What can HyFlex-organized teaching do?

- The students approach

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Abstract

The article focuses on the conditions of communication in HyFlex teaching, where half of the students can be on campus every second time, while the rest can follow the teaching live online. An e-moderator in the lecture room acts as a communicative link between the online participants and the lecturer.

The empirical data includes a quantitative and qualitative part and focuses on lectures and the students' communicative participation.

The survey results show, among other things, that 74% of students choose to follow the lectures online and that the students agree that HyFlex is a good and flexible lecture organization. The arguments for choosing onsite / online participation show a range of individual preferences.

The e-moderator function is important. Online students are more communicatively active in academic matters (on average one contribution from every third online student in the chat). Chat communication initiates questions / answers via e-moderator (IRE triads), while interaction lecturer / onsite and onsite / online students (interaction chains) have difficult terms. The students' experiences include sparring, reflection, variety, commitment and motivation as important parameters for their approach to HyFlex teaching.

Introduction

Since the spring of 2020, universities have been under pressure. Both students, teachers, and management have experienced personal, social, and professional challenges. Research on the so-called emergency teaching, caused by the COVID-19 pandemic, has been carried out at educational institutions (i.e., Jensen et al., 2020) and across institutions (Georgsen & Qvortrup (red.), 2021, Mathiasen et al, 2020) consistently throughout 2020. Beyond the Danish borders, experiences have also been collected (see for instance: www.postpandemicuniversity.net).

Reports and articles tell of teachers and students experiences with web-mediated teaching and of the multitude of both technical, professional, personal, and social challenges these include (https://uniavisen.dk/to-forelaeseres-gyserdagbog-fra-en-maaned-med-digital-undervisning/).

Covid-related restrictions have meant that campus-based onsite teaching have had to find new forms of organization. This article focuses on *lectures* that embrace both on-campus (onsite) and web-mediated teaching (online) simultaneously, which was possible from the autumn of 2020 until the beginning of December where new Covid-restrictions meant that lectures could only be conducted in an online format.

Based on a case study, the purpose of this article is to contribute to the discussion on what HyFlex-organized lectures can and cannot do.

HyFlex-teaching environments entails a certain complexity because lecturers must think of themselves as participants in two teaching environments simultaneously. Thus, lecturers must communicate with students participating onsite while also thinking about communicating with students participating online. From a communication theoretical perspective, the conditions of communication in the two environments are fundamentally different, which students might also experience when they shift between participating in lectures onsite and online. The article's theoretical focus is on communication, which will be expanded upon through the concepts 'teaching' and 'learning'. Furthermore, the theoretical frame includes didactical aspects in relation to HyFlex-teaching.

The overall theme of this research concerns the conditions of communication (Luhmann 1992) in this way of organizing teaching (HyFlex). In the qualitative part of the study, we ask the students how they experience the conditions of communication in HyFlex-organized teaching, and which approaches and preferences they in this context express. In the quantitative part, we ask students about the volume of their communicative participation in HyFlex-organized teaching with an e-moderator attached.

The concrete organization of teaching, central to the case study, is termed HyFlex (Hybrid & Flexible) when teaching takes place simultaneously onsite and online. As an introduction, the article will elaborate on the concept 'HyFlex-organized teaching' and subsequently describe the framework and the concrete teaching context of the case study.

Afterwards, a description of the empirical design follows. Analytical findings based on the quantitative and qualitative data are presented and discussed, and the article ends with a conclusion based on the applied communicative theoretical framework.

What is HyFlex-teaching?

HyFlex is a combination of 'Hybrid' and 'Flexible'. 'Hybrid' because the students are being simultaneously taught both in the auditorium (onsite) and online (livestream with camera and microphone in the auditorium), and 'flexible' because each individual student can choose how they attend the individual classes. This form of teaching was developed at San Francisco State University around 2007. In 2016 the university condensed the definition to be: "HyFlex courses are class sessions that allow students to choose whether to attend classes face-to-face or online, synchronously or asynchronously." (Beatty 2019). The teaching is recorded and made available after the class sessions

together with relevant materials. The intention is that students get the same possibilities to learn what is required in both synchronous and asynchronous teaching environments (Beatty 2019).

HyFlex-organized teaching requires, as a minimum, a technical setup with camera and microphone pointed towards the lecturer (possibly also on the students onsite), computer with live streaming software and additionally either loudspeakers or an e-moderator in the classroom that can mediate the contact with online students, as well as possibly a video platform for the recordings.

HyFlex-teaching, framework, and context of the case study

The faculty of medical science at The University of Copenhagen (KU SUND) offered the possibility of HyFlex-teaching to all study programs after the summer vacation of 2020. Teachers could participate in webinars to learn how to teach HyFlex and over the summer, auditoriums were upgraded with more and permanent camera/sound solutions plus equipment that could be borrowed.

Additionally, course managers and lecturers could request help from an e-moderator for individual lectures. The e-moderator team consisted of 11 students (max 15 hours/week) who managed the lecturers' requests and collaborated with them, especially by sharing their experiences. The whole setup was coordinated by KU SUNDs Center for Online and Blended Learning (COBL) that by autumn 2019 had had an entire semester of experience with developing livestreaming.

E-moderators had several functions. First, a technical function. This included securing that the necessary equipment (software, microphone etc.) worked and coordinating with lecturer before lectures. E-moderator also controlled the camera so that online students could see both the lecturer's gestures, mimics, movement around the auditorium, blackboard activities and screen presentations e.g., slideshows and videos. E-moderator facilitated breakout rooms for online students and managed special software for the lecturer.

On top of this, the e-moderator had a communicative double function; the e-moderator had to follow the chat and when a question to the lecturer was written, the e-moderator had to notify the lecturer and present the question in the auditorium. Furthermore, the e-moderator had to engage in dialogue with the online students, should problems arise concerning for example sound or visibility of the lecturer's black board activities. After a lecture, the e-moderator would report data on the session, upload the recording and make it available to the students, if the lecturer agreed to it.

The case study included observations of three courses: Basic Pharmacology (Pharmacy program), Medical and Health Psychology (Medicine program) and Cytology and Basic Histology (Veterinary program). All lectures took place in auditoriums. The technical setup included a camera on tripod, wireless buttonhole microphone fixed to the lecturer, and no microphone for onsite students. Zoom was used to share video and sound. The Zoom chat was used for communication with and between online students. Half of the students had been given permission to show up physically at the auditorium.

Theoretical framework

The frame is HyFlex-organized teaching with 100+ students attending. This results in some concrete didactical and communicative challenges. The so-called triad pattern, I-R-E, which stands for 'Initiation', 'Response' and 'Evaluation' respectively (Lemke, 1990; Mehan, 1979) is challenged communicatively when online students 'respond' (in the chat) on the lecturer's question ('Initiation'), and the lecturer have to end with 'Evaluation' without practically being able to ask a quick follow-up 'Response' – or when onsite students do not give a 'Response' and the lecturer have to conduct 'Evaluation' alone.

The HyFlex-organization offers communicative and didactical challenges on multiple levels. 'Evaluation'/follow-up of the students' answers can have different functions like whether the answer is right or wrong, an unfolding of possible answers, and inclusion of other perspectives in the answer/answers. The complexity increases when the teaching environment both contains an onsite and an online context. The different frameworks for maintaining communication simply have different conditions. For example, a written interaction has a different character than a verbal interaction where the communicative bandwidth is larger. Here, it is possible for multiple participants to synchronously utilize communicative tools such as eye contact and gestures. In the following, a concept of communication inspired by the German sociologist N. Luhmann (Luhmann, 1995) is presented. This concept serves as the baseline for the analytical focus on communication's conditions of possibility in HyFlex-organized lectures.

Communication and teaching

The applied perspective on communication is inspired by Luhmanns concept of communication (Luhmann, 1992) and is chosen because of its usefulness when the conditions of communication in campus-based and net-mediated teaching forms are in focus (Mathiasen, 2008).

A unit of communication is a synthesis of three selections (Luhmann, 1995) where the two first selections, choice of information (1) and form of message (2) respectively, are undertaken by "the communicator" (e.g., lecturer) while the third selection, choice of understanding (of that communicated by the lecturer), is undertaken by the "addressed" (e.g., a student). A simple form of communication is thus a continued stream of the lecturer's communicated information, and the student's efforts in understanding them. If the lecturer chooses this form of communication, it is called a monologue. To be able to speak of a synthesis, one unit of communication, a monologue requires that there is at least one student that 'wants' the communication, and therefore directs their attention towards the information communicated by the lecturer. Simply put, a monologue can thus be characterized as the sum of the units of communication where the communicator remains the same.

A monologue can in its communicatively simplest form be characterized as dissemination when it concerns pure one-way communication. For example, a lecturer giving an onsite or online lecture, thereby consecutively being the communicator, where the student is not thought of as active regarding their communicative contribution.

A pivotal point concerning the presented concept of communication is that it is only the first two selections that can be observed, while the third selection, choice of understanding of the communicated, cannot be observed. Observation in the empirical design therefore only concerns the first two selections. The addressee is a black box, and only by i.e., the lecturer (the communicator) asking the student (the addressees) about their understanding of the communicated information, and only by the student, now assuming the role of communicator, getting the possibility of communicating their understanding to the lecturer (that has shifted from being the communicator to the addressee) - the lecturer can begin to construct their understanding of the students communicated understanding. And only by the lecturer subsequently asking, now as the communicator, the student whether the lecturer's constructed understanding is correct in relation to the student's own understanding, are the conditions in place for

the lecturer's and the students' constructions of understanding to be tested.

In other words, chains of units of communication, where the role of communicator/addressed continually change, can foster a mutual communicative understanding. This form of communication is called 'interaction'. In the literature, interaction is described as characterized by different forms of 'chain patterns' amongst other things (Scott et al., 2006). Should the interaction between a lecturer and a student be described as a chain pattern, it could appear a closed I-R-P-R-P-R-E, where the triad I-R-E is extended with 'Prompt', P, e.g., a lecturer asks a student to expand their answer before ending communication with 'Evaluation' (Scott et al., 2006, s. 612).

If the lecturer involves more students (R1, R2, R3, R4, R5) in the interaction, this could potentially develop into the following chain pattern: I-R1-P-R1-P-R2-R1-P-R2-R3-R1-P-R5-R2-E. This chain illustrates that the lecturer does not 'prompt' every statement from a student, but lets the students interact with each other. If a chain is not terminated by the lecturer's validation but is instead left without a closing 'Evaluation', this can be an invitation to further immersion and knowledge seeking by the students. In such an instance, the chain can be characterized as open (Ibid.).

A consequence of the chosen concept of communication is that the individual student's choice of understanding can be interpreted by the lecturer and fellow students only when everybody has had the communicative possibility to test their understandings. This demands the possibility for interaction – both onsite and online. Lecturer and fellow students cannot know whether an individual student has chosen the understanding intended by the lecturer, through their choice of information and forms of message and use of various technologies, or not. The technologies can affect the probability of students understanding the communicated information as intended by the lecturer. It is, however, a different matter whether the intended learning objectives equals that of the students, given that it will always be the individual student's own understanding that is being actualized (Mathiasen, 2008). The student chooses understanding from their own 'mental preparedness' and observational optics. In the applied theoretical framework, the result of learning is this continued construction of knowledge which builds on a constructivist concept of learning (Luhmann, 1988). Onsite/online students (and lecturers) participate in a teaching communication when they direct their attention toward it - through which *they* can learn something. Communication constitutes a social system where social relations, amongst other things, can be developed (Wubbles & Breckelmans, 2005; Mathiasen, 2019b).

Lecturing is one of many kinds of teaching (Mathiasen, 2021). The very concept of 'teaching' is understood as a specific form of communication that intends changes amongst the students that direct their attention to it. A communicative contribution is understood as a complex of words, gestures, mimics, physical movement, intonation, pauses, tactile elements, smells, and eye contact, that support understanding of them. This 'communicative bandwidth' depends on the number of tools at play.

A monological, 'talking head'-video-lecture can make use of communicative tools such as intonation, gestures and pauses. It can be supported by slideshows with sound and animation. Such a format is characterized as 'academic dissemination' given that the communication is monological (Mathiasen, 2019a).

Lectures on campus, based on physical presence, can also be monological (one-way communication) and can as such also be characterized as academic dissemination. If the lecture is recorded and made available to the students, this format can be characterized as a learning resource and as academic dissemination.

Communicatively, the concept of 'teaching' reaches beyond the form of dissemination. This is because interaction is possible in specific contexts. Onsite teaching with presentations, different teaching activities, and group/plenum discussion, is an example of a context where the 'communicative bandwidth' can actualize more communicative tools. The greater communicative bandwidth gives the individual student and lecturer the possibility of connecting to the teaching by drawing on the communicative possibilities interactively.

HyFlex-organized lectures are not merely academic dissemination, but teaching, if the students participating online can ask questions in the chat to lecturer through the e-moderator, receive answers form the lecturer, and from fellow students in the chat, while also participating in chat-based chains of communication with fellow students.

Communication and its conditions of possibility affects learning and vice versa. Choice of teaching form, and organization thereof, is quintessential for the intended communication, the academic theme of the teaching, and the intended objectives of learning (Mathiasen, 2008).

Empirical design

This case study is based on a mixed method design (Hammersley & Atkinson, 1987; Mathiasen,2006, Creswell & Clark, 2017). The study thus includes a quantitative and a qualitative part. The method of analysis is inspired by a meaning condensing approach and thematic analytical approach (Kvale, 1997, Braun & Clarke, 2006), and it is possible to test the case study's validity through the proposed empirical design. The case study is understood as a case where new knowledge can be obtained through a specific case study (Flyvbjerg, 2010). The quantitative part involves data collection during 282 lectures in 38 courses with an average of 109 students participating. The focus is on the volume of the students' communicative participation in the chat during the lectures. Furthermore, data concerning the use of communication tools/fora such as quizzes, padlets, chats, and breakout rooms have also been collected.

The qualitative part involves online-observations of HyFlex-teaching and simultaneous online lurking in the chat fora used during the lectures. The observations were succeeded by group interviews with students that had participated in the observed lecture. These 'observiews' grants interviewer and informants the possibility of having a common frame of reference (the observed lecture) during the interviews (Kragelund et al 2015). Additionally, e-moderators were asked to answer questions, and potential follow-ups, via mail. A special focus was placed on the extend of lecturer monologue, interaction between lecturer and students, onsite an online respectively, and communication between the students in the two different teaching environments.

Thus, lectures were the area of interest. They were chosen based on information from the qualitative study and based on the criteria that multiple 'large' educations was represented.

The three chosen lectures (duration: 2-3 lessons) are all bachelor-level from the program: Medicine, Pharmacy, and Veterinary medicine.

The chats of the case, primarily used by students participating in the lectures online, have likewise been used as a common reference during the group interviews as well as a facilitating examination of the chat-communication itself.

Two group interviews (40 minutes) with 4-6 students for each of the three observed lectures have been conducted: one with students participating onsite and one with student participating online.

The group interviews with onsite students were conducted immediately after the lecture. Immediately thereafter, the interviews with online student were conducted.

The students that participated in the group interviews had offered themselves as informants on their own volition. Selection of informants based on specific criteria has thus not occurred. In total, 15 students participated. The group interviews were completed based on a semi-structured question guide, where focus was on how the students experienced HyFlex-organized lectures and related communication (monologue/interaction), onsite/online respectively (potentials and limitations), communication 'across' the two teaching fora, and how the students participated e.g., asking questions, answering questions, contributing to discussions, and arguments for participating/not participating in the communication. Additionally, they were asked how they support each other communicatively (peer feedback on assignments, social platforms/fora relating to assignments/activities etc.), how they

experience their fellow students' approach to being a student in a HyFlex-organized teaching environment, and how the teaching could be organized on a short term (spring 2021) and on a longer term (after Covid) basis.

Three e-moderators experiences of the students' participation onsite and online have also been included. These contain reflections on chat communication's potential support of online students' communication during the lecture, the e-moderators communication as a link between online student-lecturer and between online students, and the interaction between onsite students/lecturer and online students/lecturer respectively.

The empirical study

First, the results of the quantitative part of the empirical study will be presented. Then, the qualitative part.

The quantitative part

Table 1. Overview of the case.

Study	Course	Onsite stud.	Online stud.	Total stud.	Stud. in course.	Chat posts*
BSc Pharmacy, 3. semester	Basic Pharmacology (2 hours)	16	80	96	250	11
BSc Medicine, 2. semester	Medical psychology and psychology of health (2 hours)	50	98	148	305	28
BSc Veterinary medicine, 1. semester	Cytology and general histology (3 hours)	30	124	154	163	137

* Includes only chats posts concerning academic topics.

The quantitative analysis consists of data reported by the e-moderators and data from the administrative systems. At every session the e-moderators count the no. of students present onsite and online after approx. 15 minutes of teaching. Along the way, they note how many activating initiatives the lecturer includes, especially use of quizzes, Padlet, and the no. of times the students are send to breakout rooms. Furthermore, they note data on the quality of sound and picture, and after the session they count the no. of posts in the chat, and how many of them concern academic content. All of this is posted in a shared database.

COBL has registered 282 sessions (In total 698 hours, approx. 15% of total teaching time on the faculty) in total during the period August 31 - December 4, 2020. This covers all sessions where e-moderators have been used. The following table showcases some central numbers from the registration as a picture of the HyFlex-activities in the autumn of 2020:

Table 2. All HyFlex-lectures with COBL organized e-moderators in autumn.

	No. of sessions	Total hours	% stud. online	Onsite stud.	Online stud.	Total stud.	Avg. chat posts / session*	Avg. chat posts/ session /online stud*
BSc Pharmacy	110	165	76%	32	104	136	10	0,09
MSc Pharmacy	30	78	76%	24	77	102	21	0,27
BSc Veterinary medicine	42	102	69%	50	109	159	98	0,90
MSc Veterinary medicine	5	17	89%	10	81	92	65	0,80
BSc Medicine	12	30	68%	42	90	131	28	0,31
MSc Medicine	10	51	36%	18	10	29	8	0,74
BSc Health and Informatics	8	29	30%	24	10	34	6	0,62
MSc Health and Informatics	8	32	35%	12	7	19	1	0,08
BSc Public Health	11	22	43%	38	28	66	2	0,07
MSc Public Health	46	172	35%	19	10	30	4	0,39
Total / average	**282**	**698**	**71%**	**32**	**77**	**109**	**25**	**0,33**

* Only chat posts on academic topics included. Our cases are from the cells marked in grey.

There is a difference between how many students participate onsite or online in the lectures. On Pharmacy, it was 38% (table 1, 38% = 96/250), on the Medicine course it was 49%, while 94% of the enrolled students participated in lectures on Veterinary medicine.

In the lectures of the case study, most of the 'attending' students participate online: 89% on Pharmacy, 66% on Medicine, and 81% on Veterinary medicine. In average, 74% participate online on all the 'large' courses (Medicine, Pharmacy, Veterinary medicine). Given that 50% have the option to show up physically, the number of students that choose to participate from home is quite substantial. The distribution is reverse on smaller courses (Public Health as well as Health and Informatics) that typically consists of 40-80 students. Here, only 37% participate online on average. The focus of the article is on lectures with large bodies of students. In the qualitative part, the students' reflections on the conditions of communication during such lectures are thematized. They also verbalize other teaching formats that come into play when the teaching is organized as class teaching.

There is a difference between how many students wrote chat posts in the three course sessions (Table 1). The students on Veterinary medicine wrote the most (More than 1 post per online student; 1,1 posts/stud on three hours). Concerning the students of Medicine and Pharmacy, the number was 0,29 and 0,14 posts/stud/session respectively. All three numbers are close to the averages (table 2) of BSc Veterinary students (0,9 posts/stud/session), BSc Medicine students (0,31 posts/stud/session) and Pharmacy students (0,09 posts/stud/session).

Given our focus on the conditions of communication, we only wish to present these numbers and invite new research projects with hypotheses on i.e., the significance of whether the lectures are recorded,

being a first semester student, genres of lecture, and applications of chat, to be conducted.

The use of student activating software varied in the case study. The Medicine course had four quizzes, one discussion with the person next to you/breakout rooms, and a final evaluation exercise, while IRE-triads and chains of interaction were few in the other two courses. The low number of activities echoes the general picture of all HyFlex-lectures. In 9% of the lectures, quizzes were used, in 3%, Padlet, and in 10% of the session breakout rooms were created. Early on, breakout rooms got a bad reputation amongst lecturers, because only few students chose to enter them. In the qualitative part, the students' approach is presented.

The qualitative part

The analysis draws on students' experiences as participants in the HyFlex-organized lectures of autumn 2020 at KU. It consists of observations of HyFlex-organized teaching, lurking in chat fora, group interviews with students and e-moderators' experiences (cf. *Empirical Design*).

As mentioned, each student can participate onsite every second lecture, and online, primarily through Zoom, the rest of the time. The lecturer is physically present in the auditorium with the onsite students and an e-moderator.

The observations of the lectures were conducted online, given that it wasn't possible for the researcher to participate onsite. The focus of the observations was on communication regarding onsite and online fora/chat fora respectively. The observations showed that monologues by lecturers were prevalent, but that to a varying extent, activities serving as answers to questions initiated by the lecturer (I-R-E-triads) were also included. Quizzes, which also can be characterized as I-R-E-triads, were also observed. These could have evolved into chains of interactions if the lecturer for example had implored onsite students to discuss possible answers with each other, and online students to chat about possible answers before voting. Generally, lecturers primarily focused communicatively on onsite participants. When an e-moderator indicated that online participants had questions, however, the lecturer answered them.

The students' activities in the chat were primarily academic questions to the lecturer (I-R-E-triads), but questions and answers directed at fellow students also appeared (researcher only had access to the shared chat communication – not private chats within the chat). There was regular academic chat activity. The e-moderator played a central role in conveying the students' questions to the lecturer, but also different kinds of questions such as: "Can't follow at all, can she speak a little slower, that would by lovely ;)", after which the e-moderator writes: "I have already asked if she can go through it slower". A student then writes "Someone who wrote that down?", e-moderator writes "You can ask again" after which a student writes "Only got half of that" (Observation, chat 12.04.20). The students share their notes and knowledge in the chat. The e-moderator attempts to interact both online with participants and onsite with the lecturer. Beyond academic chat themes, there is also a continuous stream of shared commenting on various non-academic themes.

E-moderators' general experiences with HyFlex-organized lectures

The e-moderator experienced that the "majority" (e2) of the students primarily participated in the lectures online, and that the onsite participants asked fewer questions in plenum but used the breaks to ask lecturers questions as was the norm pre-Covid19. "It is rare that a student in the room asks for an answer to be elaborated upon but online, the same barriers do not exist. This could be because they are allowed to communicate with the lecturer through an e-moderator." (e3).

This approach to communicative participation was also thematized by the students. This gives occasion

to dwell on the culture and the alignment of expectations.

To obtain a form of communicative contact with online participants, "Some lectures look directly into the camera and address the student directly." (e2). Concerning the possibility of asking questions, one of the e-moderators have experienced that "Many lecturers are good at implementing Q/A sessions after each subject, which is nice given that I get the opportunity to collect multiple questions and ask them." (e2). "The students' participation, when online, is very different. Its highly dependent on what year they are in, which course, teacher and time of the lecture we are dealing with." (e3) (The case study has not elaborated on these important parameters).

There are multiple perspectives at play concerning the premises of online participants:

> "So, a lot of time doesn't pass from the question being asked to it getting answered. They can feel "overlooked" or that their question ends up being irrelevant if too much time passes between question and answer. In general, that it something I always mention to the lecturer. In that way, the lecturer can assess whether questions are something s/he wishes to address continuously or at the end [of the session]. If the lecturer prefers to do it at the end, then I communicate it to the students at once […]. Because students also have a habit of dropping in, I make sure to give them a receipt for their question and remind them that the lecturer will address questions at the end." (e3)

Communication between e-moderator and lecturer/online participant respectively is experienced as important. It can be considered as part of defining what participating in a HyFlex-lecture implies. The e-moderators all experience that:

> "The chat function is worth a lot for the students […] It can happen that a student doesn't get an important point and asks their fellow students if they got it. It can happen that a student is in doubt and wants an answer from the lecturer. Here, they are also great at helping each other or rallying behind the question." (e3)

One of the e-moderator have experienced that the lecturers get "upset" (e1) with the students when they don't show up. According to the e-moderator this is because the lecturer is not aware that many of the students are with them online. The e-moderators experience full house in the auditorium. Even though the lecture was being recorded. An e-moderator (e1) assesses that the reason students are not showing up, when they can watch the lecture as a video, is that they often find it less meaningful to show up.

Summary

The e-moderator have been the communicative bridge between online/onsite students and lecturer in the broadest sense.

Group interview with students

The analysis of the group interview is divided into six themes based on the themes of the interview questions.

Theme 1: Pros and cons of onsite participation

Several students express that onsite participation implies better concentration.

> "[…] I am really bad at concentrating if I just sit at home. I am really bad at listening when its online. When I am physically present, I feel that I am a little involved in the session." (Informant 2)

These onsite students also focus on the fact that few participate onsite.

> "There is of course fewer people in the lecture halls which can seem odd, but I also think that this can help some students to dare to participate because they have to speak in front of fewer people." (Informant 3)

The context is displaced from that of a lecture to an experience of participating in a smaller class, thereby bringing forth other communicative expectations and possibilities.

> "It has become a little nicer, there's fewer people, it like class teaching. So, when the lecturer asks a question, maybe you feel more obligated to answer." (Informant 1)

Furthermore, the students state that an advantage of onsite participation is the possibility of asking your fellow students questions during the lecture and interaction i.a. initiated by the lecturer.

> "You can sit next to each other, and it is a little faster talking with each other, compared with breakout rooms where you don't know each other, and maybe there's a different tone, maybe you feel more safe verbalizing your thoughts even if it's someone you don't know." (Informant 5)

For the students, it is a recurrent theme that the communicative bandwidth affects their approach to the concrete contexts of interaction. A student twists the theme and puts emphasis on the lecturer: "the advantage is for the lecturer, so that they can get some feedback by looking at faces […]" (Informant 7). This theme is reoccurring in several contexts where 'black screens' (webcams switched off) are thematized as barriers for continuous interaction. (There has not been collected data on the extend of black screens).

The significance of the social dimension is emphasized by all interviewed students. As one student puts it: "I think it is good to be onsite and talk with some people, be a little social instead of just sitting at home." (Informant 11). The 'shift of arena' is important for some students. "There is an entirely different atmosphere at campus and the level of concentration is higher." (Informant 13)

The students state that "many lectures are very old-fashioned […] can't see any advantage by being there as opposed to sitting at home." (Informant 6)

HyFlex-organization means that the online students' chat questions via e-moderator is forwarded with a slight delay during the lecture. Onsite students experience this as disrupting the flow of the lecture: "HyFlex, well the lecture is kind of interrupted all the time, the e-moderator has to repeat the question, it is not that fluid." (Informant 9) A student states that onsite participants have the possibility to communicate during the break, and that this is often actualized.

Summary: Theme 1

From a communication and system perspective two parallelly active social systems is at play: the onsite lecture and the online chat. When an e-moderator indicates an online chat question, a 'communicative bridge' is created between the online and onsite systems. Some onsite informants found this disrupting because the communication flow onsite, often a lecturer's monologue, was interrupted. Individual preferences concerning concentration, social relations, and possibility for interaction play a part in the choice of teaching context (online/onsite), including the lecturer's capabilities.

Theme 2: Pros and cons of online participation

The students regard the pros of online teaching as lying in its more pragmatic character concerning issues such as geographical distance, sickness, infection and pauses.

> "Positive aspects online are that when there's a break, I go on a break, I am good at walking away from the screen, and go out to do the dishes or go out on the balcony to get some air, and unwind completely and then go back to the computer when it starts again. But the lecturer needs to have a plan for pauses and stick with it." (Informant 9)

Something that several students state is that the lecturer needs to understand which premises the online participants participate under. Amongst other things, they have a need for clear communication about breaks and expect the time schedule to be kept.

The chat communication gives the online students possibility to communicate with each other and the e-moderator:

> "People are good at using the chat. There are a lot of students that never participate actively in the lecturers, so of course there's also a lot that do not write in the chat, but there's often good communication between those who choose to use the chat, where students can answer if there's a question from another student […] E-moderator as a good connection between the chat and the lecturer." (Informant 3)

The chat serves as a forum for communicative activities of both academic and social character. "The chat has turned into us asking and answering each other – dialogue with the person 'next' to you." (Informant 14) "The chat in Zoom works really well because a lot of things are elaborated, and you can help each other, you can ask something, and then someone else in the chat can answer." (Informant 8)

The online participating students problematize the benefit of the actual lecture.

> "I feel as though it can be difficult to grasp it all when you are online; to watch the PowerPoint, and where the lecturer is pointing and also write notes, and the lecturer is drawing on the black board, that is difficult because I can only see one thing at the time online, they can see both things simultaneously onsite." (Informant 14)

It is not merely a question of premises onsite being difficult to translate to an online setting but also that "It is difficult to watch the screen, take notes and engage with the chat, when it is new material." (Informant 13), and that as a 1. year student you experience that "It is difficult to sit at home when it is something completely new." (Informant 14) A particularly important attention should be directed towards these 1. year students, who, with their unusual start during a Covid-inflicted 2020-21, have not yet established social relations, have not 'cracked the code', and have not previously participated in HyFlex-organized teaching. This article does not expand on this importance, but emphasizes it, nonetheless.

A specific theme, the students mention in the interviews, is the use of breakout room.

> "I know that the majority of my fellow students hate breakout room, myself included. It really sucks to sit at home be put together with three people you've never talked to before and be told that for four minutes you must discuss academically with them. It is difficult to motivate yourself to do it. When you're there [physically], you sit together with people you know, so you can say, well, my friend shall we… f2f is easier." (Informant 7)

The students agree that if breakout rooms have to be used, some thought need to be invested into placing people together with people they know, "It is just a matter of confidence" (Informant 6), and the result is often "Black screens – a lemming situation; I'm not going to bother turning on the camera then. Do not want to do something embarrassing" (Informant 7) and "You don't want to sound stupid in the breakout rooms." (Informant 5)

The students would like to discuss academic themes and find their own communication fora such as "If

I was home, then I sat with my friends through Facetime, or something like that, and talked with them before we headed back to Zoom." (Informant 4)

Several students thematize the connection between what is supposed to be learned, the concrete class and the lecture context: "If it is just memorization, where you just need to throw it up at the exam, I find it completely unimportant to discuss it with others […]" (Informant 7). This is a perspective that invites critical, didactic reflections on the future approach to teaching forms and organization, but also to dialogue with students on why academic interaction can be fruitful even on the lower taxonomical levels (Mathiasen & Andersen, 2020).

Summary: Theme 2

The students thematize different reasons of unwillingness to participate in 'breakout rooms'-activities, a point meriting special attention, also viewed from an (academic) educational perspective (Fossland et al., 2015). At the same time, students recount the usefulness of chat communication during the lectures and of their self-organized, alternative communication activities. This puts the significance of the social dimension and the conditions of communication in focus, including the students and lecturers approaches to participation. Generally, we can talk about the importance of aligning expectations and articulating culture on a class, study, and institutional level.

Theme 3: Communication across onsite and online fora

The students do not experience communication between students across the two different fora. Students participating onsite seldom open the chat, whereas students participating online more often do - their 'lifeline' to the lecturer. Some students speak of communication 'across' when for example an online participant via Facebook communicate with a fellow student onsite. Some onsite students use the chat: "I use the chat to copy/paste into my own notes – if there is a wrong answer in the chat, then there are others who'll say, no, that is not right, this is the right answer." (Informant 8)

A special form of communication 'across' is quizzes.

> "I think programs such as Shakespeak are obvious to use as it is an easy way to get many people to participate. Additionally, it is a great break in a monologue, and it can be done whether you're watching from home or on campus." (Informant 3)

Students participating online experience some inclusion when lecturer invites them to participate in a quiz. "We used to do quizzes a lot, and it works very well when you're sitting at home. I feel like I'm still on campus." (Informant 4)

Students participating online agree that the e-moderator plays a crucial role regarding the communication.

> "You can't communicate with the lecturer during lectures where an e-moderator is not present. Sometimes they check the chat at the end of the lecture and answer potential question, but they do not look at it along the way." (Informant 3)

According to the students, it is a challenge, specifically as an online student, when the lecturer forgets that they cannot see where s/he is pointing at the screen, or when the lecturer uses the black board. With the e-moderators help, these challenges are minimized as dynamic camera movement and pictures of black boards give online students better opportunities to keep up with the lecture.

Summary: Theme 3

The students experience that those participating online ask more questions than those onsite.

Furthermore, they experience that amongst those participating online there are many who answer questions in the chat both when asked by the lecture and by the chat itself. Quizzes are experienced by both onsite and online students as meaningful. It is however a challenge for online students that do not have the option of discussing possible answers with someone else given that, from a communication perspective, this could contribute to learning and therefore construction of knowledge (Mathiasen 2015).

The students state that HyFlex-organization can work when an e-moderator is present. They prefer this rather than 'pure' online lectures.

Theme 4: The students' approach to participation in HyFlex-organized lectures

The students primarily expect lectures to be monologues by lecturers. However, this is dependent on the lecturer and their use of quizzes, dialogue with fellow students in answering questions, invitation to reply (I-R-E-triads) and plenum discussions (chains of interaction). "For the most part, it is the lecturer giving a monologue, but it differs from lecturer to lecturer. Some are good at asking question." (Informant 3)

As the quantitative study also shows, not all students make use of the option of participating onsite every second time.

> "Splitting up in two teams is silly and something that you don't need to do because it is still the same select people that show up." (Informant 1)

Yet, there are differences, which the students ascribe to quality of the lecture regarding learning outcome. The students experience that HyFlex has worked for them, but several students also point out that they miss being able to ask the lecturer questions and get them answered in the breaks. At the same time, they see clear advantages in having fewer people be present in the auditorium. Some compare this situation with their class teaching. "The very principle of HyFlex has been great, we are not sitting 240 people in the auditorium." (Informant 4) Several students thematize lectures and learning outcome. "Lectures take up so much of the schedule compared to what the learning outcome is. Many are lost due to this." (Informant 6) The challenges are met in different ways. "In my class there are some girls who have eight-hour Facetime calls, where they just read and discuss things, and I have a Messenger group where we write all sorts of things." (Informant 7)

Multiple students comment on the communicative bandwidth and communicative flow: "[...] that you can sit and be part of the exchange of information from the lecturer, and that you can see that they can see the reactions from us, that is definitely worth something." (Informant 14) That lecturer and student can have eye contact is perceived as a substantial difference between participating online and onsite by several students. Lecturer often chooses an onsite student to answer the question.

> "That a lecturer is standing in front of people in an auditorium makes a difference for those of us at home. It might be that you are not part of the dialogue, but a dialogue is happening, and that just makes a huge difference." (Informant 14)

Online students comment on the importance of participating in a context where they can watch the communication onsite.

Summary: Theme 4

Regarding eye contact, which the online students notice is missing, a 'talking head'-webinar and a lecture video in an auditorium with onsite students are in the same category (Mathiasen 2019a). But the fact that onsite students are sitting in the auditorium gives online students a possibility of watching the communication and auditorium situation which can contribute to motivation.

The students note something problematic in the relation between the number of lectures and their

perceived learning outcome of them. Some students are especially challenged. This invites to further research with focus on onsite/online lecture formats and students opting/dropping out of participating.

Theme 5: The students own assessment of learning outcome through participation in HyFlex-organized lectures

The students have different preferences and experiences in relation to HyFlex-organized lectures and their own learning outcomes. They agree, however that "it is a big help that you can rewatch the lectures." (Informant 3) This especially in preperation for exams.

Some of the students "like to just study by themselves, and many of my fellow students enjoy this as well – reading a book, and then some lectures on the side, that gives me knowledge in a different way." (Informant 7) Here, the student has a point. The book's content is communicated in one way (in writing), while the video lectures might offer communication in a more elaborate fashion e.g., a lecturer verbally passes on the relevant subject matter while simultaneously supporting this communication with slideshows, animations, sounds, and so on (Mathiasen 2008).

A student articulates their experience as such:

> "Sometimes I understand things better when I get to say it out loud, do some exercises, and spar with the lecturer. With lectures it doesn't matter much whether I am at home or not but with class teaching it is different." (Informant 6)

Communication with lecturer and fellow students is important, and interaction during lectures is experienced as lacking. Therefore, 'it doesn't matter much'. "You lose all that is social, and we've been doing that for half a year now, so I am just an empty shell spitting knowledge." (Informant 7)

The students point out a declining motivation and loss of social activities, so that they can spar with and see themselves in each other.

Summary: Theme 5

Students have different preferences but generally agree that class teaching should not be carried out in a HyFlex setting, but rather onsite. They have missed the social dimension and related activities. This is because the probability of chains of interaction increases in onsite contexts since the communicative means are more numerous (Mathiasen 2021).

Theme 6: Good advice from the students, on a short term, and on a longer term

The students suggest clear communication from lecturers on practical affairs. Further, a suggestion is that "The lecturers have got to use Absalon [KUs LMS] for info between the lectures. More communication between lecturer and students e.g., that a lecturer asks the students a question after each slide." (Informant 4)

The desire for more information and interaction is common. The same can be said about lectures being recorded. The students point out that online participants should not be overlooked.

> "Consider sticking with recorded lectures. It's a conservative concept in a way. There are those who gain a lot from them, and there are those who does gain absolutely nothing from them at all. But the general sentiment is that it's great that we can watch the recordings. This should be held on to once Covid is over but class teaching, and laboratory teaching, cannot be compensated for online, just lectures." (Informant 6)

The students agree that HyFlex-organization is only suitable for lectures. "Don't take our class teaching from us. Someone is standing, talking, and that is not interaction." (Informant 7)

The strain on the social aspects preoccupies the students a lot. Both that "they would like to have the feeling of attending a university and to get to know the people and the place." (Informant 3)

Even though most students do not want to participate in breakout rooms where they do not know the other participants, some students have had good experiences. They completed "the assignment, got to ask about how you're feeling, do you also think this is difficult, do you also spend a lot of time reading it, what do you think about the lecturer? You know, just small things." (Informant 15) In the interview, the student points out that, apart from the academic possibilities, there is also the possibility of taking example from others and sparring in these rooms, and that this can have a positive influence on the motivation and will to continue as students. The prospect of maintaining the established social systems, and thus continued communication, is assigned great significance.

Summary: Theme 6

The pivotal point is once again communication and its conditions of possibility (class teaching/lectures). The lecturers are advised to understand the importance of framing lectures clearly.

The students have different approaches to participation in breakout rooms etc. Those that have reflected on the benefit of participating actively have viewed these communicative spaces as places where they put themselves on the line and got the opportunity to discuss, ask questions, get a sense of their own academic 'position', and built social relations.

Conclusion

In the qualitative part of the study, we have inquired on how the conditions of communication in HyFlex-organized teaching have been experienced by the students, and which approaches and preferences they express in this context. In the quantitative part, we have examined the volume of the students' communicative participation in HyFlex-organized teaching with an e-moderator attached. We have chosen the applied concept of communication because it makes focusing on students' and lecturers' opportunities for different kinds of interaction possible. The students agree that HyFlex is a good and flexible format for lectures. Their arguments are, apart from the more pragmatic ones related to flexibility, that online teaching often is information communicated by the lecturer to the students. This one-way-communication is a way of handling the complexity in the social system, especially when actualized in the context of 100+ students in an auditorium. Interaction as more than IRE-chains suffer since the context does not invite plenum discussions, and even IRE-chains can be difficult to actualize

due to purely practical/physical reasons. Yet, this is also because students are careful of contributing communicatively in the auditorium because they fear being branded as not capable by their fellow students. The students point out the essentiality of the social dimension for their approach to being students. A challenge in this regard is establishing a culture that embraces failure and 'making a fool of oneself'. The social dimension becomes poorer on communicative content, so to speak, if the students are too self-censoring. In an education perspective, it is important that the students can and will participate in discussions, also in the context of auditoriums.

The students like the option of having onsite interaction with teacher and fellow students, yet when the teaching takes the form of large-scale lectures, many (74%) choose to watch the lectures from their homes.

When the students state that class teaching (approx. 30 people) and lab-teaching should not be HyFlex-organized, it is once again a question of the conditions of communication. The students experience that interaction with teachers and between students affect the academic as well as the social development. The social dimension is emphasized as crucial for the framing of the teaching environments. The e-moderator serves as an important linkage between the onsite and online teaching environments. It concerns the conditions of communication and the facilitation of this communication.

The students accentuate the weakness of the webinar-format where lecturer appear as a 'talking head'/slideshow. Here, elaborate communication is not possible – neither IRE-triads nor chains of interaction. This is not experienced as motivating. Instead, HyFlex-organized lectures with an e-moderator controlling the camera is experienced by online students as a more motivating and engaging teaching environment. The students experience an expansion of their possibilities for joining the communication when lecturers use body language, writes on black boards, points at screens, asks questions and gets answers from students in the auditorium, and when e-moderator asks lecturer questions from the chat to which the lecturers answers. The multiplicity of the communicative means is emphasized as important for the understanding of information.

The students use the chat to communicate with each other during the lecture and contribute with both questions and answers. It is primarily online students that use the chat, but onsite students also use answers from the chat in their notes. Online students express that more questions are asked in the chat than in the auditorium. The reasons for this are primarily that the students do not want to "fail", "display their ignorance" or "stand out" when sitting in the auditorium. In the breakout rooms, this approach can also be observed. Here, a discussion on what university teaching should offer from an educational perspective might be relevant.

Something to be attentive of, and which invites didactical reflection, is that the students participate in chat communication, but not to the same degree in the synchronous, verbal communication. The case study does not show that this approach to communicative participation is specifically tied to a certain course, study, or year.

For some students, who prefer onsite participation, it is about "seeing and talking", creating contact, sparring, and reflect fellow students. For yet other students, participating onsite helps them to maintain concentration and focus on the communication. No matter the preferences, the foundation of participation is communication. Therefore, it is important that a continued focus is put on the conditions of communication in the relevant teaching environments.

The case study shows that students appreciate the option of accessing recorded lectures as needed, especially as preparation for exams. This is because they are at a different place academically at this stage than they were when they first watched the lecture. As such, this one-way-communication learning resource can build on current knowledge and contribute to a deeper understanding. With the applied theoretical framework, videos of lectures can as mentioned be described as an academic communication format where sequences of a unit of communication are processed.

Among the students, there is support for the continuation of HyFlex-organized lectures livestreamed

from auditorium, with an e-moderator attached, and as a video resource available afterwards.

Possibility for onsite participation is a must ('the atmosphere of an auditorium'). The online students state that being able to follow IRE-triads/interaction patterns is motivating. The communication unfolds differently in different fora and in different physical contexts. These are the conditions of social systems. The unpredictability is also in some way what the students emphasize as motivating and engaging.

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Links

www.postpandemicuniversity.net tilgået online d.15.02.2021

https://uniavisen.dk/to-forelaeseres-gyserdagbog-fra-en-maaned-med-digital-undervisning/ tilgået d. 12.02.2021 (In Danish)

https://www.uu.nl/sites/default/files/LERU%20Dig%20Trans%20Summery%20to%20LERU%20website.pdf tilgået d. 16.02.2021

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Research field since the 80s: Pedagogy, didactics and technology applications, - seen in a learning and communication perspective

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