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# Learning Design Patterns for Hybrid Synchronous Video-Mediated Learning Environments

By CHARLOTTE LÆRKE WEITZE, PhD fellow, Aalborg University, Copenhagen Campus, Case: VUC Storstrøm, Global Classroom Project, Contact: cw@learning.aau.dk.

*This article describes an innovative learning environment where remote and face-to-face full-time general upper secondary adult students jointly participate in the same live classes at VUC Storstrøm, an adult learning centre in Denmark. The teachers developed new learning designs as a part of their daily practices and also participated in a design-based research project exploring new learning designs for this environment (Weitze, 2015). The teachers' traditional learning designs were challenged, and this led to altered pedagogical approaches with less group-work and an extensive use of monologue-based teaching. The findings were, however, that the teachers, through pedagogically innovative strategies, developed knowledge about how their pedagogical patterns in this hybrid synchronous learning situation could be supported by an array of additional educational technologies and strategies to create activating and equal learning designs for the students. This article is written on the basis of a chapter in the PhD–thesis by the author.*

Keywords: Hybrid synchronous video-mediated learning, learning designs for hybrid synchronous teaching, pedagogical innovation, pedagogical-technological patterns.

## THE GLOBAL CLASSROOM

VUC Storstrøm, an adult educational institution in southern Denmark, has implemented the Global Classroom concept, a hybrid synchronous video-mediated learning environment, as a full-time educational option for adult general upper secondary students. The Global Classroom allows for synchronous lessons for students who are present in the classroom with a teacher and students who participate from home via their own PCs. It is a parallel-teaching method in which all participants can communicate, see each other and see and write on an interactive white board. The use of the hybrid synchronous video-mediated teaching environment is particularly relevant to VUC because the flexible programme makes it possible for adult students to combine their education with their family and working patterns by studying from home. This is in line with findings about how hybrid or blended synchronous video-mediated learning designs are becoming part of a new, flexible way to offer education for students who live far from educational institutions or are challenged by family or job obligations (Ørngreen, Levinsen, Jelsbak, Møller & Bendsen, 2015).

### The video-mediated teaching and learning environment

The hybrid synchronous video-mediated teaching room (Polycom, 2016) is arranged with an interactive whiteboard and two flat-panel screens at each end of the room (Figures 1 & 2a&b). This

room arrangement makes it possible for the students in class to see the students at home on flat-panel screen 1 when looking up towards the teacher (Figure 2a). The teacher is able to see the at-home students on flat-panel screen 2 (Figure 2b) when looking towards the classroom students.

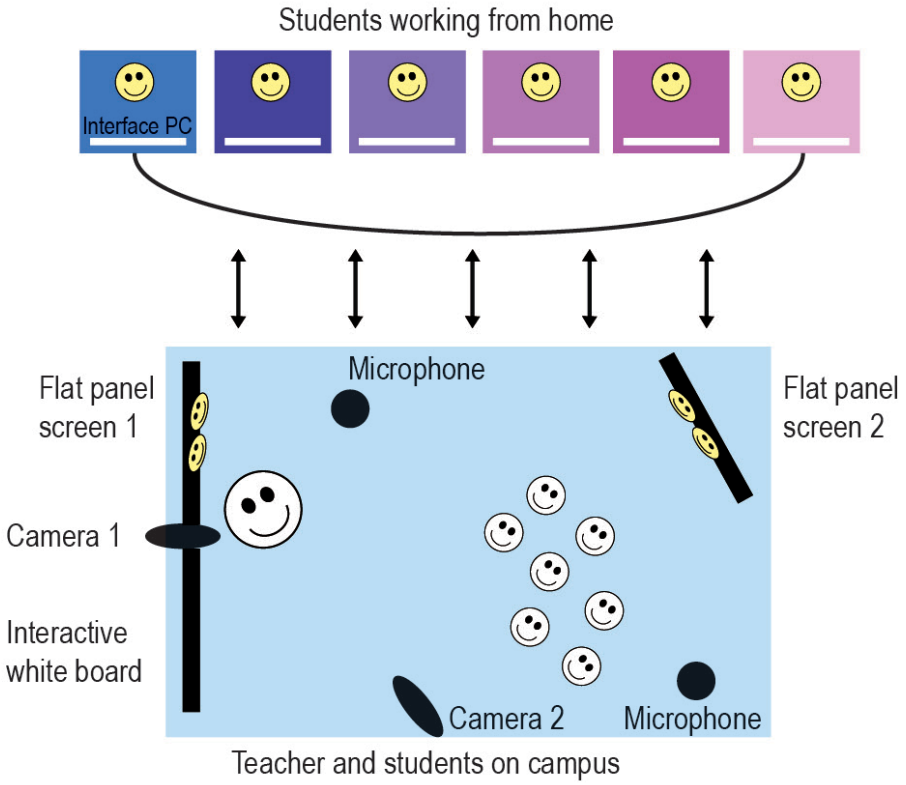



Figure 1: The Global Classroom - A hybrid synchronous video-mediated learning environment.

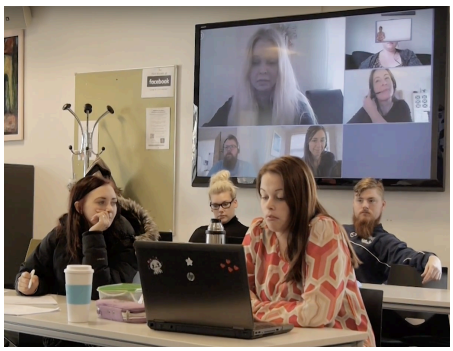


Figure 2a (left): Global Classroom teacher from the perspective of an in-class student.

Figure 1b (right): Students in class and at home (on the flat-panel screen in the background) from the teacher's perspective.

There are two cameras to capture different angles and two microphones to pick up the sound from the room; the teacher can adjust the cameras and sound from a panel. The teacher can also use two pre-set, fixed positions for the camera, pointing Camera 1 at the class and Camera 2 at him- or herself as he or she stands beside the interactive whiteboard. The teacher must therefore pay attention to where to stand and must decide which part of the room to present to the students participating from home.

## TEACHING AND LEARNING IN THE HYBRID SYNCHRONOUS LEARNING ENVIRONMENT

When teaching adult students in traditional brick-and-mortar classes, the teachers generally designed the learning as a combination of teacher-controlled and student-controlled learning designs. The pedagogical approaches were variations of individual/acquisition learning processes and social/participation learning processes, and in many cases the teachers also had clear aims to create motivating learning situations for the students (Illeris, 2007). In the Global Classroom, however, the narrative or monologue form of teaching became a large part of several teachers' learning designs (Laurillard, 2012). This created a dilemma for many of the teachers, as their pedagogical aims were to make the students participate actively in learning activities. As in findings by Bower and colleagues (2015), the teachers reported that teamwork often was difficult and time-consuming to establish between cross-over groups of at-home and in-class students in the learning environment because of technological problems and classroom noise. The teachers therefore used less teamwork in their learning designs than they traditionally would. Teachers found in particular that they assigned fewer short-term group projects that would have required students to meet together during class time.

Many of the teachers in the Global Classroom had motivating learning strategies for their adult general upper secondary students in the traditional bricks-and-mortar classes. The purpose was to activate the students, involve them in the learning processes and to vary the teaching approaches and thereby achieve the students' attention in order for them to focus and learn. Such strategies were hindered in this new hybrid synchronous classroom because most of these designs demanded the presence of all students within a physical classroom, where they could move and interact together, or at a physical location outside the classroom. The teachers lacked learning designs that could create shifts, vary the teaching and engage and activate the students in the Global Classroom.

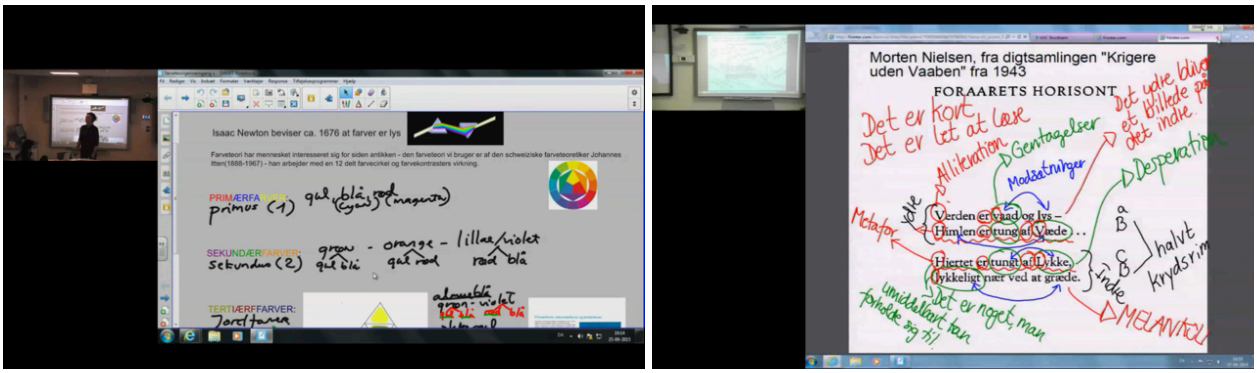



Figure 3: PC interfaces as viewed by two students attending class remotely.

The students participating from home experienced the classroom on their computers' interfaces (Figure 3). But for many students participating from home, it quickly became "boring" to watch the

lessons over videoconference; as they sat in private, familiar surroundings with other spheres of interest that could distract them, their attention dropped more quickly than when participating in class. The students at home indicated that they felt somewhat left out; they felt as if they were spectators rather than participants. Most home-students did not participate in the same active way as students in the class, and, according to both students and teachers, home-students learned less than the students in class. Participating in the video-mediated lessons required more concentration and initiative than participating in the classroom.

This called for learning designs that would involve at-home students more actively in the learning situation, designed to include more frequent variations to help students participate in a more active way. One purpose of researching within this area is therefore to create new knowledge about how to design engaging video-mediated collaborative online learning experiences that involve the use of additional educational technology and enable remote students to participate in face-to-face classes on equal terms (Szeto, & Cheng, 2014; Roseth, Akcaoglu & Zellner, 2013). There is a need to learn more about how to design technological setups combining hardware and software so they support educational designs and to investigate how the involved teachers and students qualify these technological setups through motivating learning designs (Bell, Sawaya & Cain, 2014). To make these new learning designs work, it is important to develop knowledge about key learning designs, frameworks and pedagogical patterns that may contribute to the best possible learning experiences for the students as well as for the teachers (Bower, Dalgarno, Kennedy, Lee & Kenney, 2014).

## METHODS AND RESEARCH DESIGN

The following analysis is based on the qualitative and quantitative data that was collected from February 2013 to January 2016 through interviews, observations, surveys and in workshops with the teachers. Some of the described learning designs were developed by the teachers in their daily work with the students in class through reflections in and on action in their performed teaching practices (Schön, 1983). Other learning designs were developed through common ideation and creation in teacher teams that were part of the design-based research experiment (Weitze, 2015). All of the designs had an aim to meet the combined needs for relevant and active learning for students in class and at home, and the purpose of the designs was to create motivating learning experiences for the students. The project contributed to development of and experiment with teaching methods using a blend of digital products, processes and teaching materials in addition to the videoconference system in the Global Classroom. The aim of the following empirical analysis is to give an overview and characteristics of the potentials and barriers for re-designing learning experiences in the Global Classroom. The research question for this part of the design-based research project was: How can teachers create activating and equal learning designs in hybrid synchronous video-mediated contexts?

## THEORETICAL AND EMPIRICAL ANALYSIS

The following sections describe examples of innovative learning designs emerging from and developed for the hybrid synchronous video-mediated learning environment. Though the bulk of the teaching that took place in the environment was conducted as presentations, dialogues and variations of teamwork, this article describes alternative learning designs involving educational technologies additional to the mediating videoconference system. As the teachers used several pedagogical approaches in each lesson the following learning designs represent a mix of cognitive, collaborative and motivating learning designs. The aim for these learning designs was to create equal and activating learning conditions for the students sitting in class and at home.

## NEW LEARNING DESIGNS FOR THE HYBRID SYNCHRONOUS VIDEO-MEDIATED CLASSROOM

### Learning Design #1: Collaborative Writing Processes and Formative Evaluation

Many teachers let their students work together in Google Docs (2016). The specific affordance of Google Docs is that it is easy to access and use, and everybody can write in the web-based documents, synchronously collaborating. This allows for collaborative learning designs where students in class and at home can work together under equal conditions. The web-based software also has a feature which makes it possible to see the names of the other students as they write, creating an impression of individual appearance within the document when students write together in groups (Figure 4).

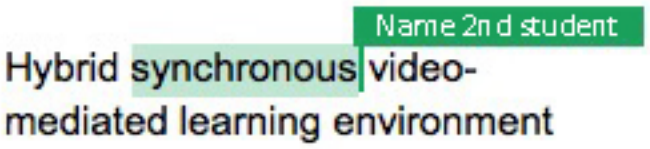



Figure 4: Group members' names are shown live as they write in Google Docs.

If these writing processes are combined with video-mediated cross-over groups (Figure 5), then the experience of working together can come close to the feeling of sitting in the same room, even though the students are at different locations. But as in all group work, creating this experience also requires that every student take responsibility to contribute to the work process; in addition, the video-mediated groups must be set up and working well where audio is concerned. In the Global Classroom, in-class students participating in cross-over groups wore headsets and worked at a non-disturbing distance from other in-class students. (In Figure 5, the students are in a room by themselves and therefore do not need headsets.)

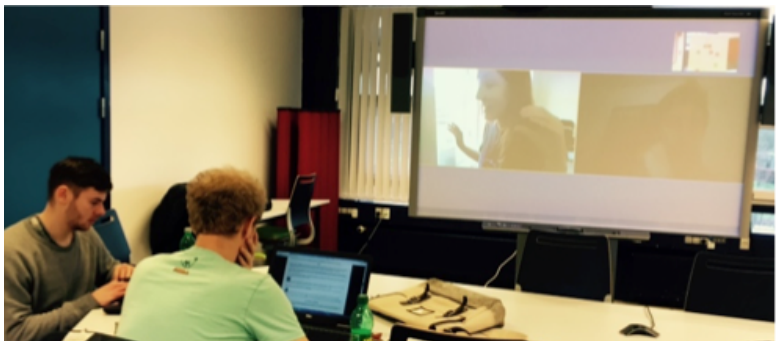


Figure 5: Students collaborating in a cross-over group between home and school in the Global Classroom.

**Individual formative evaluation:** "It is very difficult to keep track of the students at home, and therefore one cannot differentiate teaching when you cannot sense what they have learned" (Teacher in Global Classroom). This was a recurring problem that several of the teachers experienced. The reasons varied. Some at-home students were shy and quiet; sometimes it was difficult to see students' facial expressions, making it difficult to determine whether they were actively listening and understanding or drifting away. One teacher approached this problem by using Google Docs as a reflective tool for the students. In his lessons, every individual student had a shared Google document with the teacher; at the end of the class day, the teacher wrote two or three questions for each student about how he or she had understood the subjects or assignments of the day. Then, while the class was busy solving other assignments, the teacher would have time to stand by his computer, read the answers and comment in their Google documents. He could then also immediately attend directly to students who were experiencing specific difficulties. According to the teacher, this enabled close, direct attention to each student and made it possible to differentiate the learning process while also documenting each student's learning process. Other teachers chose to synchronously follow and comment on the collaborative teamwork in the various teams' Google documents. This was used for in-class groups, at-home groups and cross-over groups.

**Brainstorms and ideation:** Another web-based collaborative construction software (Laurillard, 2012, p. 200) that the students and teachers appreciated and frequently used for brainstorms and discussions was Padlet (2016; Figure 6). Padlet is a virtual sticky note tool that is easy to access. The students just need a link, and then everyone can create relevant virtual reifications (words, pictures; Wenger, 1998) and collaborate by discussing while moving the notes around as if they were in a physical room. One teacher asked the students to do a shared brainstorming session on subjects for an upcoming assignment. The subjects were then discussed and assigned for the different groups to work with. Both teachers and students found this tool very useful for common collaboration, and it was equally accessible by all of the students. It became "one of the tools in the box" for collaboration.

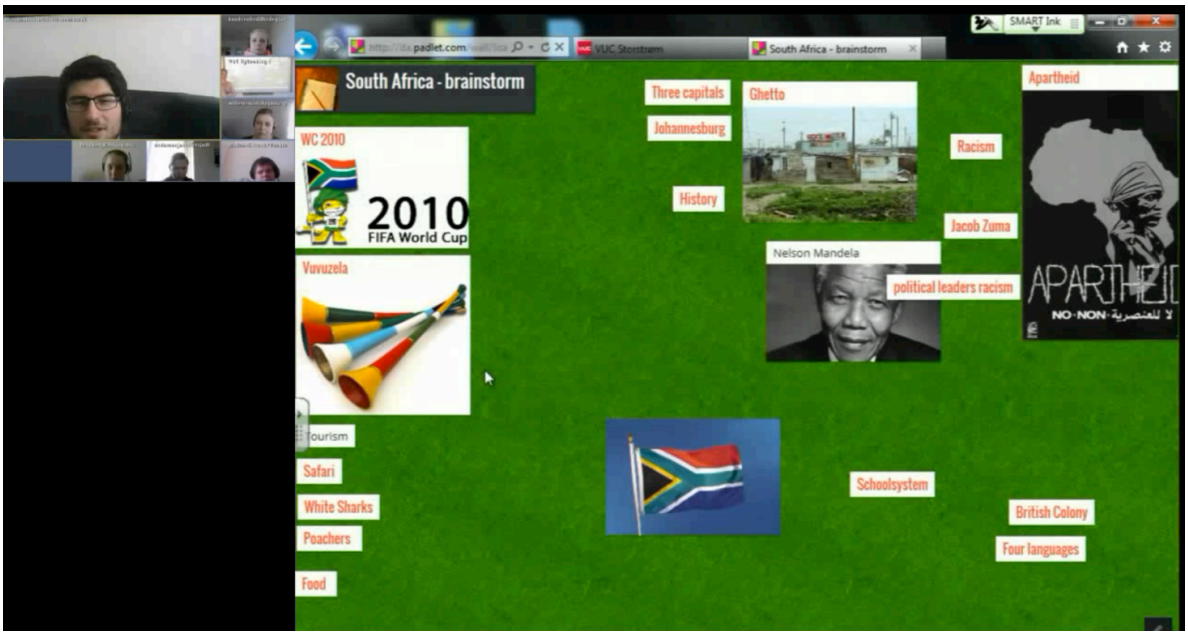
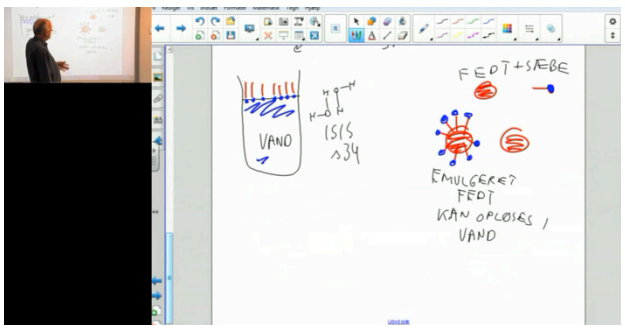



Figure 6: Learning design in which students brainstorm on subject areas for group assignments in an English as Second Language lesson.

## Learning Design #2: Lab Experiments - Teaching Chemistry

In teaching chemistry classes, teachers used the interactive whiteboard to present chemistry formulas. They also showed slides, pictures and web-pages and continuously explained the formulas as they wrote them on the interactive whiteboard. The interactive whiteboard, which was visible for both in-class and at-home students, was thus used both for sending/showing static content and for writing and explaining (Figures 7 & 8). The two chemistry teachers used three different approaches for making learning designs for the chemistry lab experiments:



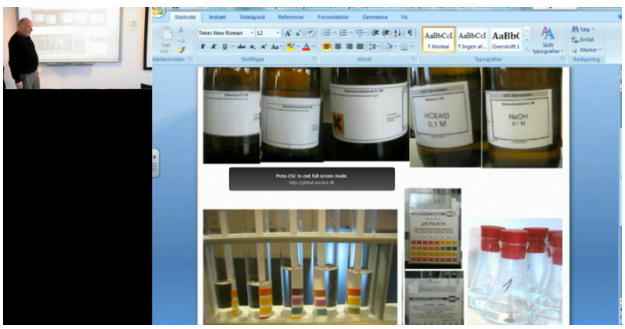



Figure 7 (left): Writing chemistry formulas on the interactive whiteboard.
Figure 8 (right): Pictures of chemistry experiments on the interactive whiteboard.

A) In the early stages of the Global Classroom, one teacher asked students to come to campus on the days these lab experiments took place. The students participated in the experiments in the chemistry lecture room using the chemical solutions and laboratory supplies. There was no videoconferencing system. There were, however, days when some students stayed at home in spite of the teacher's requirement to come to class. These students asked their peers if they would

help them participate. Their fellow-students placed their own computers next to the experiment and used Skype (2016) to video-mediate the experiment for the at-home students. This was a viable alternative for the students at home, enabling them to follow the experiments and (to some extent) to see what happened.

B) In 2014, the number of days students were required to attend class from campus was reduced. The chemistry teacher moved to the videoconference room so students could participate from home, showing pictures with the relevant experiments on the interactive whiteboard to create equal access for student in-class and at-home (Figure 8). This learning design lacked the hands-on experience of performing a real-life experiment. In this case, taking the needs of the online students into consideration meant that the students attending class had a poorer learning experience. The teacher spent most of the time lecturing, the at-home students remained passive and the in-class students were also very quiet.

C) Another chemistry teacher who started to teach in the hybrid synchronous video-mediated learning environment in 2014 had ambitions to keep the experiments part of the teaching concept. He used a small table with wheels to bring the chemicals for experiments into the classroom. He experimented with the camera angles and the zoom feature so the table could be seen by both the home and in-class students (Figure 9 and 10).

Figure 9 (left): The teacher talks to the camera and the students "on the wall," as seen from the class.

Figure 10 (right): Small table with chemicals for experiments, as seen by a at-home student.

The students in class came up to the table and conducted small experiments; the teacher instructed them where to stand so the online students could watch. The teacher and students discussed how to experiment, mixed and stirred the fluids and discussed the different outcomes by using the theory behind them. One at-home student asked experimenters four different times to step aside so she could see. This indicated that camera angles could be improved, of course, but it also showed that she was following the experiment closely and that the students and teacher in class could help her “be” actively and attentively “in the classroom” by letting her hear and see the experiment close up. The teacher even explicitly discussed the smell of a fluid, instructing students

to be careful when smelling an unknown fluid and demonstrating how to wave a hand over the bottleneck in the direction of one's nose. The class discussed what the fluid smelled like, noting that it was like the smell of new cloth, making it possible for online students to imagine the smell. The teacher said in an interview that he was conscious of being very explicit in describing chemical phenomena such as changes of colour or crystallisations that were difficult for home-students to see, essentially "being their eyes." The teacher ended by showing something on the interactive whiteboard; this was (perhaps by oversight) not sent to the online students. In addition, the camera showing the classroom was not switched back to the teacher, and it became difficult for the at-home students to follow his final explanation. This final chemistry learning design (C) could have been improved as far as the camera angles at the end of the lesson (and perhaps by adding a document camera), but it became an interesting and almost tangible and sensory experience for the online students as well as the classroom students. This experiment illustrated how the teachers' tacit practices were altered in the video-mediated environment.

### Learning Design #3: Walk and Chat

One of the things teachers missed in the Global Classroom was the opportunity to activate students through movement – especially at the end of the day when the students became tired. This applied to most of the teachers. One teacher had previously done QR-code assignments in the schoolyard to send the students outside to discuss and get some fresh air. When teaching in the Global Classroom, teachers felt grounded, and students at home sat statically on their chairs all day. A Global Classroom social science teacher experimented with the concept "walk and chat" in the innovative teacher-teamwork (Weitze, 2015). In a teacher workshop the teachers tried out the learning design using their smartphones with the software TodaysMeet (2016), this software was easy accessible. This educational chat platform enables everyone to chat together while taking a walk outside in the fresh air, regardless of where they are geographically. The aim was to chat about concepts within a subject area that could be further explored when the team/class met on videoconference afterwards.

### Learning Design #4: Students Producing Films

One of the new initiatives among many initiated by teachers was to create designs in which the students formed groups and made short videos about problem-based subjects. The teachers were very impressed by what the students accomplished using the software Screencast-O-Matic (2016); the students also stated that it was fun to work with. The program was used to make five-minute movies. One teacher used this learning design to evaluate an American Civil War topic; others used it to let the students make instructional videos to train oral communication. Several of the teachers reported that this learning design with video had been fully integrated into their teaching practice in class. In the Global Classroom, the challenge was twofold: 1) For a team to create a film, most tasks had to be done together in the same physical room as students recorded each other. 2) It was difficult to work together in this tool in virtual groups, as the software worked on each person's individual computer. These hurdles were examples of how crossover-group

collaboration can become difficult because of the (missing) affordances of a digital tool. It is possible to create workarounds by sharing screens, but the teachers often experienced that the pedagogy changed for the online students. Students who worked in cross-over groups ended up working cooperatively (Dillenbourg, 1999); students distributed the assignments among themselves and later combined their individual results; whereas the in-class students, sitting in the same brick-and-mortar classroom, had other options for close and discursive collaboration, working with tools that afforded equal and collaborative work opportunities. Even though the in-class students could not collaborate within the same tool, they could walk over to a fellow student's computer and sit beside it, pointing out on the screen what to alter and what to do next in the making of the film.

## DISCUSSION

What are the common guidelines in these new learning designs when the focus is to create equal, active and motivating learning experiences for in-class and at-home students?

1) **Web-based collaborative construction software.** Learning practices often take place through the use of materials and tools in collaborative processes. Students sit together and collaborate with materials in reification processes (Wenger, 1998). Because the remote students could not interact with physical materials in the classroom, the collaborative environment had to provide tools for working and learning that were equally accessible for students in class and at home. This was accomplished with a variety of web-based collaborative construction software. The common features in learning designs #1 and #3 included the following:

- Students had access to a collaborative construction environment.
- Multiple students could work with the technology at the same time.
- The technology was equally accessible from different locations.
- Students could "see" the other collaborators – depending on the software it was possible to se "where" they were in the software and/or what actions they performed – within the software.
- When combined with connecting audio (and video), the collaboration software could contribute to a feeling of working together under equal conditions, more closely approaching the experience of sitting in the same room.
- The technologies were easy to access (one-click or one-link access), easy to use (high usability) and stable. This ease of use minimised the number of tasks and actions students had to perform in addition to controlling the videoconference system, allowing them more time to focus on the learning processes.

Teachers reported that some of these tools became "one of the tools in the toolbox." This could be interpreted to mean that these tools had become entangled in practice and were used with ease in various learning designs designed into various contexts (Orlikowski, 2010). These tools enabled students in class and at home to interact on equal conditions.

2) **"Unequal" learning designs for experiments.** In some classes, students had to participate in experiments using relevant materials and tools provided by the teacher. According to the findings, it was motivating for students to engage in experiments with the materials. Some teachers abandoned their previous in-class experimental learning designs in order to provide equal access for all students. This led, in some cases, to longer slide-based presentations with less engaging learning designs, causing students to lose concentration. In such cases, the teachers' focus on providing equal access resulted in poorer learning designs for all students. Learning design #3C did not provide equal access to the chemistry class experiments for all students, but it nevertheless allowed the students at home to become actively engaged in the learning experiences. The teacher made sure that camera angles were in place for remote students to follow the experiments and explicitly described details that were difficult for the remote students to see, hear or smell. It re-mediated traditional chemistry experiments by offering carefully designed, video-mediated, bodily performed experiments and reflective discussions, making the experience interesting for the at-home students as well as the in-class students. Such "unequal" learning designs, with common experimental activities involving artefacts in the classroom, may be the best possible motivating learning design solution for both student groups in the hybrid synchronous video-mediated learning environment.

3) **Collaborative workarounds and technological bricolage.** Learning design #6, which involved students making films, exemplified a motivating learning design that made equal collaborative access difficult for remote students. This was a typical learning design in the Global Classroom. The fact that a collaborative learning design involved the use of a technology that was not accessible by more than one person created a need for collaborative workarounds and bricolage. Collaborative workarounds took place when collaborative assignments were turned into cooperative assignments by distributing tasks among group members and combining their individual results later (Dillenbourg, 1999). The choice was often that the in-class students, able to look over each other's shoulders and discuss, worked with the technology while the at-home students collected information or contributed with written work.

> *Bricolage is about the particular and the particularities, and in the case of learning technologies it helps explain the relationship between practice-as-designed and practice-as-practiced or emergent. The concept of bricolage shifts focus away from technology design as usually understood as the design of an artefact towards emergent design of technology-in-use, particularly by the users (Johri, 2011, p. 212).*

Bricolage occurs when students engage in action and activity work with the (digital) tools at hand to the best of their ability, developing a new practice involving these tools (Johri, 2011). Bricolage was used when the students used the tools at hand to combine various technologies to make the

collaboration work – for example, using a screen sharing technology to enable all students in a cross-over group see a film creation tool; or, when recording video at one of the locations, uploading it to the LMS for sharing and further collaboration in a film edit tool at another location. These processes sometimes became so complicated that in-class students preferred to work without the remote students in a group because they could not make their current learning design work when participating remotely.

4) **Hybrid synchronous mobile learning designs.** In the general upper secondary classes, many teachers used a "change of learning environment" approach by creating learning designs for outside the classroom and bringing students out into the fresh air at the end of the day. For students "without their body in the class" participation was difficult. The teachers began to develop hybrid synchronous mobile learning designs so all students could participate in learning designs outside the classroom.

## CONCLUSION

The new learning designs aimed to create equal, activating and motivating learning experiences for in-class and at-home students and followed one or more of these four patterns: 1) Some designs relied on web-based collaborative construction software, equally accessible for in-class and at-home students to work in. 2) "Unequal" learning designs for experiments with shared activities involving artefacts in the classroom were experienced to be the best possible motivating learning design solutions for both involved student groups. 3) Other designs allowed for collaborative workarounds, where in-class and at-home students distributed tasks between group members and combined their individual results later, and technological bricolage, where students constructed collaboration practices with the tools at hand by combining various technologies. 4) The hybrid synchronous mobile learning designs allowed all students to participate in learning designs outside the classroom as well as within.

This study contributed new, relevant knowledge to the newly developing research field of learning designs for hybrid synchronous video-mediated learning environments. This involved developing knowledge about emerging learning design patterns when the aim is to create equal, activating and motivating learning experiences for in-class and at-home students in a hybrid synchronous video-mediated learning environment. In future studies, it would be valuable to deliberately implement these four learning design patterns as overall learning design strategies in order to investigate their effects upon teaching and learning in a hybrid synchronous video-mediated learning environment.

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