to be heard in the Teams call. The PTZ Camera is filming the teacher. There is an 86-inch touch screen as well so if the teacher writes any notes on the screen, it will be clear for both in-class students and online students. The stereo speakers make it possible for online students to be heard in the room. And the teachers use the regular Teams application on their computers for this setup. (Hanken School of Economics C, n.d.).

Figure 1. Medium size lecture room at Hanken.

2.5.2 Hybrid room example 2 – advanced room setup

Two of the rooms at Hanken have a more advanced setup that provides some extra features. Besides the equipment that the Hybrid Room Example 1 has, these rooms are equipped with a Teams Room System and an extra screen back in the room as well. The Teams Room System makes it possible to attend the Teams meeting easily without the need for an own computer, the room system takes care of that. The second screen in the back makes it possible for the teacher to see the online attendees, if they have their web camera turned on. (Hanken School of Economics C, n.d.).

Figure 2. Medium size lecture room at Hanken.

3. Theoretical framework

Hybrid learning is not a new thing, experiments have been done for many years, but it is more relevant today after the covid-19 pandemic. Hybrid learning refers to the mixing of learning environments: online environment and face-to-face classroom instruction. The goal is to provide the most effective and flexible learning experience by combining the delivery methods. The key features of hybrid learning are that it can be adjusted according to the needs, such as place, time, and pace. Despite the benefits, the approach has been found to be less adopted by providers due to drawbacks in terms of integration, applicability, and cost restrictions (Sameer, 2014). Hybrid lectures in higher education are commonplace and a lot has been written about how to design and build an optimal hybrid lecture however, there seems to be lacking information about the best practices on how to best implement hybrid learning. Historically it has been more focused on the online technology and less on the technical setup in the classroom. When planning the classroom technology, it seems to be a good idea to start from the learning outcome and prepare the technology based on that. Building technology for usage just for the technology's sake is distracting and does not motivate the learner or the students (McGee & Reis, 2012). An effective hybrid learning environment is necessary to implement innovative pedagogical approaches using technology in education. The introduction of hybrid learning faces challenges for it to be an effective innovation in teaching and learning. One big challenge is how users can successfully use the technology and ensure students commitment given the individual learner characteristics. However, analysis results show that hybrid learning designs features and student characteristics predict student satisfaction as an outcome (Kintu et al., 2017)

3.1 Student view of hybrid learning

Despite the growing interest and great potential in hybrid learning, the evidence is mixed. Many students saw the benefit of that, where everything is laid out and well organized. The students didn't have to worry if they miss one FTF class, because all discussion threads, documents etc. is uploaded on an online platform. 56% of the students agreed that the online components helped them to balance their coursework with other home and work responsibilities. One point that was brought up by the students where that it was like having two different teachers, so if your human teacher doesn't identify with your learning need, sometimes a computer is better. Further, when conversations were carried from the classroom to the internet or vice versa, all students (including the shy ones) could participate, and all voices could be heard. The main benefits of hybrid learning seem to be: Multiple modes of delivery. When both FTF and online are used, there is more focus on meeting the diversity of needs of the learners. Connectivity and interactivity. Connectivity in Web-based discussions is also associated with content connectivity. Increased activity in a hybrid course could be achieved by bringing comments that students posted online to the FTF class for further discussion. Adding the online component of the hybrid course made it more appealing due to its clear structure and focus.

The challenges on the other hand: Some issues were a lack of technical skills and a lack of high-speed access to online components. Even though a majority of today's students grow up in front of computers, they have also spent the past decade or so in traditional classroom setups. Keeping both virtual and physical office hours. Adding an online component into FTF teaching complicates instructions. Communication and monitoring challenges occur. A suggestion for hybrid course instructors is to keep both physical and online office hours. Updating technology skills. Instructors and students that are not comfortable with new technology need to update their technology skills. Offering hybrid learning orientation. The first week of the class should be dedicated to the orientation of the hybrid course. The study found that students whose technology comfort level was low felt more challenges in the hybrid learning enjoinment. Overall, most students preferred hybrid learning and saw benefits with it, mostly because of the flexibility where they don't have to sit in a classroom to participate in class. (Olapiriyakul & Scher, 2006) (Lin, 2009)

3.2 Planning is key

The growth of hybrid learning has been tremendous since 2000. Enrollment in online programs has more than doubled in the last few years. Some factors in the growth of online learning are technology and enhancement, perceived value or improved reputation, and increased accessibility. Some universities have experimented with a hybrid format, and they are reporting promising results from students like learning more, writing better papers, performing better on tests, discussing course material more meaningfully and completing higher-quality class projects. However, while students seem to enjoy hybrid learning it does require more planning and preparation from the educator than face-to-face courses. Experiences show that students learn better when the course is well-planned and clear, therefore planning and structure are key. A suggestion for planning the hybrid course according to the proposal paper is to divide it into these six sections:

1. Policy and procedures
2. What to be done before the first meeting
3. How class activities should be divided between face-to-face and online format
4. Managing online activities, particularly managing live chats
5. Class participation policy (both face-to-face and online)
6. Evaluation and lessons learned.

Overall, there is much to be considered when designing and delivering hybrid courses. However, there is also potentially much to be gained in terms of the student learning experience. (Mossavar-Rahmani & Larson-Daugherty, 2007)

3.3 Best of both worlds

Other reports show an overall positive outcome from hybrid learning. The goal of combined traditional and internet-based education is to get the full advantage of the benefits that each platform can offer, it may provide an educational opportunity that can promote student learning better. Results show that well-planned hybrid learning is more effective than FTF or online models in higher education. Some of the advantages of hybrid learning that the study points out are:

- Many courses are more complex and too expensive to obtain through distance and therefore are better served through blended learning.
- Increasingly flexible and effective learning spaces that meet today's learning demands.
- The use of physical resources is maximized.
- Content can be developed to meet the unique styles and needs of various learners.
- Extends learning through innovative use of online resources.
- Offer personal benefits to educators in terms of their comfort level.

And some of the challenges they found were:

- Obtaining physical resources like computers, high-speed internet etc.
- They need to learn more sophisticated technologies.
- Lack of peer contact and interaction.
- Developing skills in both uses of pedagogy and tools of online learning.
- Effective online learning will take time to implement properly.
- Staff need to be trained and to develop online facilitative skills.

Some of the effects of hybrid learning that the study found are presented above. Research shows that the use of hybrid learning is more effective than FTF or online models in higher education. Between face-to-face and online, online is on the same quality level as FTF and may even have advantages in terms of improving student achievement and potentially expanding the amount of quality time students spend learning. However, some research results are not that positive. In one current study, a recent experiment of a course concluded that fully online was the best of all the approaches, better than both face-to-face and hybrid. Another found where that developing and planning a large enrollment hybrid course takes about two to three times the amount of time a traditional class would take. Future research should evaluate the effectiveness of hybrid learning, so it will help educators to design optimal learning environments. (Meydanlioglu & Arikan, 2007)

3.4 Organizational, pedagogical, and technological challenges and benefits

3.4.1 Organizational benefits

Some higher educational institutes are dealing with a decline in student enrollment numbers because of the increased offering of online and distance education. Synchronous hybrid learning could provide a solution for this issue, by offering the possibility to attend remotely or face-to-face. Moreover, there is also possible to offer more specific or elective courses which are normally taught at one specific location, consultation from external experts, and address the personal interest of students better. Another benefit from an organization's point of view is that hybrid learning eliminates the need to teach the same course twice to different classes at different locations, which reduces workload. Flexibility is a big benefit, is a student for example is ill and therefore can't attend class there is a possibility to attend remotely. (Raes et al, 2019)

3.4.2 Pedagogical benefits

A hybrid setup makes it easier to include expertise outside the institution so that students can get a broader range of ideas and views. Another perspective is that this setup can strengthen the student's willingness to make new contacts all over the world. Moreover, by combining the two educational modes (FTF and online), there is better flexibility for students that nowadays live a busy life with work etc. As a last benefit to bring up, students also get to experience the many possibilities that technology has to offer and work with it. Therefore, they get better prepared for their future careers in our technology-rich society. (Raes et al., 2019)

3.4.3 Pedagogical challenges

This type of learning environment requires a huge shift in the teachers' pedagogical methods to handle the new technology. With hybrid learning, the quality of the teaching is partly dependent on the teacher's technology skills, therefore the teachers need to constantly learn how to work with the technology.

Another important challenge is that hybrid learning requires more coordination from the teacher when the teacher needs to pay attention to students both online and on location. Overall, it has been found that when using synchronous hybrid learning, it also gets more difficult to activate and engage remote students. Students online were generally more passive and behaved almost like they were watching TV. One main reason is that it gives classes with

a more monologue-based teaching setup, this type of teaching is not well suited for hybrid learning as it is described above. Lastly, hybrid learning demands more self-discipline from students online because the teacher is not physically present. (Raes et al., 2019)

3.5 Technological challenges

The biggest challenge in synchronous hybrid learning is the audio component which is important for success. Optimally, students online should experience the same audio quality that students in class experience. Therefore, setting up and testing all the technology in beforehand is of great importance for the lecture to go smoothly. Overall small changes, updates or issues around technology can cause high-stress levels for the teacher. (Raes et al., 2019)

3.6 Optimal hybrid lecture rooms

Is there even such a thing as an optimal hybrid lecture room? To investigate this further, it's a good idea to see what other universities around the world have done when it comes to preparing an optimal hybrid lecture room experience. Therefore, we will look closer at Harvard Business School, University of Amsterdam, Imperial College London, and Oulu University of Applied Sciences. Below are some of the main takeaways from the universities summarized, a closer look into the room setups will be made in the discussion chapter.

3.6.1 Harvard's first hybrid lecture room

Harvard Business School developed their first hybrid lecture room when the pandemic hit. The challenges were many, some examples include, how could the boards and class material be visible for both the in-class and online groups, how could the professors interact and engage with the remote students, how would the engagement be possible between the students in both groups etc. The team who was responsible for the development of the room identified five key directives: maintaining the classroom experience, ensuring equity for both the in-class and remote students, maintaining a familiar teaching environment, and keeping all the involved safe. A main goal for the technical setup where that the room needs to be as automated and self-served as possible. Two cameras were installed, one in the back between the online participant screen for a natural viewing angle and one in the front to give a wide-angle picture of the students in class. Several screens, 4k cameras and 45 new components in the technology closet were installed all connected to the Zoom rooms. (Harvard Business School, 2020)

Figure 3. Hybrid lecture room at Harvard. (Harvard Business School, 2020)

Harvard did a lot of trial and error to develop the room bot for the hybrid experience but also to make the room as safe as possible considering the ongoing pandemic. The feedback of the room where mainly positive:

"It felt very safe, and I immediately felt at home—give me chalk and a blackboard and I'm in my comfort zone. Zoom is a great technology, but I find myself very distracted—I can't read emotions and make eye contact. In the hybrid classroom, I can focus on the case,"

(Narayanan, Harvard Business School, 2020)

"Students can see the boards, my writing is better, and I tend to move a lot in the classroom. In the office, I'm confined, and the students have liked that in the hybrid classroom I can move around and call on people—they feel that energy and they appreciate it,"
(Viceira, Harvard Business School, 2020)

Something that is not mentioned in the article is how they handle the technical support for the teachers. With all the screens, cameras, zoom rooms etc. it is questionable how they succeed to make everything run smoothly if they don't have at least one technician present all the time.

3.6.2 Technician hired at the University of Amsterdam

Besides investing in several cameras and ceiling microphones, the hybrid room at the University of Amsterdam has also a full-time technician and a budget for 3 staff, working 3-4 days a week for the studio has been allocated. Because of the full-time technician, the hybrid lecture room allows for high-quality "TV studio-like" productions and ceiling microphones were installed with interaction as a high priority. (Media & learning, 2022).

Figure 4. Hybrid lecture room at the University of Amsterdam. (Media & Learning, 2022)

It is easier to build a room that works one way, meaning that the content in the class is streamed to the online audience without them being able to interact with their computer microphones. The challenge is to build a hybrid interactive lecture room without making the technical setup too complicated and complex. One question that comes up is, will it be possible to run a complex hybrid lecture room without a technician?

3.6.3 One-way stream at Imperial College London

Another way to look at a hybrid lecture is to scale down the complexity and make a higher number of rooms prepared for one way stream, as Imperial College London decided to do They have campuses in 9 locations and a total of 600 rooms where they managed to maintain teaching during the pandemic. The rooms are equipped with a camera, speaker and microphone which focus on the teacher, therefore the students in the classroom are not visible or heard. This makes the technical setup less complex and much easier to maintain and handle for the users. Imperial College London also did a more complex hybrid room very similar to the ones described above. A couple of interesting statements about the complex hybrid room were made. They mention that they still have some acoustic challenges in the room when it comes to audio quality and those need to be examined by experts. This is an issue we also have in almost every room at Hanken, the audio quality is okay with minimal echoing problems but, it could be better. In the article, they describe the process to start a Zoom room meeting as 5 to 7 taps on the iPad connected to the room, which they describe as "reasonably easy". The two more complex hybrid rooms at Hanken have a touch panel for controlling the Teams meeting, there it's just one tap on the panel to start the Teams meeting, so 5 to 7 taps sound unnecessarily complicated. (Media & Learning, 2022).

4. Method

To be able to investigate what the teachers at Hanken think about Hybrid learning, the chosen method for this study is to implement a survey.

4.1 Creating a high-quality survey

Before sending out the survey, a few things need to be established, like the optimal number of questions, type of questions and what platform to be used etc. The more questions, the shorter time responders spend on every question. When a survey takes more than 5-7 minutes to complete, it results in a completion rate drop from around 5% to 20%. It takes about 5 minutes to complete a survey of 10 questions. According to the data above, 10 questions seem to be a safe amount to strive for. In the survey for this thesis, the number of questions was a total of eight from the start, when adding the "comment your answer" field it ended up being a total of 10. Therefore, the safety guidelines for the number of questions were followed. In the end, it was beneficial to have 10 separate questions, so they were divided from each other and not asked for several things in the same question.

It is recommended the use closed-ended questions compared to open-ended questions. It is then easier for the participants to answer and therefore lowers the risk of them giving up halfway through the survey. That recommendation where not followed in this thesis survey because the goal where to gather the widest variety of feedback possible, to limit that possibility would not be beneficial for this thesis even if the risk for drop-offs were higher. To balance the drop-off risk, almost all questions were optional, the responders didn't have to answer a question if they feel that they don't have anything to respond to. The questions are neutral and not leading, this is important because leading questions can damage the data of the survey. Before sending them out to the teachers at Hanken, a test run where made to make sure that everything works properly, and that the answers are correctly delivered to the system. (SurveyMonkey, 2020)

4.2 Survey ethics

Ethics are the idea of what is morally right or wrong. When working with surveys, it's a good idea to have some ethical best practices established. The survey that will be sent out to the teachers will not ask for any private information and therefore not collect any. It will be anonymous to participate in the survey, so no names or addresses will be asked for. To make it harder for the same person to answer the survey several times, the survey website will save a cookie on the participants' computer so that the same web browser can´t be used a second time to answer the survey, at least not in an easy way. The answers will be used and beneficial by the survey creator and TeachingLab members at Hanken. The information about anonymity and the use of the answers are informed to the participants before they participate in the survey. There is no sponsorship interest in this survey and no bribes whatsoever have been used to collect the answers. (Fisher, 2020)

To make sure that the storage of the survey answers has the best protection possible, the survey platform Webropol which is approved and used by Hanken School of Economics will be the chosen platform. Webropol has its head office in Finland and therefore follows both the EU´s and Finland's data privacy rules, like GDPR. (Webropol Oy, 2021).

4.3 Survey questions

The survey questions were written based on the guidelines for writing successful ethical questions. The type of questions that needed to be asked became clear when investigating the other universities' hybrid lecture experience as well as looking into earlier research around the topic. The questions were written with some support and feedback from Hanken TeachingLab, which have a good insight into the educational-related challenges and close collaboration with the educators.

The definition of hybrid learning in the survey: When a lecture has attendees both online and in class.

1. Have you implemented hybrid lectures for your education (Where students have participated online and in class)? Never, A few times, Many times, On a regular basis
2. Has your decision to implement or not implement hybrid lectures been a personal preference or an external requirement or something in between? Please elaborate on your decision.
3. On a scale of 1 to 5, rate your overall hybrid lecture experience technology vice. 0 = The worst, 1-2 = Bad, 3-4=Not bad, 5-6=good, 7-8=very good, 9-10= excellent
4. Do you feel comfortable using the hybrid classroom technology? YES/NO
   If not, do you have any suggestions that would support you when using hybrid technology?
5. What issues/challenges have you experienced during a hybrid lecture? Please, list as much as you can.
6. What do you feel works well with the current hybrid Lecture setup? Please specify which rooms you have used at Hanken or how the setup has been if you have taught hybrid lectures elsewhere.
7. Do you feel that you can treat the students the same way when they are participating online VS in class? YES/NO. Please comment your answer:
8. Is there something else you want to comment on? The word is free.

5. Results

The survey was sent out to the teachers at Hanken with an internal newsletter.

Approximately the number of teachers working at Hanken: 180

Number of teachers that did not respond: 160

Total number of respondents: 20

Response rate: 11.11%

1. Have you implemented hybrid lectures for your education?
   Number of respondents: 20

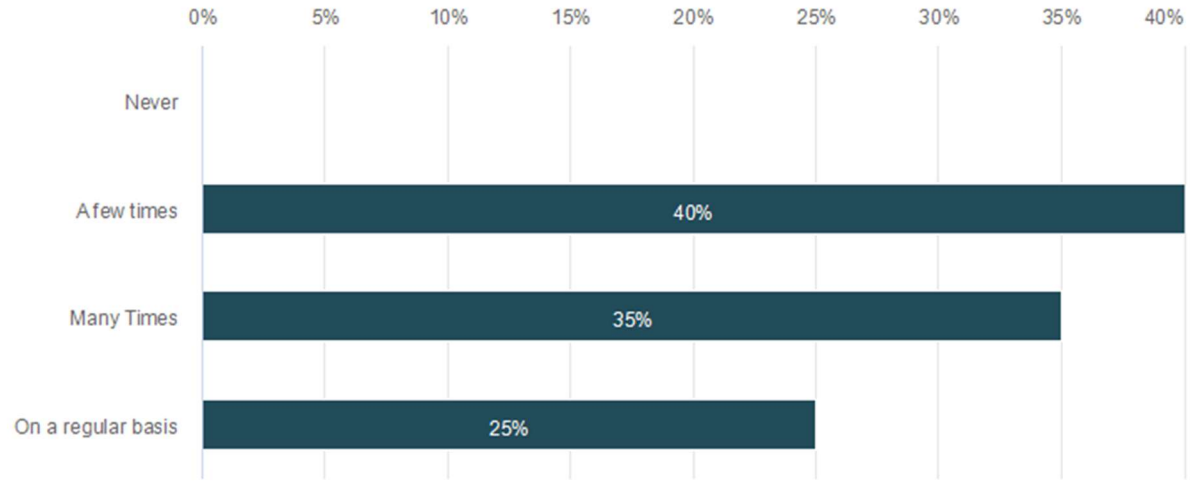

Figure 5. Results of implementation of hybrid lecture.

It's satisfying to see, that all responders have somewhat implemented hybrid lectures and will therefore have feedback to provide. Most of the responders have been implementing it on a regular basis or many times. This means they all have experiences to share in the survey.

2. Has your decision to implement or not implement hybrid lectures been a personal preference or an external requirement or something in between? Please elaborate on your decision.
   Number of respondents: 20

It was expected that most have been implemented because of external requirements, like the pandemic. Even if most answered that the requirement was an external request, some had considered it before the pandemic or even implemented it already. Therefore, we gather answers from different perspectives. There will probably be different attitudes depending on if they have implemented hybrid lectures voluntarily or by force.

Table 2. Responses to question 2 in the survey.

Responses
Something in between. Had planned to do an onsite course but had course participants from other countries and was prepared to switch to hybrid if needed, and the pandemic worsened and I had to.
It has been a personal choice as a way to test and try new forms of lecturing.
Endast på grund av tvång, coronabestämmelser som gjorde att vi inte kunde kräva fysisk närvaro
Something in between. During look-down that was the only way to get at least a few students to school.
Mostly an external requirement.
Personal preference. I think it is evident that universities, just like any organization, must have learned something from the pandemic online time. I provide flexibility to be online for about 40% with certain requirements to be physically present for about 60% for getting points for participating (with certain submitted input in each session which is evaluated and on which I provide reflective feedback). Discussions during sessions are held in groups both online and in class. But no other online gimmicks :).
It is my personal preference. I do not want to force my students into the classroom due to COVID or other reasons. However, more and more students now come to the physical classroom, which is nice. Some of my students have done their work in Lichtenstein, South Korea and Dubai. That way their studies might be shorter

Personally, I prefer to have students either only in class or only remotely. As there is always an element of insecurity regarding technical aspects in a hybrid setting. The hybrid teaching I've implemented has been more of an external requirement.
I implemented hybrid teaching out of necessity during the covid-19 pandemic and also during one other course which had participants on both campuses. I prefer to teach only in the classroom with no simultaneous online attendees, but I am open to the idea of hybrid teaching again in the future if there is a reason to do it.
external requirement
I implemented hybrid lectures during the COVID-19 pandemic and the academic year after the pandemic. So, the reason for implementing hybrid lectures could be considered an external requirement.
Something in between started with external requirements and ended with personal preference.
The external requirement from heads of subjects or heads of departments. My preference is 100% online or 100% in class. Both work really well, but hybrid not so well.
Both. Before Covid, it was a personal preference (to offer students the possibility to watch recorded lectures). During Covid, it was mostly a requirement. After Covid, it is a personal preference (I have kept those aspects of hybrid lectures that I believe work well for the students).
During covid, it was in practice a requirement. Generally, I am old school, preferring onsite attendance, and I have had that option available whenever it has not been explicitly forbidden. In the Covid times, I had, if it was allowed, both onsite, live online, and recorded. After covid, onsite is the default, but the lectures are recorded. Seminars are onsite only.
A mix. A personal preference in terms of increasing the chances that the students participate in the lectures and actually learn something. But Hanken also encourages collaboration between the campuses (that was the main reason why I had hybrid teaching)
External. At Hanken, some language courses are targeted at both campuses to save resources. This was something I was asked about in my job interview some years back and I said yes, without previous knowledge about hybrid classes.
It was a personal preference. At different times during the pandemic, the school was open and students who wanted to come to class could do so (e.g., the P1 academic year 2020-2021). I tried hybrid lectures in two courses: one BSc course and one PhD course.

More a requirement from circumstances. My teaching is offered at both locations at Hanken and I want it to be available regardless of time as well (so I record also).
External requirement due to student needs (not able to participate in class).

3. On a scale of 1 to 5, rate your overall hybrid lecture experience technology vies.
   1 = Bad, 2 = Not bad, 3 = good, 4 = very good, 5 = excellent
   Number of respondents: 20

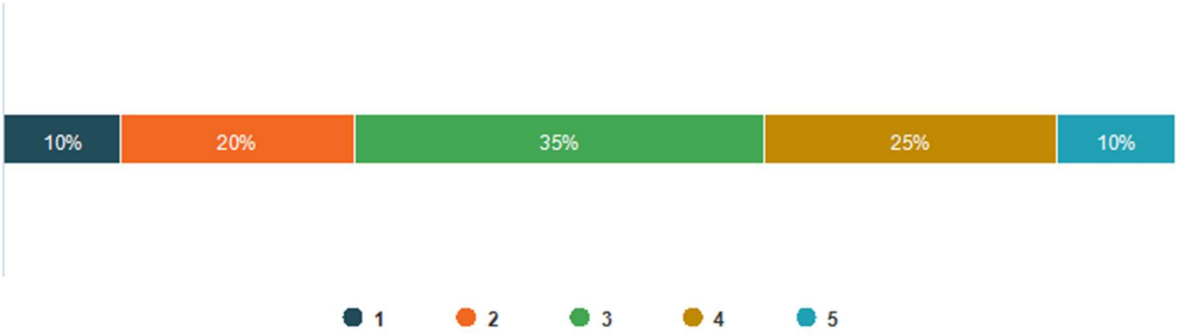

Figure 6. Results of the hybrid technical experience overall.

70% of the responders answered the experience was somewhere between good and excellent. Only 30% answered between not band and bad. The experience seems to be on a decent level with room for improvement.

4. Do you feel comfortable using the hybrid classroom technology?
   The number of respondents is 20.

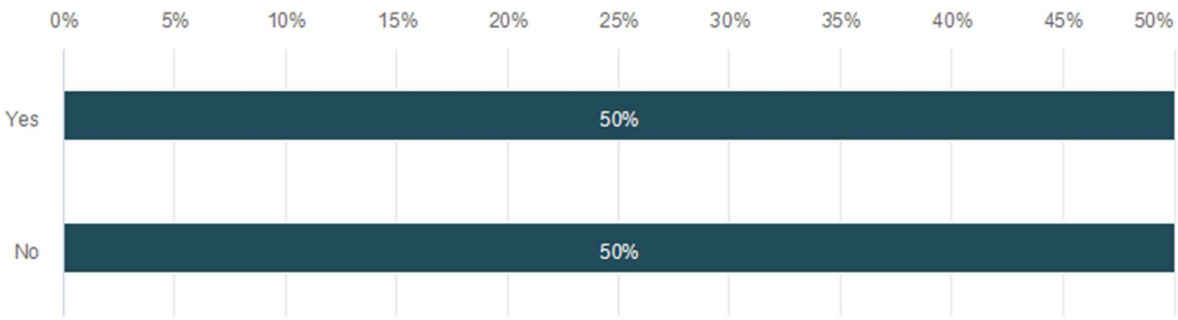

Figure 7. Percentage responses to question 4.

Half of the survey participants feel comfortable, and the other half are not. How is it possible that the level of confidence can be this divided?

5. If no, do you have any suggestions that would support you when using hybrid technology:
   Number of respondents: 15

Below I very relevant feedback for the future developments of the rooms and technology setup. It is nice to see that even if ten people answered no, 15 had some feedback to give. We see from the answers that teachers don't want to concentrate on technology and this is something that we need to focus on.

Table 4. Responses to question 5.

Responses
What I found odd was that the camera was in the back of the room and when I spoke to students online I turned to the screen where I could see them and simultaneously they and those in class saw my back.
It is not so much about technology. It is more about the relationship with the audience. I prefer to lecture either online or in the classroom. Not hybrid.
Jag är inte intresserad av hybrid. Som lärare vill jag vara på sen med publiken närvarande. Det funkar inte då de sitter nånstans med kameran avstängd. Det skulle kräva mycket kunnig personal även bakom kameran (räcker inte att rings om det blir problem).
The biggest problem is that you actually serve two different groups (online and on-site). At least personally I mostly forget the online group, seems I'm totally unable to address two different groups.
Of course, having large flat screens both in the front (for the teacher to see those online) and in the back (for students in the class to see those online) would bring online students into the class with much more "force" and "presence". I understand such investments were made by e.g. Harvard. I think the future of hybrid teaching must look like that, but expensive. Om du vill snacka mer, så är detta Mats :).
I would love to see comments in teams even if I am sharing the screen. Is it possible?

As a teacher I prefer focusing on my presentation and teaching - all the hassle with connecting to Teams etc gives additional stress I'd prefer to live without. However, I've always received help from the IT department when I asked for it.
perhaps an assistant
First of all, the technology should be working. And lecturers should be given support if support is needed.
For me, one of the most important things is to have a screen that I can write on (while sharing it in e.g. Teams). The screen should work fluidly, and for this, an active pencil is in my opinion required (a screen which reacts to the pencil but not to the hand when writing).
There should have been some other option than just Yes or No. I opted for Yes, although there has been some struggle, both technology-wise and content-wise.
I would like to have someone there during the hybrid lecture to adjust the sound etc. my experience is that hybrid works best for the ones who participate on-site.
I have received help and hints in live situations, so the support was very important and very welcome, and it helped a lot. And I think the current technology is the best I have heard anyone else describe since we went to an international conference on this topic last summer. I still have issues that I wonder about. One odd situation now is the moment when I form a breakout room for the distance people and would like to join them in the room. Then I have to switch between different audio settings (not always successfully) to go and hear them and be heard there, without the roof mic taking the presence groups to talk, but only me in front of my computer.
The new cameras and microphones work well, but it's difficult to navigate different screens (e.g., screen with the slides and screen with the online participants and chat) with only one lecturer and especially in smaller rooms where only one projection screen is available.
I have not implemented hybrid teaching in the sense that I would demand active participation by the student that takes part remotely. They have only (passively) followed the class.

6. What issues/challenges have you experienced during a hybrid lecture? Please, list as much as you can.
   Number of respondents: 20

Great to see that even if the questions were not closed-ended, people had eager to take the time to write. Many of the responders have similar experiences and feedback regarding the screen placement and camera angles, as well as the challenge to engage online participants.

Table 4. Responses to question 6.

Responses
unsure about the technology and how to use it unsure about how to coach students and teachers online the turning back to the camera and in-class students' problems when looking at those online takes more time in advance and when the course ongoing
Connecting to the online audience. With this, I mean not forgetting about them and including them in the dialogue.
Personal bakom kameran (som kan följa en då man går i klassen). Många skärmar i publiken så man ser peroner online (så man kan gå runt i publiken utan att tappa kontakten med de online)
Too few or none in the class if they have the remote option. I have not handled the hybrid infra without assistants, so I do not know what difficulties I would run into on my own.
Aside from a few technical problems (losing contact with the internet), the biggest problem is just forgetting that the online group even exists.
As I see it, you must make compromises, not focus on various online gimmicks, and not follow chats but instead ask students online to just jump in with questions & comments if they have. I think hiding in chats is not good for the development of students although it of course offers a way to quickly scan potentially a lot of comments. The only thing the teacher needs to remember is to actively ask questions once in a while and also to those online to activate them.

That I cannot see comments when I am sharing the screen. It would be super huippu if we could have cameras that follow me in the classroom. Now I have to remember where to stand to be seen.
Problems with sound, problems with sharing screens, and overall not knowing what the students on remote are able to see and hear from the classroom. I guess students attending on-site would like to see the students remremotely well, to my experience they have to turn around and look at the screen in the very back of the classroom to see the Teams screen with names of participants. Overall, it is difficult to build a team spirit when some attend from home and some attend on-site.
Technology-wise I think the circumstances were excellent. The only lacking thing was a camera which would show the audience in the room. All cameras are always pointed at the front of the room where the lecturer stands, but if an online attendee is giving a presentation or discussing with others in the room it might be nice to also have a camera view of the audience present in the room. The bigger challenges were about arranging the group discussions and exercises so that participants in the classroom and remote participants get equal opportunities to interact and participate actively. That is more of a pedagogical challenge though, not a technological one.
technical hitches poor connection no faces, only icons (not recommended for communications lessons)
1. Being able to interact with the students in a relaxed way. 2. Make sure during the lecture that students have understood the material. 3. The technology not working or new technology being introduced into the classrooms without considering how that would impact the way lecturers lecture. Example: I used my Wacom a lot when giving hybrid lectures, when I began teaching in 2023 the possibilities for me to use the Wacom were gone. Instead, I had the possibility to use another pen. Okay, but no one could get the pen to work. When teaching a hybrid lecture having a pen for drawing on your PowerPoint are crucial, and still, no one was able to help.
Inactive online group (or the other way around)
Setting up technology. Focus on students online as well as in class. Students online are not as engaged. Students in the class are not as engaged as well if they for example know that the lecture might be recorded.

In the beginning, there were many. These were mostly addressed by buying a more powerful computer that could handle sharing the screen with hundreds of students, writing on the screen, etc. I also had to learn how to maximize the learning experience of the students (i.e. what they see and hear on their screens). Asking for feedback from the students and reacting to this feedback mostly solved these issues.
How to use programs like Teams, Panopto, Moodle, and all the applications within the programs. Every now and then, there have been technical issues with cameras, microphones and screens. Most often personnel has been available to help. TackTack, Daniel! You cannot always be sure that your video is seen by the participants, as Teams does not show yourself when sharing the screen, and only one screen is available. What can be done for activating students?
The online crowd did not hear the classroom that well, so sound issues.
Sorry, the current point is written under 4. Past issues were mostly connected to transferring sound or video sound to both groups at similar quality. At first, I struggled to understand why not to attach my computer to the cable in A305, but have now realised that screen sharing and sound sharing are easier without it. One thing that is not related to the gear but Teams is the transcription, which I always get in English even if a speak another language. We get weird texts in our videos but I find this mostly funny. I think one thing is psychological: the students are afraid of the camera, so if they come to the lecture they sit in funny corners of the room to avoid being filmed. Luckily I was able to activate the distance group and they are more used to me than the people who attend in class. There is no technical solution to this :)
Going between screens, minding the chat in real-time, and getting people who are online to turn on their cameras and be as involved as those in class.
usually nothing. Occasionally something doesn't work. like sound. We don't have an optimal solution for dividing people into hybrid groups.
I find it challenging to keep in mind the people who are not there, in class. I easily forget them. (Divided attention, in other words!) Also, the settings do not seem to be right in all classrooms at all times, which causes a hassle at the start of a lecture.

7. What do you feel works well with the current hybrid lecture setup? Please specify which rooms you have used at Hanken or how the setup has been if you have taught hybrid lectures elsewhere.
   Number of respondents: 20

Good to include this as well, so we can get confirmation on what works well. Then we can keep that standard and try to develop it. The audio seems to be of good quality in the rooms and several of the responders are happy with the technology overall.

Table 5. Responses to question 7.

I am currently in 210 a. I have been in Maxen. Works with seminars in Futurum as well. I have not got any complaints!
I've used Futurum and A305. Hybrid teaching is probably good for busy students not able to attend campus due to work, family etc. My personal attitude, however, is not a very positive one towards hybrid teaching.
I have used Futurum and some of the "normal" classrooms on the 3rd and 4th floors in Helsinki, but I can't remember exactly which ones. The camera, microphone and speakers have worked perfectly apart from a few incidents, and generally, the equipment at Hanken has been excellent. I have also taught a hybrid class at Helsinki University, and the equipment was much more lacking there. There was no microphone covering the entire room and the camera was of very poor quality.
Futurum
The cameras are good and the sound systems are good in most of the classrooms.
V142 in Vaasa, A309 in Helsinki
309 and 210 work well.
Maxen 309 210 The rooms with a Smart screen (is it called so?) are great.
If hybrid refers to onsite+online, then there is not much good to say. It is very challenging to cater to both onsite and online participants at the same time.

If hybrid refers to onsite+recording, the risk is that many such participants that would have taken an advantage of being onsite do not learn anything as they watch all the videos in one go just before the exam. I have used all the big rooms at Hanken and for seminar purposes also smaller rooms like A308. I like to write on the screen. Therefore it is important to have that option available in an easy way.
I have used in Vasa (room 236) and I got help to check that everything worked from the IT desk Dennis was very helpful. But as I wrote, the online crowd could only hear one side of the classroom...
The mic is really good. I have recorded and seen the quality. Even if I forget to face the mic it still catches the sound. A305 only, now that I know it. We have also held campus-neutral personnel meetings there because I now know how to use them.
I taught in the Auditorium and one of the smaller rooms upstairs. If I recall at that time, we did not have ceiling mics, but table mics. They worked, but it was a bit difficult to get the people online involved as they were only visible on the big screen while those in class were sitting around a table.
I like the plug-and-play set-up in 516, Futurum, 305. But I'm equally comfortable with a regular meeting setting in like 210.
I have only used the technology once, so can't really say. At this point, the challenge is more so me not being used to it rather than that there would be something wrong with the technology.

8. Do you feel that you are able to treat the students the same way when they are participating online VS in class?
   Number of respondents: 20

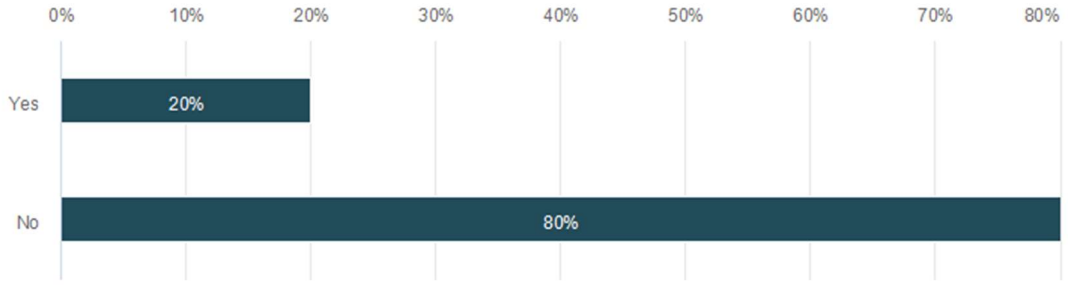

Figure 8. Percentage responses to question 8.

This was expected, the teachers don't feel they can have the same focus on both groups. What surprised me though, is that 20% feel they can treat the two groups the same, what is their secret?

9. Please comment on your answer.
   Number of respondents: 18

The comments written below were expected. This is something that needs to be investigated further, how can technology help with engagement?

Table 6. Responses of question 9.

Responses
Naturally, those in class get more attention and eye contact easier for those in class to be active and to work in a team
I can engage well with students if I have the class only online or only in class. This does not really work for me in hybrid mode.
Man får ingen kontakt med en avstängd kamera jämfört med ögonkontakt och kroppsspråk i klass
You are less connected when they are participating online. Less interaction.
See earlier answers
Well, yes and no. But I think we should not even try to treat them exactly the same as we should still incentivize them to come physically to class (but also provide the flexibility that

most employees all over the world today desire). Students are no different. In my (current) view they should be able to study also when they are, for example, visiting friends in Stockholm or a grandmother in some other city, having a job interview in London, or just sometimes participating from home or wherever, etc.
I am not sure if I treat them the same way. I have a hard time getting Teams people active. However, I do not require them to be active either. The choice to be in the classroom, in teams or only watch the videos is theirs and probably therefore I am not worried about how I treat them.
I feel like the students present in the classroom always get more attention than the ones participating remotely. Solving this problem would require developing new teaching methods and a lot of practice, but it would surely not be impossible.
My courses are highly interactive communication courses. Spontaneity, stimulation, humour, etc are lacking when there is "divided" teaching.
I feel that is much harder to interact with students that are online. Most of the interaction comes from some activating application (quizzes, polls etc), I don't always the interaction to be natural.
Teacher's attention gets divided + difficult to connect to and engage with students online when standing in the classroom. That is why I prefer 100% online or 100% in class. Much easier to focus on, for everybody involved.
It is much easier to connect to the students when they are in the classroom. Online, they tend to keep their cameras off etc. This can affect the interactivity of the lecture.
Onsite + live online gives too many dimensions to take care of. There are students in different places, and just setting up the online system, i.e., remembering the camera, microphone, Teams/Panopto, sharing, Moodle, what not, needs your attention in a much bigger way than just onsite lecturing. Although I am probably pretty well equipped for doing the technicalities, there are challenges every now and then. I have learned that things in the end typically turn out well.
I feel that naturally, you speak more to the students who are in the classroom and that you can 'see' in person.
It is never sure if they all can hear me or see the screen etc. It’s always connected with a feeling of insecurity. And the distance people cannot be reached, no matter what we do in class.

Since the online participants can only be seen on the computer screen or the projector screen they are never as much in focus as those in class. At least when I teach in class I move a lot and I try to engage the people in the class. If I want to engage people online I have to look at the camera but I don't see their faces on the screen.
I design my teaching so. It's not a 100% yes, on-premise students have a better experience but I feel like it's possible to design for both.
It's more difficult to engage students who participate remotely as the focus cannot be put fully on them.

10. Is there something else you want to comment on? The word is free.
    Number of respondents: 14

Table 7. Responses to question 10.

Responses
Nope
Hybrid funkar helt enkelt inte om vi ska ha kvalitet i kontakten.
Hybrid should be used mainly for two-campus simultaneous teaching.
As far as I'm concerned, I will not use hybrid. I will teach on-site for the most part, and online when it’s the method that clearly works best.
Nopes:) Lycka till med studierna!
Those mobile cameras. None of the classrooms nowadays have pointers. all broken! I have made at least 3 remarks about that but nothing changes so I do not use pointers at all to change my slides but run back and forth in the classroom. Forgot to say that mics are excellent nowadays!
I've been very thankful for all the innovation and help the IT staff has been and keeps providing. Good luck with your studies, Daniel!
My belief at the moment is that Hanken should not focus too much on hybrid lectures. Instead, the material should be recorded and classroom time should be more case-based and interactive.

Even though I am a bit critical towards hybrid teaching, note I am not at all critical towards online teaching and online courses. On the contrary, I think online teaching and online courses are an inevitable part of the future (even if it is popular nowadays to look down on online formats after the pandemic).
It is important that we have AV-support available at short notice so that acute problems in class can be solved on the go.
I think we need to use more hybrid teaching to meet the students 'life' in general, e.g. working, having kids/family at home etc. but the challenge is to treat them equally (online vs. in class) and that they receive the same quality in education
Nice interview. Good luck!
I think Hybrid works better if an extra person minds the online participants and the chat. That is difficult for smaller courses at Hanken but is quite common in executive education. Technology-wise, I think a good room for Hybrid teaching is Futurum because there the lecturer has a screen in the back of the room and does not need to look back at the computer screen or the projector.
A hybrid setup does limit what I can do activity-wise. interaction needs to be planned. Also, I used hybrid when already we had Ubicast and I'm thinking of those times as well. I prefer the solutions with two-way communication although I encouraged people to use the chat in ubicast for questions.

6. Discussion

My research question is “What is needed to build an optimal hybrid lecture room in higher education?”. It will investigate feedback from the current situation in the lecture halls at Hanken. The goal is to be able to find solutions and suggestions on how to at least come closer to an optimal hybrid lecture room setup. It will mainly focus on the technological aspect and on other areas that affect the hybrid lecture room experience.

We can see from the results of question 3 - rate your overall hybrid lecture experience technology vice, that the technological experience is very divided among the participants. Where most participants seem to think that technology is around good but, 10% think it is bad.

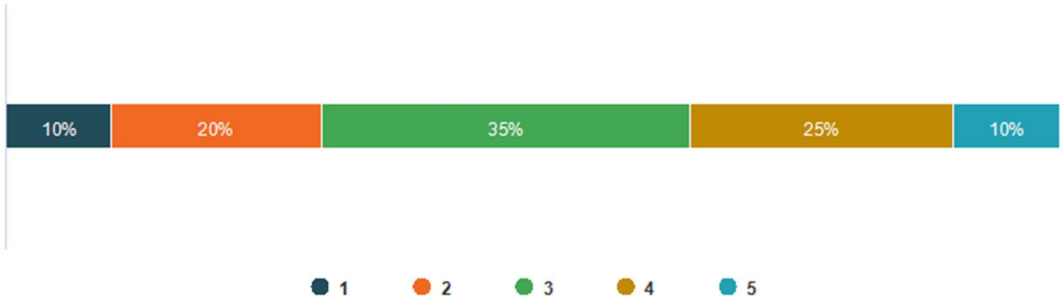

Figure 9. Percentage responses to question 3.

What’s exciting to see is that most of the responders think that the hybrid lecture experience technology wises are “good”, with the average number on a scale from 1-5 being at 3.0 and 50% feeling comfortable with the technology. It seems like the technology is on a decent level, but something is missing for optimal experiences and features.

The purpose of the survey where to gather information from the main users, the teachers, and their experience from around 2 years of hybrid lecture usage. Even if the response rate is just over 10%, the comments and issues brought up are pointing in a certain direction. The results probably show a quite trustworthy situation of the hybrid lecture setup at Hanken. It´s also important to take into consideration that not all 180 teachers at Hanken have implemented hybrid lectures, they have therefore probably not bothered to answer the survey. All participants in the survey have implemented hybrid learning in some form: A few times 40%, Many times 35% and regularly 25%. When looking through the answers, four main categories are shown: Technical issues, user issues, support challenges and pedagogical challenges. Several issues are also brought up repeatedly. The plan is to analyze the survey answers with these four categories as the base.

6.1 Technical challenges

"*As a teacher, I prefer focusing on my presentation and teaching - all the hassle with connecting to Teams etc. gives an additional stress I'd prefer to live without*." (Survey answer, 2023)

The quote above is so spot on, the teachers are not interested in the technical hassle, and it just causes stress to the whole situation. The technical challenge is to get all the technology to "just work". As stated in the theoretical framework chapter, one of the biggest challenges is to get the users to effectively use the technology (Kintu et al., 2017). Something that was brought up several times is that the camera angle is odd when talking to the online participants, assumed that they are mostly referring to the rooms that don't have a screen at the back, so they must face the screen in the front instead. That could easily be solved with a second camera in the front but, there are some technical challenges. Then the teacher needs to manually switch between cameras, and that will not happen. Even if a hardware switch can be installed, it will not help. Teachers should focus on teaching, not technology. If Microsoft Teams would support several cameras from one user default, it would be easier to solve this. Another way is to bring in two cameras into one source as a split screen into Teams. Then the online participants will have a view from both angles and can by themselves decide which view they are focusing on. This could easily be done with a Blackmagic ATEM Mini for example, where you bring in two feeds, split them into the same picture and send it through the USB port as a webcam. Another solution for this is also to add a screen in the back of the room, then the teachers would look at the online students in the same direction as the camera. However, a second camera would anyway be beneficial.

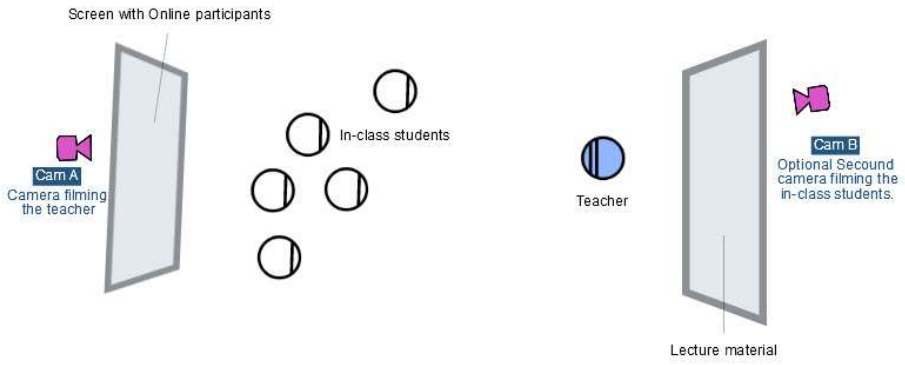

Figure 10. Illustration of screen and camera setup in a classroom example.

A camera that focuses on the students in the class was also mentioned, can that be the same camera in the front or do that need to be a third camera? Wide-angle cameras have been tested in other universities, the problem is that the students will be too small in the picture then (Harvard Business School, 2020). Maybe it could be a PTZ camera that is connected to the ceiling microphone. So, when the students are talking in the class, the PTZ camera is focusing on that area and when the teacher is talking it will just be a wide shot of the room that then also includes the teacher when speaking towards the screen. The challenge with this setup is to make sure that the camera moves to the position only when someone speaks and not when other sounds are made.

In a famous article from Harvard Business School, they describe how it was a problem for the online participants that the in-class students were so small in the wide-angle camera. The first solution they had were to let the in-class students log in to the same Zoom meeting with their laptops, but that caused heavy audio feedback (Harvard Business School, 2020). This was done a few years ago and the technology has been moving forward since then. Let's go back to the original idea, to let the students log in with their laptops to the same meeting to give a good camera view for the online participants. Because teams nowadays have a way to log in to a meeting when you are in the same room as the main meeting audio device. So, if the in-class students are asked to log in to the meeting with their laptops, and cameras turned on, and "don't use audio", it will solve the issue. There are other benefits included in this setup. If it's hard to see the screen in the front, you can easily see what the teachers presenting on your own laptop. And, if the students want to present something, then it's just to share the screen in the Teams application and it will be visible both in class and online. The challenge, on the other hand, is to get the students onboard to voluntarily turn on their cameras. This solution has been used in the meeting rooms at Hanken during different board and staff meetings and has been receiving good feedback, so it's only a matter of attitude. This solution has been approved by Harvard later on as the technology has been improved. (Schiano, 2020)

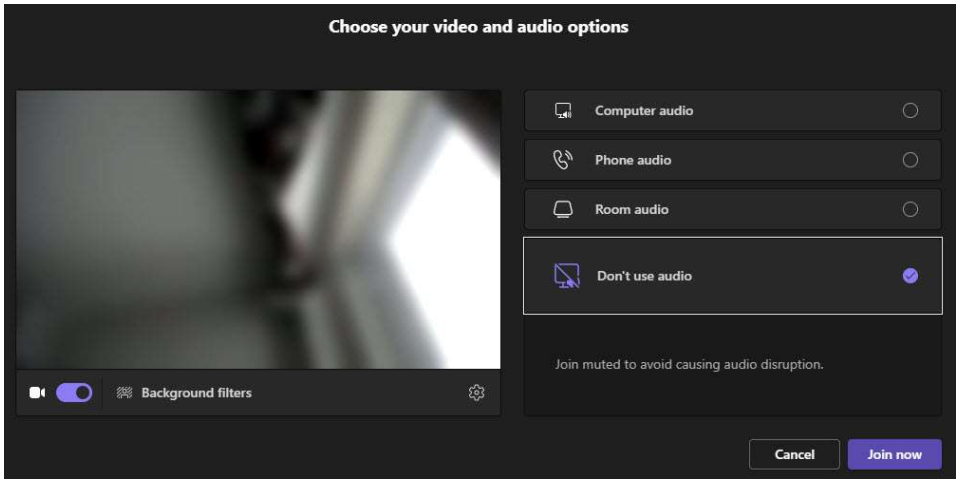

Figure 11. Login screen before entering a Teams meeting.

Another camera-related issue brought up is that the camera is static, meaning it does not follow the teachers' movements. It would be interesting to investigate that further to see how cameras that are equipped with built-in tracking perform. If the tracking is doing a great job, then it's worth taking into consideration. The AV company Creston has released a new camera system based on AI. The camera understands when more people enter the frame, who is speaking and if someone stands up. Several cameras can be connected to an AV server and the system collaborate with the ceiling microphone. When the ceiling microphone focuses on a specific area, the camera can with help of AI understand who is talking and even if someone is talking at all, the sound picked up by the microphone is maybe just a cough. The system then cuts between different camera pictures automatically, with no need for an AV Technician. The system can even position the camera before cutting, so no stressful camera movements will be visible to the viewer. It sounds amazing in theory and would be interesting to try it out in practice to see how well it works. (Creston, 2023)

Figure 12. Board room with several camera angles. (Creston, 2023)

The University of Amsterdam has solved this by hiring a technician for the hybrid lecture room. The room has a full-time technician, and a budget for 3 staff working 3-4 days a week for the studio has been allocated. The technician then takes care of all the technology in the room and switches between the 5 cameras from a fairly complicated mixing deck. The format allows expert guest lectures and international students to participate remotely. And because the room is equipped with ceiling microphones it is possible to engage in discussions between the room and remote participants. After the pandemic, the plan for the room is to use it for more "event-based" activities and courses specifically designed for this context (Media & Learning, 2022). The challenge is of course the budget and to have staff working for one room only is costly. Maybe this could be beneficial if some courses were available for both Hanken students and internationally available as paid courses. So Hanken students would participate in class and the lecture is also high quality streamed online for international participants that have paid for the course. Then the argument for having a technician there is stronger and costly more beneficial when some students pay for the course.

Some responders were pointing out that it is awkward for the students in the class to have to turn around and look back at the screen to see the online participants. The Teams Room System that is installed in the advanced room setups at Hanken has a button for swapping screens, the picture then swaps between the front and the back screen. This is again a great example of how teachers don't want to care about technology and instead, focus on teaching. The solution for this is quite straightforward, to add a second screen in the front of the room that shows the online participants for the people in the class. Another option is also to go back to the Harvard article, if the in-class students are logged into the meeting with their laptops, they can then see the online participants from the laptops.

An interesting suggestion where to add several smaller screens in the lecture room where the in-class students sit. It could be hanging from the ceiling above the students. At every screen, there could be 1-4 online participants showing per screen. That would bring the experience to the next level. Of course, it can´t be unlimited participants on the screens, then the most active participants could be prioritized to be shown on the screens. The pictures below from the article "Designing for hybrid is all about the space, the pedagogy and the community" describes quite well the idea of having several screens with 1-4 online participants per screen. The screen placement could be more optimal and placed above the in-class participants if the rooms allow for that. (Media & learning, 2022)

Figure 13. Example of several screens with online participants. (Media & Learning, 2022)

On the other hand, in earlier research, the microphone seemed to be a bigger issue with bad audio quality and challenges when trying to cover the whole classroom (Raes et al., 2019). In the survey for this thesis, almost no audio-related issues were broth up and instead positive feedback was written about the ceiling microphones. Access to high-speed internet where also a bigger issue back in the days according to earlier research (Olapiriyakul & Scher, 2006). According to the survey answers, this is not something that we have to take into consideration today.

6.2 User Issues

Building an optimal hybrid lecture room is probably not all about technology, it´s also about setting the rules and guidelines for the hybrid lecture course. Below are some user-related feedbacks brought up. Everything can´t be solved with technology but instead with user behaviours and probably some guidelines, especially for those participating online.

Something that came up in the survey several times was that teachers only see icons of the online participants because they don't have their cameras on. The only solution for this issue is to kindly ask them to have their cameras on. Or demand them to have the camera turned on if they are choosing to participate online, otherwise, just participate in class.

"You must make compromises, not focus on various online gimmicks, not follow chats but instead ask students online to just jump in with questions & comments if they have" (Survey answer, 2023)

The quote above is an interesting approach. Technology gives a lot of different options for communication like feeling expressions, chatting etc. It can be exhausting to give attention to all those different communication options. When reading Harvard's article about their hybrid lecture room, they are constantly focusing on improving the experience for both online and in-class participants in a way that is as close as possible to the setup when everyone where in the room. They are not focusing on chat, polls, emoji expressions etc. and instead focusing on bringing the online participants into the room and vice versa. (Harvard Business School, 2020). Harvard Business School is on to something here, maybe the solution to this challenge could be to limit the use of those extra tools and just approve the one preferred.

6.3 Support Provided

"It is important that we have AV-support available at short notice so that acute problems in class can be solved on the go." (Survey answer, 2023)

Something that is mentioned several times in the survey answers is the importance of having access to support immediately when technical issues or questions appear. Another level of support would be to have a technical assistant in the room, helping with setting up everything and taking care of the online participants on the online platform. This is of course an optimal solution where the teacher can focus on the teaching and the technical assistant take care of the rest. There are two main challenges with this though. First, the person needs to be technically educated to be able to handle everything, and the second challenge is that it needs to be enough budget to be able to pay all the staff for all the lectures that request this. If the budget is not an issue, having a technician in the room who is taking care of the technology has been a success when looking at other universities like the University of Amsterdam. Then you can produce high-quality online content and the teacher in class doesn't have to focus at all on the technical aspects. (Media & Learning, 2022)

6.4 Planning and guidelines are needed

"A hybrid set-up does limit what I can do activity-wise. Interaction needs to be planned." (Survey answer, 2023)

It is probably a little naive to just walk into a classroom and expect that a hybrid lecture will "just work". It is also a little naive of the IT department to think that the teachers want to give any focus to technology. The courses will benefit from being planned together with the teacher and the technician from the IT department. What options will be allowed? Like chat, emoji expressions etc. How should online participants ask questions or raise their hands? Should the in-class students bring their laptops to integrate with online students? Will the chat be enabled and used? If things like this are planned and the guidelines are clear for everyone before the course starts, then probably the whole hybrid experience will be much better (Schiano, 2020). The survey responses are backed up by previous research stated in the theoretical framework chapter. Even if the students seem to enjoy the flexibility of hybrid learning, it does require more planning from the educator than regular in-class lectures. Some feedback is related to the student's concentration and learning and is sometimes blamed on the hybrid lecture setup. However, it might be the lack of preparation and planning that causes this, the students learn better from a well-planned course, hybrid or not. (Mossavar-Rahmani & Larson-Daugherty, 2007)

When looking at other universities like the University of Oxford in the article "Planning and presenting a hybrid teaching session" we see that they have guidelines and instructions on how to plan and present hybrid teaching sessions. In the article, they lay out different recommendations, challenges, and instructions like how to plan the whole course for hybrid lectures and how to engage students. What is impressive about the article is how honest they are about the situation, that it is still a work in progress, there will be some challenges and it is hard to take care of a hybrid lecture by yourself. The key takeaway is that this is new to everyone, and it will get better in the future. If we work together, plan carefully and listen to the feedback this will maybe be the new normal in the future (University of Oxford, 2023).

6.5 Pedagogical challenges

"*It is not so much about the technology. It is more about the relationship with the audience. I prefer to lecture either online or in the classroom. Not hybrid."* (Survey answer, 2023)

The main focus where to look into the technological aspect of hybrid lecture rooms but it is also important to include other aspects. For the teachers, it's probably not so much about cameras, microphones, screens etc. In the end, it is all about the pedagogy, to be able to teach a subject effectively to the students. My field of expertise is not the pedagogical area, but it was brought up in the survey several times so therefore it's important to include this. During the research of what has been done earlier in the hybrid lecture field, the pedagogical aspect was mostly brought up, as seen in the theoretical framework chapter.

Most challenges brought up about hybrid lectures in the theoretical framework chapter are also brought up in the survey for this master thesis. It seems like a fair amount of the people that participated in the survey seem to prefer either in-class or online, not hybrid at all. That the online participants have their cameras turned off annoys many of the survey responders, why does it seem to be so hard to get the online participants to have their cameras on? It should make it more fun for everyone attending if cameras were turned on. This of course affects the interaction between the teacher and the online student, as well as the in-class students and online students. It is also pointed out that it's hard to interact with two different groups (in-class and online), several responders write that they easily forget that the online group even exists. This issue is brought up in previous research as well, there seems to be a challenge to get online students active in the lecture, online students are more often passive as if they were watching TV (Raes et al., 2019). According to Fischer (2021), a good guideline is, if 40 percent of your students are remote, call on remote students roughly 40 percent of the time.

The balance between in-class and online is also a challenge, where many teachers experience that if hybrid is offered, it's a high risk that very few students show up in class at all.
A solution for this challenge could maybe be to have an application form. It would be a limited number of online participation slots that the students must register for to be able to attend online. With this solution, it's possible to control the amount of attending online versus in class.
A tip brought up in the survey for helping with the interaction is to ask online students for feedback, and therefore not care about the chat at all. When investigating the technology for hybrid lectures, it's clear that we still experience similar issues and challenges that were brought up in the articles written in the theoretical framework chapter.

7. Conclusion

Based on the information collected, some key takeaways can be made. An example drawing is also provided based on the information on how an optimal room could be equipped, without considering any budget limitations. Hanken has been focusing on preparing all the lecture rooms to a decent hybrid level. To have all the rooms prepared is probably a good start, then it is probably beneficial to focus on one room. Make that one room the best hybrid room possible according to the discussion above. The lectures need to be planned and optimized for the hybrid lecture. There is no idea to use an old course structure and assume that it will just work automatically for hybrid lectures. One room with a well-planned course is maybe the solution for an optimal hybrid lecture experience from all aspects.

7.1 Technical takeaways

7.1.1 Cameras

There should be enough cameras to make the interaction as good as possible. The online participants should be able to see both the teacher and the students. A wide-angle camera will not work, the picture will be too "zoomed out" and then the in-class student will be too small in the picture. 1-2 PTZ cameras are needed to be able to focus on the students in the classroom. Two cameras can work simultaneously, and each camera can focus on a specific part of the room. A third PTZ camera needs to be installed as well, focusing on the teacher. A total of 2-3 cameras are needed.

7.1.2 Audio

At least two ceiling microphones should be installed, one that is focusing on the teacher and the other one on the students. The room should be acoustically prepared, and some form of automatic echo cancellation (AEC) should be installed in the system. Ceiling speakers are probably the best option here, preferably installed as far away as possible from the microphones.

7.1.3 Screens

Several video screens are beneficial. Behind the teacher, a total of three screens are needed. One where several online participants are visible, one more screen where the active online participant is visible and one bigger where the presentation is shown. These screens are there for the students in class.

In the back of the room, there can be two screens showing several of the online participants, and another one for showing the active student full screen. The teacher should not need to look behind his or her shoulder to see the presentations, therefore one screen in the back for the presentation is beneficial. The number of screens in the back is four and the total number of screens in the room is seven.

7.1.4 Automated or Manual

This depends on the wanted outcome, and both can be optimal so to say. The main goal is that teachers should not need to take care of any extra technology. The quality and support will be the best possible if there is a technical person (manual setup) hired and present in the room, this is appreciated by the teacher. This person is then taking care of switching between cameras, adjusting audio levels, supporting the online platform etc.

The other option is to invest in a smart automatic system like the AI-based server and cameras from Creston which was mentioned earlier in this thesis. Hopefully, the system will do a good job that will satisfy all participants. (Creston, 2023)

For flexibility and quality, a decent room system for the chosen online platform (for example Teams or Zoom) should be installed. Then there's no need to use a computer of any kind for connection to the online meeting. The room system is also needed to run all the screens etc. it will not be possible to do from a regular computer.

7.2 Guidelines

A few guidelines and rules need to be taken into consideration to create a good hybrid lecture experience. We take for granted that both the teacher and the students need to behave in class, the same behaviour should apply to the online participants as well. These rules should be accepted by online participants if they want to participate online. Otherwise, they participate in class.

Choose beforehand which type of communication is acceptable and deactivate the other ones. As a suggestion, when the online participants want to comment or suggest something, only accept the raise hand function in Teams and then let them speak out the question with their microphones turned on. Other options like chats should be deactivated. For the best experience, online participants should always have their cameras turned on without excuses. An application form to limit the number of slots in the online meeting will be beneficial to make sure that there is a decent number of students participating in class. If there are any tasks or exercises that will be made during class, make sure that those are prepared in beforehand and available on the chosen online platform for the online participants to access.

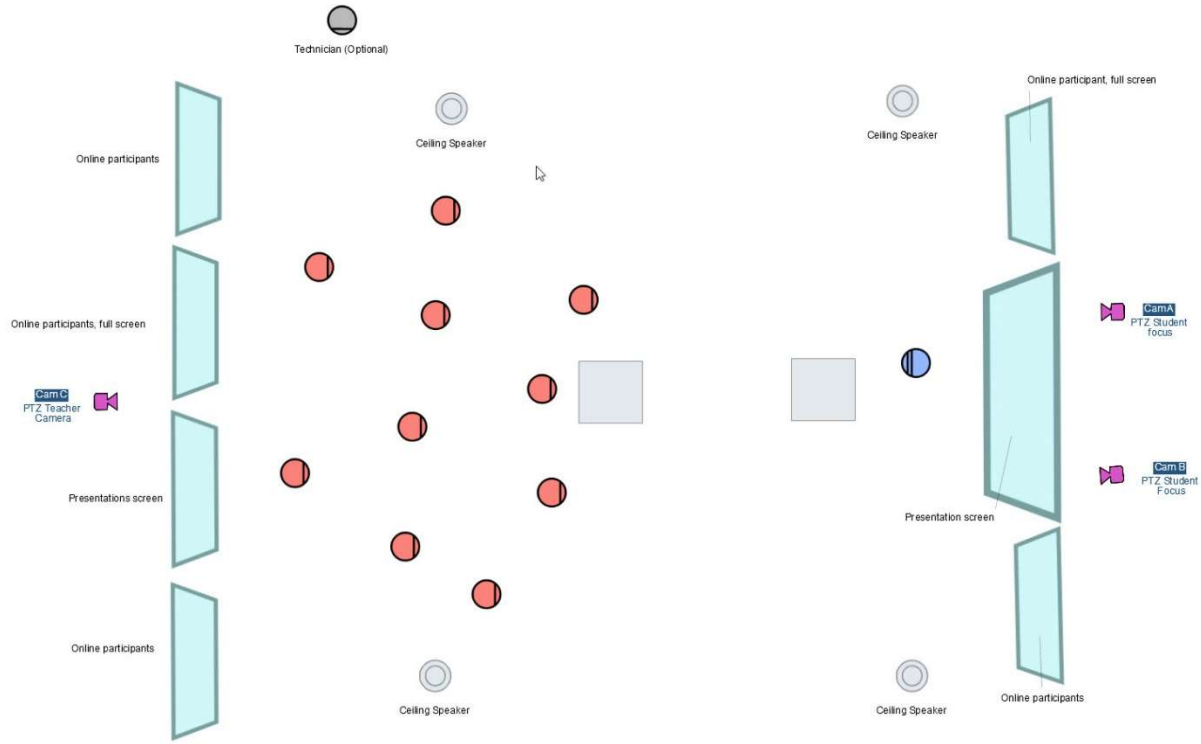

Figure 14. Example drawing of an optimal hybrid room example.

7.3 Final reflections

The overall results of this thesis are satisfying, and I will take with me several things from this research. Based on the answers from the survey it was possible to develop a starting plan for an optimal hybrid lecture room, and I will bring this knowledge with me to Hanken for future room developments. The most challenging part of this work where to conduct the survey and collect answers, people don't want to answer surveys today because they are overloaded with them. If I write any similar research in the future, I will probably choose another research method that is easier to predict and have control over. The conclusions in this thesis are important for the development of hybrid lecture rooms, and for future investigation, I think it would be important to dive deeper into the area of AI and Machine learning and how that can support the future of hybrid lecture rooms. The support of AI and machine learning will probably bring the experience of hybrid lecture rooms to the next level.

8. References

Creston. (n.d.). *Crestron Intelligent Video*. https://www.crestron.com/Products/Featured-Solutions/Intelligent-Video

DeFranzo, S. E. (2022, June 10). *Advantages and disadvantages of surveys*. Snap Surveys. https://www.snapsurveys.com/blog/advantages-disadvantages-surveys

Fisher, S. (2020, November 12). *Ethical issues to consider when conducting survey research*. Qualtrics. https://qualtrics.com/blog/ethical-issues-for-online-surveys/

Hanken School of Economics A. (n.d.). *About Hanken* https://www.hanken.fi/en/about

Hanken School of Economics B. (2022, June 1). *Hanken Digital Learning Policy*. https://www.hanken.fi/system/files/2022-06/hanken_digital_learning_policy_2022.pdf

Hanken School of Economics C. (n.d.). *Classroom Equipment*. https://www.hanken.fi/en/it-services/video-and-video-conference/classroom-equipment

Harvard Business School. (2020, October 16). *Creating the HBS hybrid classrooms: Collaboration, experimentation, equity, and innovation*. https://www.hbs.edu/news/articles/Pages/creating-hybrid-classrooms.aspx

Kintu, M. J., Zhu, C., & Kagambe, E. (2017). Blended learning effectiveness: The relationship between student characteristics, design features and outcomes. *International Journal of Educational Technology in Higher Education*, *14*(1). https://doi.org/10.1186/s41239-017-0043-4

Lin, O. (2008). Student views of hybrid learning. *Journal of Computing in Teacher Education*, *25*(2), 57-66. https://doi.org/10.1080/10402454.2008.10784610

McGee, P., & Reis, A. (2012). Blended course design: A synthesis of best practices. *Online Learning*, *16*(4). https://doi.org/10.24059/olj.v16i4.239

Media & Learning. (2022, March 17). *A virtual tour of four advanced hybrid learning spaces*. https://media-and-learning.eu/type/featured-articles/a-virtual-tour-of-four-advanced-hybrid-learning-spaces/

Meydanlioglu, A., & Arikan, F. (2014). *Effect of Hybrid Learning in Higher Education*. https://doi.org/10.5281/zenodo.1092346

Mossavar-Rahmani, F., & Larson-Daugherty. (2007). *Supporting the Hybrid Learning Model: A New Proposition*, *3*. https://www.ammanu.edu.jo/EN/Content/HEC/3.pdf

Olapiriyakul, K., & Scher, J. M. (2006). A guide to establishing hybrid learning courses: Employing information technology to create a new learning experience, and a case study. *The Internet and Higher Education*, *9*(4), 287-301. https://doi.org/10.1016/j.iheduc.2006.08.001

Parrot, C. (n.d.). *7 practical steps to create an effective SurveyMonkey survey*. SurveyMonkey. https://www.surveymonkey.com/curiosity/7-steps-for-effective-surveys/

Raes, A., Detienne, L., Windey, I., & Depaepe, F. (2019). A systematic literature review on synchronous hybrid learning: Gaps identified. *Learning Environments Research*, *23*(3), 269-290. https://doi.org/10.1007/s10984-019-09303-z

Ramshaw, A. (2021, April 6). *What is SurveyMonkey?* Genroe. https://www.genroe.com/blog/what-is-surveymonkey/7979

Sameer A. (2014). *HYBRID LEARNING IN HIGHER EDUCATION*. https://www.researchgate.net/publication/318361485_HYBRID_LEARNING_IN_HIGHER_EDUCATION

Schiano, B. (2021, August 30). *Making the Most of the Hybrid Classroom*. Harvard Business Publishing Education. https://hbsp.harvard.edu/inspiring-minds/making-the-most-of-the-hybrid-classroom

Webropol Oy. (n.d.). *Webropol Oy client and user register: Privacy statement*. https://webropol.com/wp-content/uploads/2019/06/Webropols-Privacy-Statement.pdf