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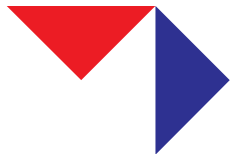
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# Undersøkelse om digital matematikkundervisning i Norge

27 May 2020

Farzad Radmehr & Simon Goodchild

Department of Mathematical Sciences, University of Agder



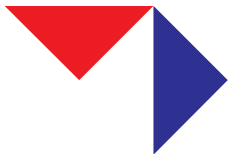
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## A brief description of the study and its purpose.

- This study explores the recent experience of mathematics lecturers and students who were engaged in on-line teaching of mathematics across Norwegian universities.
- This study aims to explore how the teaching and learning of mathematics in online environment can be improved.
- The study sample includes **ten mathematics lecturers** from different Norwegian institutions, including UiA, UiT, NTNU, UiO, UiB, USN and NLA who involved in the teaching of mathematics in the current semester. It also includes **six undergraduate students** who participated in on-line learning of mathematics in the current semester.
- An online survey has been developed as a result of these interviews that will be distributed across Norwegian universities in **June**.



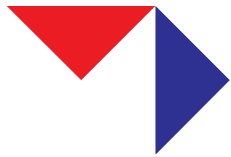
## Sample interview questions

### Lecturers:

- Please will you describe your on-line mathematics teaching that you have been doing recently.
- What are the greatest challenges that on-line teaching creates for you and for your students?

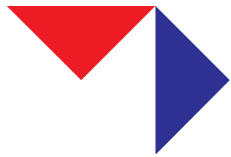
### Students:

- How do you receive feedback from your lecturer in the current situation?
- Can you describe any additional stress you have experienced as a result of on-line teaching?



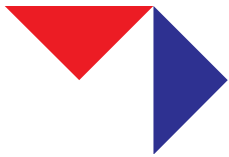
## Challenges of online teaching and learning of mathematics

- Both students and lecturers missed the **physical social interactions**.
- Lecturers experienced some difficulties and challenges when recording the lectures **off-line** (not receiving feedback from students, technical issues, difficulty in getting used to talking to one-self without student presence, and a time consuming process) and **on-line** (students do not turn their camera on, problem with GDPR when students face and voice are recorded).
- **Lack of feedback** on student learning.
- **Lack of communications** between students and lecturers.
- **Lack of students' engagement** with on-line teaching (lecturers, seminars, and group sessions).



## Challenges of online teaching and learning of mathematics

- **Lack of communications** between students and group works.
- Students had difficulty in **reaching for help** from lecturers and student learning assistants. Some students are more open to talk to their classmates.
- Students had **difficulties in monitoring their own progress** because not having enough opportunities to discuss their progress with other students and not receiving enough feedback from lecturers and SLAs.
- Students **missing receiving real-time feedback** from their peers compared to the past that they worked together.
- Students had difficulties in **taking responsibility for their learning** and establishing a new learning routine. The motivation for learning has decreased.
- Students had **difficulties in adjusting** to the new learning environment (more distractions at home).



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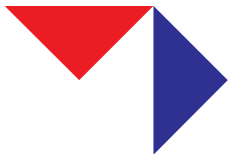


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## Benefits of online teaching and learning of mathematics: Lecturers' perspective

### Benefits for lecturers:

- Recorded lectures can be used later for teaching purpose.
- The lecturer could be anywhere, easier to travel to where it is convenient to work, not being tied to the campus.
- There is better control of time working online.
- Less interactions with university leaders give the lecturers more freedom to use approaches they believe helpful for their students



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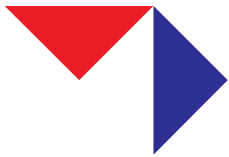


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## Benefits of online teaching and learning of mathematics: Lecturers' perspective

### **Benefits for students:**

- Online courses can be available to everyone.
- Students can watch the recorded lectures many times and at their own pace.
- Students have to take responsibility for their own learning.
- Students have more awareness of the learning materials uploaded for the course.

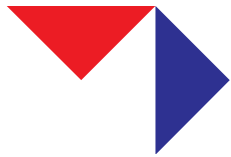


## Benefits of online teaching and learning of mathematics: Students' perspective

### Benefits for students:

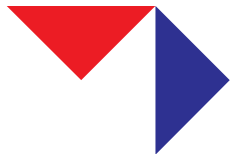
- The use of time is more flexible and can work at own pace.
- Students can watch the recorded lectures many times and with their own pace.
- Some students feeling less stressed.
- Some students had more time to focus on learning.
- Some students were more productive since the lock down began.
- For some students, it was easier to ask for help online (e.g., one to one session or Drop in MatRIC) rather than going from home to university and seek help.





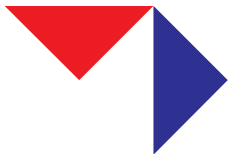
## Assessment in online teaching of mathematics: Lecturers' perspectives

- Concern about home examination because of the possibility of communication between students.
- Not changing the nature of assessment questions as the teaching has not changed significantly and it is unfair to students as many have prepared for examinations based on past papers.
- Changing the grading system to pass vs not pass to take into account the possibility of communications.
- Using both home and oral examination using Zoom.
- Changing from supervised examination (SE) to home examinations (HE) have impacted students differently. Some students changed from bad at SE to really good at HE, however, some changed from top scores at SE to low scores at HE. The latter might be related to not having the stress of taking SE.



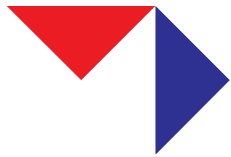
## Assessment in online teaching of mathematics: Lecturers' perspectives

- Changing the nature of assessment question by including more open-ended and analytical questions as opposed to computational and closed-ended questions.
- Added time pressure component to eliminate classmates readiness to help others (they would lose time).
- Keeping the grading system to not losing students' motivation in working hard.
- Reducing the weight of summative assessment (exam) and increasing the weight of students' projects.
- Using online assessment (e.g., STACK) to help students prepare and help teachers to grade.
- Producing different versions of each question and students randomly assigned one from each.



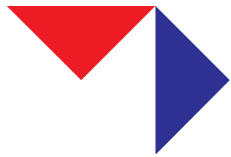
## Assessment in online teaching of mathematics: Students' perspectives

- Realizing the time pressure component in home examination, and difficulty in completing answering to all questions.
- Expecting some changes in the assessment questions and raising the difficulty level to take into account the possibility of student communications (Some students noticed some changes and some did not). This possibility create some extra stress for a number of students.
- Not very happy with changing the weights of projects and summative assessment as they might put more efforts on projects if they are aware of those changes.
- The normal grading system might not be a good idea if students actively cheating.



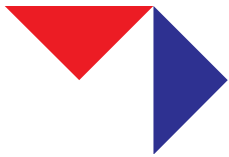
## Useful approaches for teaching and learning of mathematics on-line

- Creating more opportunities for students to work together in online environment (e.g., breakout rooms in Zoom).
- Designing compulsory group assignment could encourage student communications.
- Providing comprehensive feedback on student assignments-not just approved/not approved by student learning assistant (SLA). SLAs might benefit from some training to provide such feedback.
- Using online assessment platform (e.g., STACK) to help students monitor their progress in real-time.

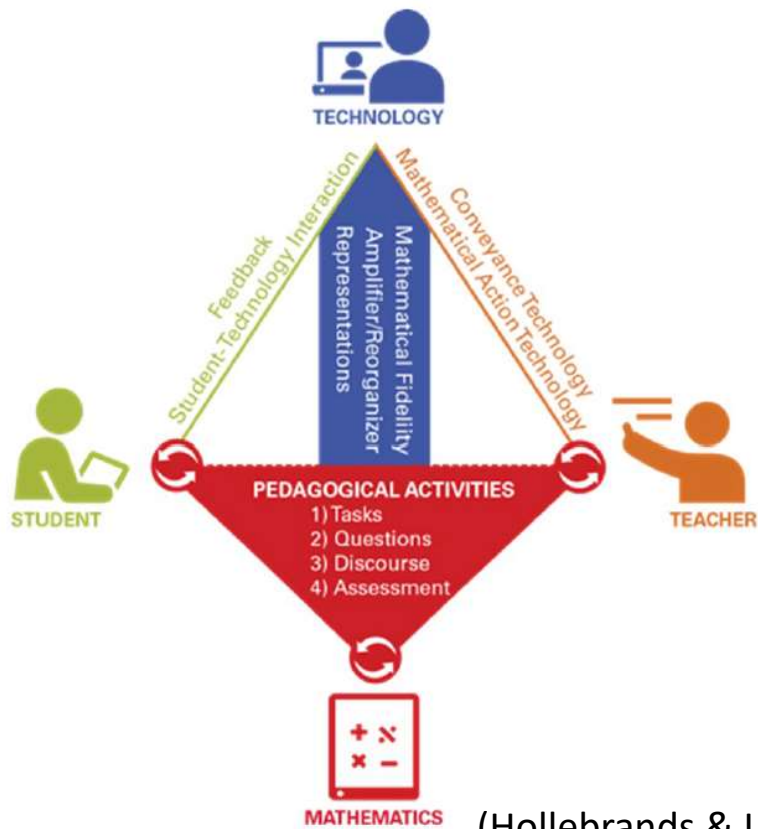


## Useful approaches for teaching and learning of mathematics on-line

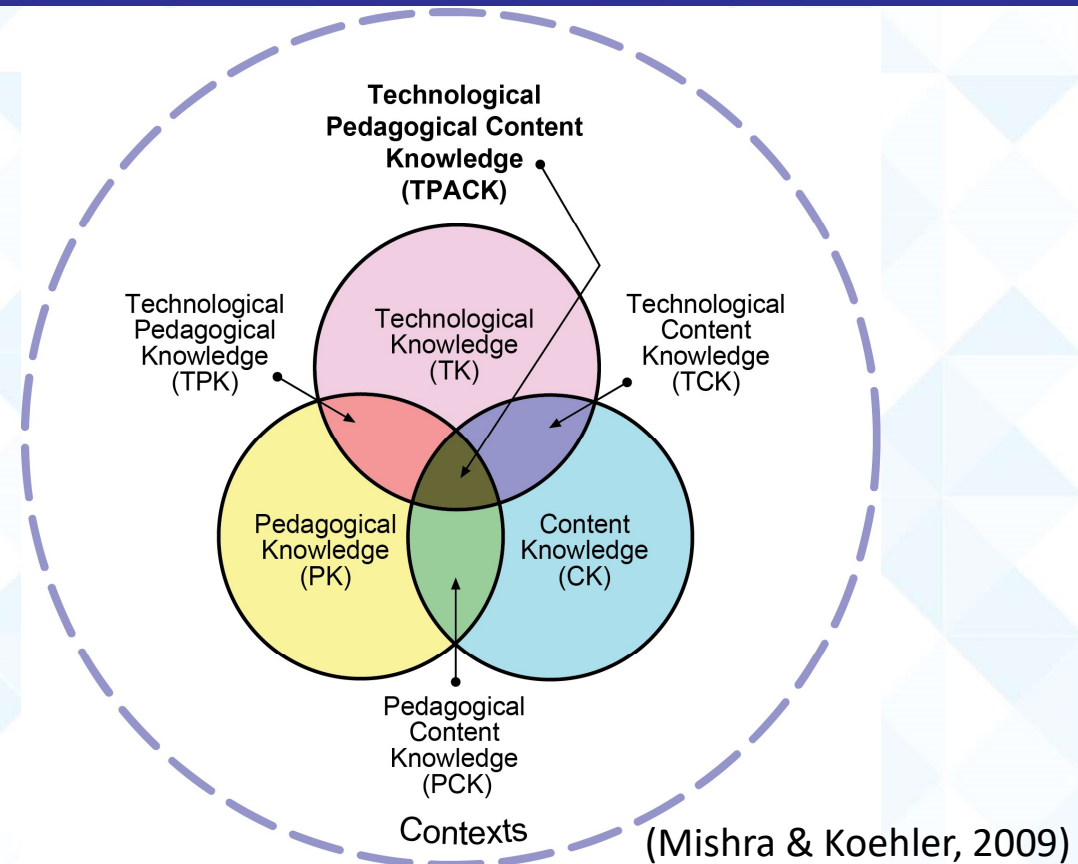
- Motivating students as much as possible in every way possible (e.g., in lectures or one to one sessions with them)- Be a social counsellor!
- Having “social meetings” on Zoom, once a week with students to talk about how to study, how to get through difficulties, and motivating them to keep working and making progress.
- Providing opportunities for students that can ask questions anonymously (e.g., Piazza), but the responses of the lecturers and SLAs be identifiable.
- Sharing all students’ questions anonymously as other students might have the same questions.



## Two frameworks to reflect upon when thinking about teaching and learning mathematics on-line



(Hollebrands & Lee, 2020)



(Mishra & Koehler, 2009)