



Best practices for online learning: experiences from the WAT Master's programme



Sara Heikonen, WAT course assistant in spring 2021

Supervision:

Meeri Karvinen, WAT programme coordinator

Marko Keskinen, WAT programme director


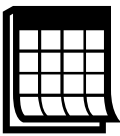




ISBN 978-952-64-9608-5

BEST PRACTICES FOR ONLINE LEARNING

Based on experiences from the Master's programme in Water and Environmental Engineering (WAT) at Aalto University

Image copyright © Aalto University/Adolfo Vera. All rights reserved.

Learning and evaluation in WAT programme have a strong emphasis in groupwork, peer learning and interaction between students and teachers. To continue meeting the learning goals of the master's programme courses while supporting the well-being of students, it was important to maintain the interactive teaching methods in the rapid transition to online learning in 2020-21 (due to COVID-19 pandemic). The best practices for online learning presented below are based on observations and experiences from ten WAT courses in spring 2021, and collected through course assistant's work in the courses, student feedback and discussions with teachers.

Building trust		WHY? • Encourages students to interact and participate in teaching sessions HOW? • Introductory rounds and icebreaker activities • Keeping the cameras on • One-on-one discussion with students
Careful scheduling		WHY? • Makes online sessions less tiring while ensuring that key contents become covered HOW? • Considering the length of the teaching session • Including frequent breaks • Time for discussion, questions and facilitation
Providing extra support		WHY? • Makes the workload of online courses less overwhelming HOW? • Optional extra support sessions • Open discussion forums on course platforms • Recording lectures
Providing opportunities for interaction		WHY? • Supports learning and well-being of students HOW? • Group projects and working in smaller groups even with individual assignments • Short group tasks during teaching sessions • Online co-working sessions
Involving the students		WHY? • Helps students stay focused and teachers to adjust contents & schedule of sessions/course HOW? • Short, low-threshold lecture activities • Group discussions and tasks • Asking for feedback
Smooth technical implementation		WHY? • Precondition for the other five elements HOW? • Planning and practicing beforehand • Assistant taking care of the facilitation tasks • Instructing students, other course staff and visiting lecturers

The starting point for exploring best practices in online learning was student feedback from 2020: 1) reduced connection and peer support, 2) difficulty of getting support with assignments, 3) online learning feeling tiring and 4) technical issues. Based on feedback in spring 2021, promoting the key elements above led to some improvements in all these issues. Teachers appreciated improved knowledge sharing on online practicalities and additional help with online arrangements: this ensured smooth technical implementation and released more time for planning the actual teaching and thus, ensured high quality teaching in the online setting.

Contents

1	Introduction.....	3
2	Context and methods.....	4
2.1	Context - WAT Master's programme.....	4
2.2	Methods.....	4
3	Best practices for online learning.....	6
3.1	Building trust.....	6
3.2	Careful scheduling.....	7
3.3	Providing extra support.....	7
3.4	Providing opportunities for interaction.....	8
3.5	Involving the students.....	8
3.6	Smooth technical implementation.....	9
4	Teaching session activities.....	10
5	Tools and platforms for online learning.....	12
5.1	Zoom.....	12
	Examples on successful use.....	12
5.2	Microsoft Teams.....	12
	Examples on successful use.....	13
5.3	Panopto.....	13
	Examples on successful use.....	13
5.4	Microsoft Stream or OneDrive and SharePoint.....	13
	Examples on successful use.....	14
5.5	Miro.....	14
	Examples on successful use.....	14
5.6	Other tools for interactive online teaching.....	15
6	Experiences from other master's programmes in ENG.....	16
7	Discussion and conclusion.....	17
8	References.....	19

1 Introduction

After spring 2020 when teaching was moved from classrooms to online platforms, the challenges of online teaching and decreased connection to students were recognized in schools and universities. In the Water and Environmental Engineering master's programme (WAT), learning and evaluation have strong emphasis on group work and interaction between students and teachers, thus transferring to online teaching affected heavily on the key teaching methods of the master's programme. Although, based on the feedback, the WAT students had been pleased with the efforts that the teachers had made in providing an engaging remote learning experience, there had also been challenges in the interaction between course staff and other students, and getting support with assignments online. In addition, the teachers had had to find the best ways to organize courses online through trial and error, under time pressure and with limited resources. To meet the learning goals of WAT courses during online teaching while supporting the well-being and motivation of the master's programme students, the challenges the students and teachers had been facing needed to be addressed.

The need of support for adapting to online teaching was recognized also in the School of Engineering (ENG) and the dean had announced extra funding to be applied for increasing the interaction in online teaching in spring 2021. With these applied and granted funds, WAT decided to employ a programme-level course assistant for the spring term 2021. The aim of the course assistant's work was to support the development and implementation of the online arrangements of WAT courses, to promote the sharing of online teaching related knowledge and practices between teachers, and to collect the findings and experiences from the spring term for potential future application in WAT or other programmes and courses. Because of limited resources, the course assistant's tasks were mainly focused on identifying and promoting small changes that can be made in courses to promote interaction and to support the students in the online learning setting.

This report describes the context (i.e. WAT) and the methods of the course assistant's work, the elements that have contributed to making online learning in WAT more engaging for students, and the online platforms and tools that have been used in WAT courses. Moreover, the report reflects the findings from online learning WAT in comparison to experiences from five other master's and bachelor's level courses in ENG. Finally, the impact of the course assistant's work is assessed based on student and teacher feedback collected throughout the spring term, and the potential future applications of the findings related to online learning are discussed.

2 Context and methods

This section describes the context of the observations and experiences presented in this report as well as the methods, i.e. the approach and practical tasks of the course assistant's work.

2.1 Context - WAT Master's programme

The observations presented in this report are based on experiences from ten WAT Master's programme courses organized in three study periods during spring term 2021. Each course had 12 – 25 attending students. During each period, the course assistant was involved in the teaching arrangements of all the courses and collected feedback and experiences to be shared with the other teachers. The experiences from each period's courses were thus smoothly transferred to the following teaching periods.

WAT programme has a student-centered, interactive approach which aims to make use of the diverse backgrounds of the students (Aalto University, n.d.). The teaching has strong emphasis on discussion, group work and peer learning. In most WAT courses there are no exams but learning and evaluation happens throughout the courses through assignments. The interaction between the teachers and the students as well as peer interaction between the students plays an important role in the learning and evaluation processes in WAT courses.

The teaching staff in WAT Programme have regular meetings to discuss topical issues in teaching and to share practices. They also have a Microsoft Teams channel for sharing information. However, as meeting times and time resources of teachers in general are very limited, the programme level course assistant significantly increased the possibilities to cross-fertilise the various online practices different teachers applied in their courses.

2.2 Methods

The starting point of the course assistant's work was to identify the main areas of improvement related to online learning. For this, the assistant utilized the feedback collected from the first-year master's students in the end of spring 2020 and from the new master's students after the first teaching period in autumn 2020. Overall, the students had been happy that the interactive and group work focused approach in WAT courses had been maintained in online teaching as well. However, there was a clear need for developing the online teaching arrangements further to support learning and the students' well-being. The main issues and areas of improvement that arose from the student feedback were: 1) lack of connection to course staff and other students as well as lack of peer support, 2) teaching sessions feeling more tiring and heavier in the online setting, 3) difficulty of getting enough support for assignments, and 4) technical difficulties with online learning platforms and course specific software.

Through collaboration with teachers and contributing to courses, as well as facilitating activities for master's thesis workers, the course assistant's work aimed to address the identified challenges in online learning in WAT. The main tasks of the course assistant thus were:

- 1) Supporting teachers with the online arrangements of courses, focusing on interaction, and considering the previously identified challenges in online learning.
- 2) Advancing the sharing of experiences and tips related to online learning between teachers.
- 3) Facilitating online writing and peer support sessions for master's thesis workers.

In addition, experiences from online learning were discussed and shared with course assistants working in five other master's and bachelor's level courses in the School of Engineering (ENG).

In practice, the course assistant's work involved contributing to the online arrangements of courses for example by planning and preparing teaching session activities on online platforms, supporting visiting lecturers with online arrangements, and advocating for having sufficient breaks during teaching sessions and for providing more opportunities for interaction during the courses. Moreover, online learning related course feedback and teachers' experiences from online teaching were gathered during and after each course, and similarities, differences and areas for further improvement were identified. The findings were shared with other WAT teachers and considered when planning following courses. In the end of the spring term 2021, the student and teacher feedback were also used for evaluating the impact of the course assistant's work.

Online writing and peer support sessions for master's thesis workers were piloted in WAT starting from January 2021 to promote well-being and peer support between master's thesis workers. The sessions were hosted in collaboration with Meeri Karvinen (WAT programme coordinator) and Anna Vilén (current WAT student and master's thesis worker). The sessions, adapted from the online writing retreats by The Write Kelley (The Write Kelley, n.d.), provided the thesis workers an opportunity for structured, deeply focused and peer supported writing or working sessions twice a week. In addition, part of one of the weekly sessions was dedicated to learning and discussing about thesis writing related topics (e.g. producing and structuring scientific text, time management strategies and the milestones of the thesis process). Online working and thesis process related feedback and ideas for improvement were collected also in these sessions.

3 Best practices for online learning

Based on the experiences from courses in spring 2021 and the course feedback from students, there were six key elements that helped making online learning more engaging and supported remote studying in the WAT courses:

1. **Building trust** within the class.
2. **Careful scheduling** of teaching sessions.
3. **Providing extra support** for students.
4. **Providing opportunities for interaction** between the students.
5. **Involving the students** in teaching sessions.
6. **Smooth technical implementation** of the sessions.

These key elements are explained further in the next sections.

3.1 Building trust

To build a trusting atmosphere that encourages interaction and asking questions, WAT teachers reserved time for an introductory round with the cameras on in the beginning of every course. Sometimes these introductory rounds included a fun ice breaker activity (Figure 1) to encourage relaxed interaction. Introductory rounds were sometimes also used at the beginning of teaching sessions that were hosted by visiting lecturers. In addition, the students were often asked to have their cameras on when they were speaking and when they were working in smaller groups in breakout rooms, if these parts of the lecture were not recorded. The teachers tried to speak with each student during the course to strengthen the connection with them and to provide more opportunities for asking questions or help with assignments. For example, during exercise sessions some teachers took one-on-one calls with students to discuss course related questions in private.

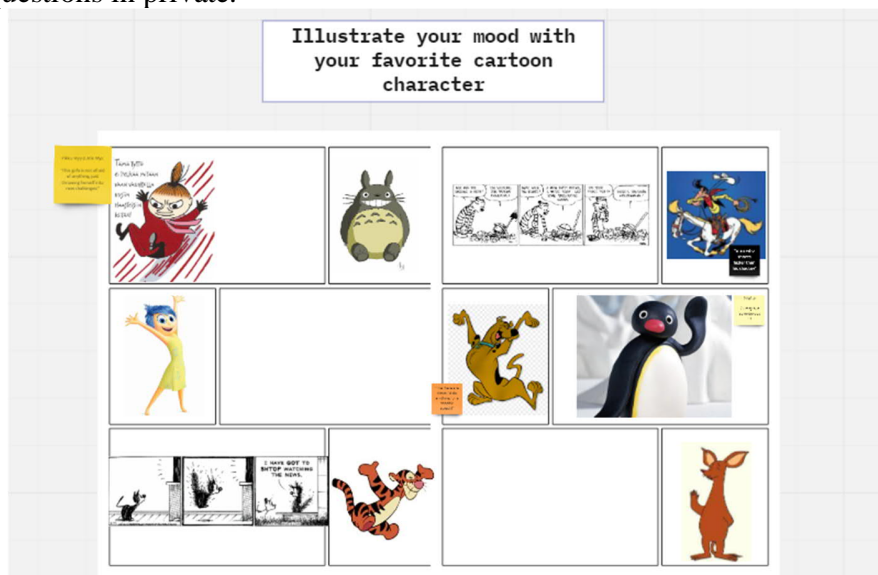


Figure 1 An icebreaker activity in Miro in the Sustainable Global Technologies Studio course.

3.2 Careful scheduling

Based on the feedback from WAT students, many students find it more difficult or tiring to focus on listening in online teaching compared to classroom teaching. To make the teaching sessions easier to concentrate in, we found it important to schedule in sufficient breaks – both in amount and in length. In our experience, having at least one longer (around 10-minute) break once an hour worked well for teaching sessions, in addition to a few interactive elements such as polls or short group tasks.

However, based on the feedback, some students found online teaching sessions heavy regardless of frequent breaks. Therefore, some teachers tried to keep the lecture parts of teaching sessions shorter (less than two hours long, preferably less than an hour long), and build the sessions around discussion and applying the lecture topics in independent or group tasks. In multiple courses, especially in the courses with longer lectures, the lecture parts of teaching sessions were recorded so that students could watch them later if they were not able to focus for the whole session or could not participate in the session at all.

Overall, the importance of careful preparations and scheduling of teaching sessions were highlighted in online teaching and studying. For example, some teachers found that they might unintentionally compensate the lack of connection with students by talking more and therefore make the lectures even longer. Some found it difficult to adapt the schedule and plan for a teaching session on the fly in the online setting. Moreover, we found that to support interaction in teaching sessions, it was useful to dedicate time for discussion, questions, and preplanned interactive elements in teaching sessions, as well as to consider the time needed for the practical facilitation of these activities.

3.3 Providing extra support

In online teaching, the students are working more independently than in classroom teaching because a large part of the usual peer support, gained through interaction during teaching sessions and outside of them, is missing. We found that, potentially because of the lack of peer support, students needed more assistance with assignments in the online setting than they would have in classroom teaching. Based on the course feedback, the students appreciated when teachers scheduled weekly optional extra support sessions or “office hours” when they were available, if students needed help. In addition, in multiple WAT courses, there were discussion forums for assignment related questions on the course platform, in which students were able to help each other as well. Another advantage of providing the additional support sessions and discussion forums is that they might reduce the number of assignment related emails that teachers receive, since the teachers are able to help multiple students at the same time in these sessions and on these platforms. In WAT courses, the benefits of the support sessions and discussion forums were the most notable in courses where the students actively participated in them. It seemed that the discussion forums were the most active in courses where the teachers strongly encouraged students to utilize them (e.g. said that it is the preferred platform for asking questions) and were active there themselves (e.g. posted when they will be available for one-on-one help calls or gave tips for assignments).

Related to extra support, in nearly all WAT courses in spring 2021, the students wished that the lectures would be recorded. In 60% of the courses, they were. The benefit of recording the lectures from the student perspective was that the students could revise parts of lectures afterwards or watch lectures later if they were not able to participate in the live sessions. However, the disadvantages of recording lectures were that for privacy reasons, the students were perhaps less inclined to speak up and interact during

recording, and that recording the lectures might have made it more tempting for the students to skip live lectures, fall out of a structured study schedule and miss the planned interactive elements such as breakout room discussions or polls. In the courses where the lectures were recorded, the recording was stopped when there was an interactive part in the teaching sessions, and if needed, the videos were edited before making them available for students. In the remaining 40% of courses, the lectures were not recorded because of one or more of the following reasons: 1) some visiting lecturers did not want their sessions to be recorded, 2) the teachers did not have the time for processing and uploading the videos because it might take several hours (saving, potential editing and exporting, uploading to Panopto etc.) or 3) the teaching sessions were heavily focused on group work and discussion and there was very little content that could have been recorded.

3.4 *Providing opportunities for interaction*

To support peer interaction that promotes both learning and the well-being of students, special attention was paid to providing the students opportunities to work together and discuss in the course setting. In all WAT courses, there were group work assignments of varying durations, and shorter group discussions or tasks were also incorporated in lectures. In addition to teacher-lead lectures, the courses had exercise or support sessions where students worked on assignments and could ask for help.

In the exercise or support sessions, even though some assignments were independent work, some teachers tried to provide more chances for interaction between students by dividing the students into smaller groups that worked together for the duration of the session. In the groups the students were able to discuss and help each other if they wanted to, and the teacher could navigate between the groups to see if there were questions. In other courses, the exercise sessions were organized so that everyone was in the same virtual meeting room and the students could hear each other's questions and potentially benefit from the answers. In all courses, there was also a discussion forum for course related questions on one of the course platforms (MyCourses or Teams). The students had different preferences on how the exercise sessions should be organized: some preferred working individually while others appreciated having the opportunity to work together. In future courses, the students could be given an opportunity to choose how they would like to work during an exercise session.

The online thesis writing and peer support sessions aimed to provide master's thesis workers opportunities for peer interaction. Previously during the pandemic, there were no regular co-working events or chances to discuss with peers organized by WAT. The participants said that they found the sessions important for their work motivation. Many participants enjoyed using the Pomodoro technique (repeating three times the cycle of e.g. 25 minutes of work and a 5-minute break) during the weekly sessions. The peer support sessions also encouraged the participants to work through challenges, and they got useful tips for their work. They shared their own tips related to for example communicating with advisors and structuring their workdays, and they also learned about the formulas for good introduction and discussion sections of the thesis. If the online teaching continues, independent course related work could also be supported by providing similar opportunities for co-working, connecting and discussion on an online platform.

3.5 *Involving the students*

WAT courses generally have interactive and participatory approach in classroom teaching. To maintain a similar emphasis in the online setting, the WAT master's programme teachers tried incorporating various activities in the teaching sessions using online platforms. These activities and platforms are

described in more detail in sections 4 and 5. The activities helped making online teaching sessions more engaging and easier to focus on, providing the students low-threshold ways to participate and connect, and providing the teachers ways to assess whether the students are following and understanding the lecture topics. Some teachers found it challenging to keep up with the students' questions and facilitate activities while giving a lecture, and often it was found beneficial to have another person (e.g. course assistant) taking care of the facilitation tasks. Having an additional facilitator in teaching sessions was found especially important in the teaching sessions given by visiting lecturers.

WAT students especially appreciated discussions or group tasks in breakout rooms because they provided an opportunity to connect with peers, encouraged to think about the lecture topics more profoundly and gave a boost of energy during the lecture. The key factors that made the breakout room tasks enjoyable and motivating for our students seem to be that the classes were small and the students knew each other beforehand, and that the insights of the group work sections were discussed afterwards with the whole class. On the other hand, some students found the breakout room discussions tiring because the communication in the groups felt unnatural, and their motivation to participate in breakout room discussions decreased towards the end of the semester.

In all WAT courses, the students were also involved in teaching sessions and course design through collecting feedback about assignments, teaching sessions and online arrangements. Feedback was collected anonymously in the end of each course in a survey, and during teaching sessions for example in Miro through mood meter activities or by asking freeform feedback. In addition, some WAT teachers asked for written feedback as part of each course assignment. The teachers aimed to apply the student feedback already during the course if possible, and based their choices of course platforms, online tools and other elements of online course design on the feedback from previous courses.

3.6 Smooth technical implementation

All the other above presented key elements rely on the fluent flow of the online sessions. In WAT courses, it was found that this requires planning the tools and steps needed for hosting an online course well in advance and practicing the facilitation tasks in teaching sessions and on online platforms. When possible, it was useful to have another person (e.g. course assistant) taking care of the facilitation tasks so that the teacher could focus on the pedagogical elements and substance of the course. In addition, to minimize any technical issues, WAT teachers or course assistants introduced students, other course staff and also visiting lecturers to the platforms, tools, and other online practicalities applied in the courses. Visiting lecturers were familiarized with the online arrangements of courses in one-on-one meetings, and the students were provided with written and video instructions, live instructions in the introductory lectures of courses, and live demonstrations before any activity that used a new tool or platform. The technical details applied in WAT courses are presented in chapter 5.

4 Teaching session activities

During spring 2021, the teachers in the WAT master's programme applied various methods for engaging students during teaching sessions and throughout the courses. This section describes the teaching session activities that have been explored in WAT courses. The activities can be grouped and placed on a scale from quick activities (around 2-3 minutes) to long term activities (up to 6 weeks) and they include both individual and group activities (Figure 2). Figure 2 also shows the tools that have been used for implementing the activities.

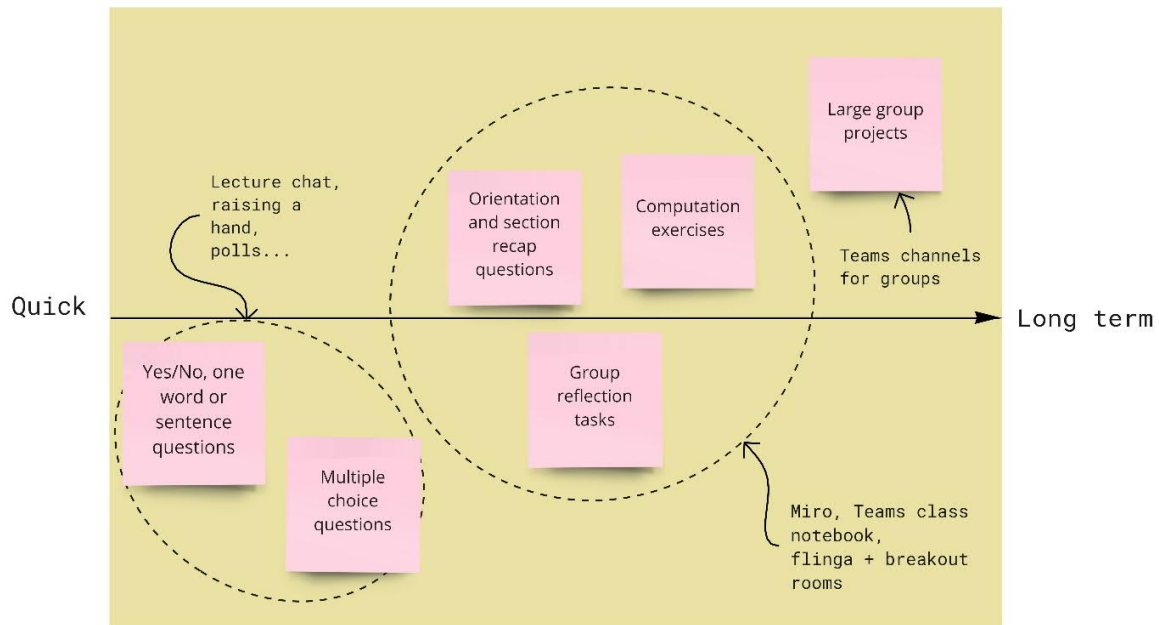


Figure 2 Activities that were used for enhancing interaction in online teaching in WAT.

The quickest activities (leftmost circle in Figure 2) include short questions that can be answered with one word or in one sentence, as well as short multiple-choice questions. These activities have a low threshold to participate. The quick activities were incorporated in lectures for example to keep students interested and engaged, to provide information for the teacher on the amount of background knowledge that the students had on a topic, or to find out whether the students had understood a concept presented in a lecture. These activities were implemented by asking the students to write their replies to the meeting chat or by voting in a poll (in a Zoom or Teams meeting) or by “raising a hand”. For these kinds of activities, to maximize student participation, we found it useful to write the question on a lecture slide so that the students would not miss it or forget it. The replies from the activities were discussed together (making the activity longer) or the teacher just noted the replies and commented them briefly before moving on (keeping the activity short).

The second type of activities (middle circle in Figure 2), with durations from around 10 minutes to a couple of hours (i.e. can usually be done during a teaching session), includes orientating, recapping or reflecting questions related to concepts presented in lectures, and computational exercises. These activities can be done individually or in groups, and the insights or answers to the questions should be discussed together after the activity. These activities were commonly incorporated into lectures before

or after moving on to a new topic, and they were often implemented using an online group work platform (e.g. Miro or Flinga) and breakout rooms in Zoom or Teams meetings. Online group work platforms were not commonly used for computational exercises since they are usually done using specific software, and there are often good tools for visualizing the results within the software itself.

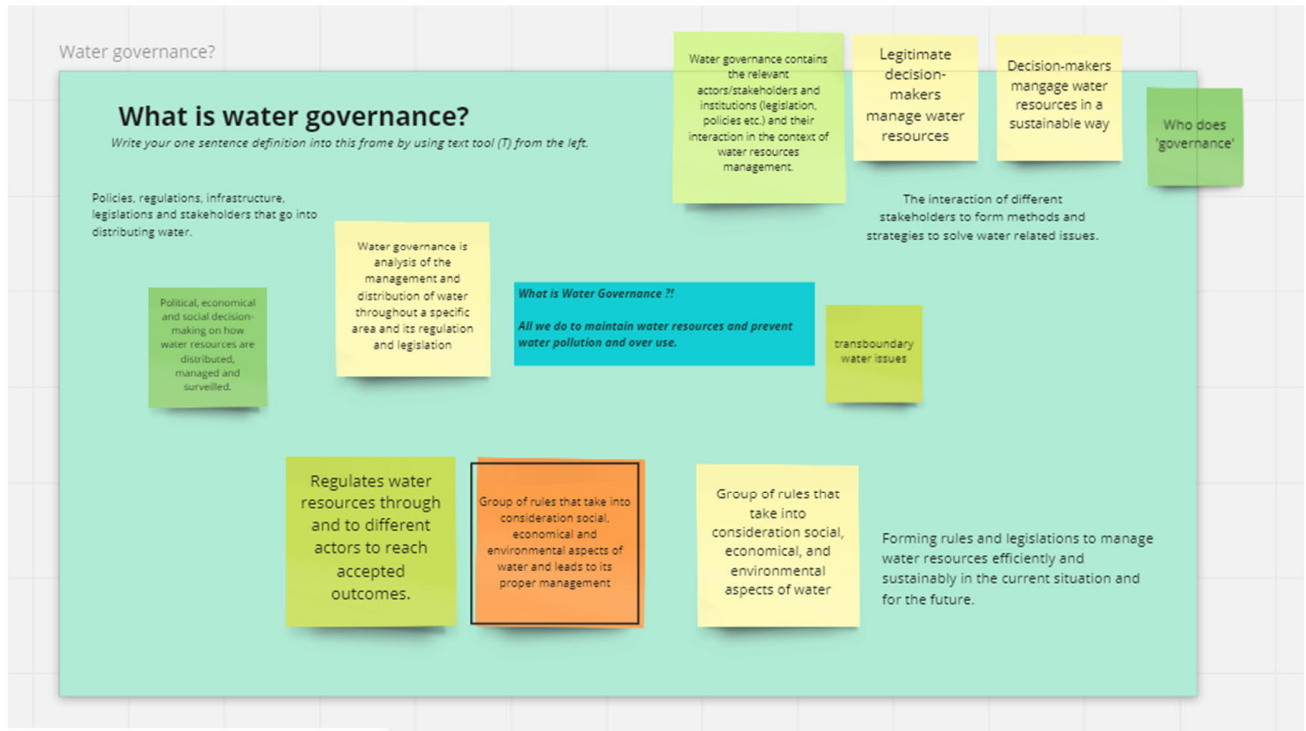


Figure 3 Example of a lecture activity in Miro in the Water and Governance course: the students added their definitions of “water governance” in the Miro frame.

The third type of activities (rightmost sticky note in Figure 2) includes any long-term group work that can last from one week up to six weeks (the duration of the course). In some courses, the teachers created an own Teams channel for each group as a platform for meetings, discussion and sharing files. If there was a group assignment that ran throughout the whole course, the assignment groups could also be utilized for other shorter group activities during teaching sessions to boost the efficiency of group work (since the students would already be used to working together). However, since the students have fewer opportunities of meeting each other during remote teaching, based on the course feedback, some students appreciate it if the groups are mixed sometimes, and they get a chance to talk to students outside their main groupwork groups.

5 Tools and platforms for online learning

This section lists tools and platforms that were used for organizing online teaching in WAT courses. For each tool or platform, there is a short general description and a list of case examples on their successful use in WAT during spring 2021.

5.1 Zoom

Zoom is a stable and versatile platform for meetings and lectures. It has useful features including recording, raising a hand, option for breakout rooms, chat, screen-sharing, drawing, and polls. There can be multiple hosts in a meeting. Some visiting lecturers in WAT courses were not familiar with Zoom or their organization did not allow using it.

Examples on successful use

Platform for lectures and exercise sessions: Zoom was used as a platform for lectures and exercise sessions in most WAT courses in spring 2021. The interactive options such as polls and breakout rooms were utilized frequently. In most courses, one Zoom-link was used for all course events.

5.2 Microsoft Teams

Teams is a versatile teamwork platform for meetings or lectures, discussion, and sharing files. Most WAT courses used a “class-type” Teams team. Students were either manually added to the course team by using their email-addresses, they were provided with the team link (required the teachers to accept join-requests), or they were provided with the team code (didn’t require accepting join requests). Visiting lecturers (i.e. users outside of the Aalto organization) could also be added to the course team as guest members, using their email addresses. The guest users might have to go through a short registration process, and therefore they should be advised to register well before their teaching session. The meetings in Teams have options recording, raising a hand, breakout rooms, chat, screen-sharing, meeting notebook or whiteboard (more information in section 5.6) and polls. It’s possible to embed web pages (e.g. MyCourses) or bots (e.g. Polly) to a Teams team.

Compared to Zoom, in Teams breakout rooms were less stable and some interactive features (e.g. polls) were not available for preparation in all types of meetings. There are four kinds of meetings: 1) “meet now” channel meeting, 2) scheduled channel meeting, 3) private “meet now” meeting and 4) private scheduled meeting. Private meetings can be started from the Outlook calendar, and the participants must be invited by their email addresses. Therefore, private meetings are more suitable for small meetings (e.g. planning meetings with visiting lecturers), and channel meetings are more suitable for teaching sessions because to them participants do not have to be invited individually. For “meet now”-meetings, naturally, no interactive features can be prepared. Meeting polls could only be prepared for private scheduled meetings which made them less available for teaching session. In Teams meetings, there could be only one host (the organizer) and the host rights could not be transferred. Because of this, if there were multiple teachers, all course events could not be scheduled beforehand by a single person. If there were multiple teachers or lecturers in the course, the host issue could be solved by creating the teaching sessions as “meet now” -channel meetings, by the persons that wanted to host the specific teaching sessions.

Examples on successful use

Organizing groupwork: In courses where there was a long group project, some teachers created private channels for the project groups. In these channels, the groups could meet, discuss, and share and work on files. There could be meetings going on in the different group channels simultaneously, and teachers could navigate between the meetings (if they were scheduled as a part of a teaching session). In some courses, groupwork assignments were submitted in the group channels as well.

A help queue during exercise sessions: In multiple courses, there was a channel where students could post when they needed help during an exercise session. The teachers would then privately have video calls with the students in the queue and mark the help requests completed by liking the posts.

Asking questions outside lectures: In most WAT courses in spring 2021, the students were encouraged to post their assignment related questions in a Teams channel rather than emailing the teachers or the course assistants. This way, other students could see the questions as well, and the teacher did not need to answer the same questions as many times in private. In addition, the students could answer each other's questions. This kind of a discussion forum could also be created in MyCourses but based on the student feedback, students preferred discussion in Teams. In WAT courses, the students actively asked for help in Teams: there were multiple questions about assignments each week or even each day in some courses. However, in the future the students could be further encouraged to help each other as well because so far, the teachers or course assistants have answered most questions.

5.3 Panopto

Panopto is a platform for sharing videos, for example recorded lectures, tutorials for exercises or any additional video material. There is a smart search feature, which allows users to search words shown on slides or screen and spoken words, and a discussion feature for commenting and asking questions. The videos can be shared for example within an organization or to a specific group of people within the organization with a link. A potential downside of Panopto is that uploading a video on the platform might take several hours.

Examples on successful use

Sharing lecture recordings: In most WAT courses lecture recordings and other video material was shared in Panopto because it allows posting larger files than MyCourses. The students could use the search-tool is for finding parts of the video that relate to specific topics.

Sharing videos from the lab: In the courses that included work in the laboratory, there were limitations in the number of students that were allowed in the room at the same time, and in the time that they could spend there. Therefore, in some courses some of the lab work was replaced by recordings of lab activities. In addition, the lab and some of the equipment was introduced on a recording.

Extra material to support assignments: Especially in those courses that included computational tasks, videos were used for instructing the use of course specific software and the Virtual Desktop Interface, and providing tutorials on computational tasks.

5.4 Microsoft Stream or OneDrive and SharePoint

Microsoft stream (or OneDrive and SharePoint) is a platform for sharing videos (among other things), for example recorded lectures, tutorials for exercises or any additional video material. If meetings are

recorded in Teams, they will be automatically stored in these platforms (there will be a migration from Microsoft stream to OneDrive and SharePoint in a Teams update in 2021 (Microsoft, 2021)), and accessible by only the members of the Teams team where the meeting was hosted or the persons that were invited to the meeting by email. Sharing videos in these platforms is faster than sharing in Panopto since there is no additional upload or processing time.

Examples on successful use

Sharing lecture recordings: In courses where Teams was used as the lecture platform, lecture recordings were automatically uploaded to Microsoft Stream. The students could watch the recordings by clicking them from the comment section of the lecture meetings in the course Teams, without having to leave Teams at all.

5.5 Miro

Miro is a versatile and flexible online platform for teamwork, and it includes a number of tools and features for creating engaging activities: sticky notes, text, shapes, connecting arrows, voting etc. To be able to invite students to work on the boards that the teacher has created in Miro without them having to register, the teacher must first apply for a free educational account. If the students are not registered, they will appear anonymous in Miro which might be an advantage in some activities. Miro is stable with a large number of users (100 and above), and basic usage is fairly easy and intuitive.

Examples on successful use

Platform for lecture activities: In multiple WAT courses, teachers have created lecture activities that benefit from a visual representation (such as making mind maps and short presentations, coming up with benefits and advantages of concepts and giving feedback) in Miro. The teachers found it useful to add short technical instructions on the board to help students that are not familiar with Miro. A notable advantage of using Miro rather than letting the students choose their working platform is that in Miro the teacher can follow what the students are doing in real time. Moreover, they can for example assess if students need more time to complete an exercise or choose points that they want to raise from the results of the activity in a joint discussion afterwards. In most WAT courses that used Miro, the teachers created one Miro-board for the whole course and added separate frames for each teaching session. This way, the students find all activities with the same link. The board owner (the teacher) can also set a password for the board.

Platform for group work outside teaching sessions: In the Sustainable Global Technologies Studio course in WAT, the students used Miro as a platform for brainstorming and planning related to their group projects with partners from other universities and countries. Some groups also used Miro when working with the partners online.

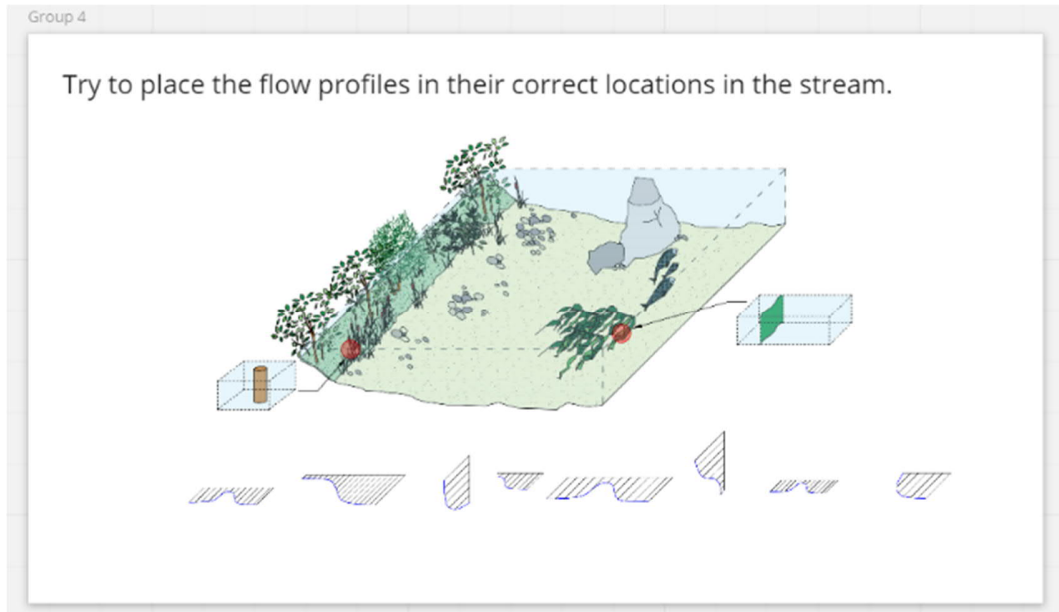


Figure 4 A visual lecture activity in the Environmental Hydraulics course. Original image by Gerardo Caroppi.

5.6 Other tools for interactive online teaching

In addition to the previously mentioned tools and platforms, the WAT teachers also experimented with Flinga and Teams Whiteboard as online collaboration platforms during lectures. Flinga and Teams Whiteboard are simple and easy-to-use platforms that can be used for individual and teamwork tasks such as making mind maps or collecting thoughts from the students. However, the WAT teachers preferred Miro over these two platforms since it has a more versatile selection of tools and elements for building engaging online activities.

6 Experiences from other master's programmes in ENG

Also other programmes in ENG were granted dean's extra funding in spring 2021 and recruited course assistants to individual courses to promote interactive online teaching. We contacted five of these bachelor's and master's level courses to interview the assistants on their experiences and practices. From these five courses, we discussed with six course assistants altogether. Based on these discussions, the challenges related to online learning from both the student and teacher perspective were mostly like the ones experienced in WAT: there was lack of connection between teachers and students, the teaching sessions felt more tiring in the online setting and there had been technical difficulties with hosting online lectures. The practices and tools used to make online learning more engaging had also been similar to the ones used in WAT (e.g. short lecture activities, group discussions and peer learning), and the degree of investment to increasing interaction in the courses varied. In all the courses we contacted, there had been sufficient teaching staff resources, which had helped in ensuring the quality of online teaching.

Compared to courses in other master's programmes and especially in bachelor's level courses, in WAT the teaching groups are significantly smaller (around 15–25 students compared to around 40 and over 100 students in some master's programmes and in bachelor's level courses, respectively). The size of the teaching group might affect the level of connection and feeling of togetherness that can be achieved within the class, as well as the activities that can be incorporated in the teaching sessions: If the number of participants is high, it might be impossible for the teacher to speak with each student during the course, and on the other hand, the students might not get to know all other students in the class. This might affect the willingness of the students to ask questions or to participate in discussions, even in smaller groups, during the teaching sessions.

In some courses where the number of students had been higher than in WAT courses, trust and connection within the class had been built by establishing permanent groups for groups tasks for the duration of the whole course. These groups were used in all teaching sessions' activities, and they helped the students to get more out of the structured peer interaction and lowered the threshold to ask and give support to each other. In courses with a large number of participants, low threshold activities such as polls, lecture meeting chat discussion and activities on online collaboration platforms had also been successfully incorporated into teaching sessions.

Among the five courses that we contacted, there was also a course that had tried a hybrid implementation: during the teaching sessions one half of the class had been present in the classroom and the other half had listened to a streamed lecture online. The classroom and online participation groups had been swapped throughout the course. One course assistant had mainly overseen the technical arrangements related to streaming the lectures, while another course assistant had worked on more general course assistant tasks and online teaching related tasks. There had been some technical issues with interactive lecture elements, such as using online collaboration platforms and reacting to students' questions in the meeting chat, but the general experience from the hybrid implementation was positive. This experience further strengthens the conclusion that careful planning and preparation, as well as ensuring a smooth technical implementation of online applications is a prerequisite for high quality online teaching. Next academic year or even after the covid-19 pandemic, hybrid teaching might become more popular, and the best practices found in fully remote teaching have to be adapted again. Encouraging experiences about hybrid implementation can act as a starting point for the transition in other courses.

7 Discussion and conclusion

In spring 2021, a programme level course assistant was employed in WAT with the additional funds for increasing interaction in online learning granted by the dean of ENG. The aim of the course assistant's work was to support the online arrangements of all WAT courses in spring 2021, to promote the sharing of online teaching related knowledge between teachers, and to collect the findings and experiences from the spring for potential future application in WAT or other programmes and courses. Thus, the context of this report is WAT master's programme, where learning and evaluation have a strong emphasis in group work, peer learning and the interaction between students and teachers. In practice, the course assistant's tasks included contributing to the online arrangements of courses, facilitating online writing and peer support sessions for master's thesis workers, collecting and sharing online learning related experiences and tips between teachers, and analysing online teaching related student feedback.

Based on the experiences and feedback from the WAT courses in spring 2021, there were six key elements that contributed to making online learning more engaging for both the students and the teachers: 1) building an atmosphere of trust within the class, 2) scheduling teaching sessions carefully and including sufficient breaks, 3) providing extra support for students, 4) providing opportunities for interaction between the students, 5) involving the students in teaching sessions and 6) smooth technical implementation of the sessions. These elements were incorporated in courses through various kinds of teaching session activities, from quick and low threshold lecture activities, such as polls, to longer term activities, such as group projects that covered a large portion of the learning goals of the course. However, the prerequisite for implementing these engaging activities (and overall high quality and engaging online teaching) is smooth technical implementation, which requires knowhow, careful planning and preparation and practicing. The activities and elements to more engaging online learning rely on choosing suitable online learning tools and platforms for hosting teaching and exercise sessions, online collaboration and group work, as well as asking questions about assignments and for sharing course material. In WAT, the combination of Zoom and Teams (in addition to MyCourses) was used in most courses, and some courses also used Miro as a platform for teaching session activities and group work.

Based on the feedback that was collected from the first-year WAT students in the end of spring 2021, the students were overall satisfied with the online implementation and communication in courses and appreciated the versatile and interactive teaching methods that the teachers had used. However, most students still found online teaching tiring because of the reduced connection to peers, having to work more independently and with less support, and the lack of a motivating working environment. In comparison to the student feedback from spring and autumn 2020, there were fewer complaints about technical issues with online teaching sessions, online collaboration platforms and accessing course specific software online. In addition, there had been improvement in the structure of the teaching sessions: fewer students found the teaching sessions too long or the breaks too infrequent or short, and students also commented that they appreciated the interactive elements in the teaching sessions. Finally, even though students still found it more difficult to get help with assignments in the online setting, many agreed that it was easy to contact the teachers and course assistants and ask for help. They also found it useful to have discussion forums for asking assignment related questions and that teachers organized extra support sessions and were flexible with deadlines. The online thesis writing session participants found the peer support that they got from the sessions important for their work and motivation. Thus, there had been some improvement in most of the main challenges related to online learning that arose from the student feedback in spring and autumn 2020.

Online elements might still need to be incorporated in teaching next academic year, and it could be useful to utilize them as part of classroom teaching even after the covid-19 pandemic. For example, hybrid teaching might become a more popular option for organizing courses, and online material could still add value to independent course work. WAT teachers saw potential in for example utilizing online platforms such as Miro for collaborative course activities, continuing to record lectures, providing video tutorials, and requesting video submissions for assignments in the future. In the feedback in spring 2021, students were also asked about their thoughts on incorporating elements of online teaching in classroom or hybrid teaching. Overall, most students considered hybrid teaching to be a positive direction in the future for example because of the added flexibility in scheduling that it offers. In addition, most students would like to maintain the option for watching lecture recordings. Some students wished that online platforms such as Teams could still be utilized in the future for example as forums for discussion, peer support and communications.

By the end of spring 2021, WAT teachers had developed and fine-tuned the online arrangements of their courses based on student feedback and tips from other teachers, and found their preferred tools, platforms, schedules, and other practices for organizing courses online. The preferred implementation was slightly different for each teacher and course because it was tailored to suit the assignments and teaching session contents. However, most teachers shared the preference for using Zoom for lectures, Teams as an additional platform for discussion and peer support and Miro as a platform for some lecture activities. They also agreed on the six elements defined in this report that contribute to engaging online teaching. On recording the lectures, the teachers had different opinions: some found it an easy way to support the students while others found it impractical because of long uploading times and other technical difficulties or because especially visiting lecturers often did not want their lectures to be recorded.

To conclude, the programme-level course assistant brought notable added value to the WAT courses during the remote spring term 2021. This was also clearly visible in the student feedback indicating improvement from spring-autumn 2020 to spring 2021 in online learning experiences. In the course assistant's work, the WAT teachers appreciated the easy knowledge sharing and hearing how the other teachers had organized their courses in practice; for example which tools and platforms they had used, what kind of discussion forums and support they had provided to the students and what kind of lecture activities they had incorporated in their lectures. In addition, having a programme-level course assistant was useful for sharing the online arrangement related tips between teachers, because it allowed getting a comprehensive view of the general trends, experiences, and preferences of organizing courses online in WAT. Moreover, many teachers appreciated the extra help with facilitating online lecture activities and preparing material for them on online platforms as well as the help with other preparatory work related to course arrangements, for example creating Teams teams and familiarizing visiting lecturers with the online practicalities of their courses. In our experience, the additional help from the course assistant notably contributed to ensuring the smooth technical implementation of online learning. With the help of the programme-level course assistant, the teachers were able to use more of their time for planning the actual teaching and ensuring high quality teaching in the online setting.

8 References

Aalto University (n.d.). Water and Environmental Engineering. Available at: <https://into.aalto.fi/display/enwat/Water+and+Environmental+Engineering> (Accessed 2.6.2021).

Microsoft (2021). Record a meeting in Teams. Available at: <https://support.microsoft.com/en-us/office/record-a-meeting-in-teams-34dfbe7f-b07d-4a27-b4c6-de62f1348c24> (Accessed 3.6.2021)

The Write Kelley (n.d.). Online writing retreats. Available at: <https://thewritekelley.com/write-with-me> (Accessed 2.6.2021).