A case study in learning spaces for physical-virtual two-campus interaction

Robin Støckert[1], Alexander Refsum Jensenius[2], Anna Xambó Sedó [3], Øyvind Brandtsegg[4]

[1] Norwegian University of Science and Technology, 7491 Trondheim, robin.stockert@ntnu.no
[2] University of Oslo, 0316 Oslo, P.O. Box 1072 Blindern, a.r.jensenius@imv.uio.no
[3] Norwegian University of Science and Technology, 7491 Trondheim, anna.xambo.sedo@ntnu.no
[4] Norwegian University of Science and Technology, 7491 Trondheim, oyvind.brandtsegg@ntnu.no

Keywords
Cross-Campus, learning space design, student active learning, network music.

1. Summary

Norwegian University of Science and Technology (NTNU) Teaching Excellence is an integrated and wide-ranging initiative aimed at helping NTNU to achieve its goal to providing education characterized by quality at a high international level. The initiative consists of a portfolio of development measures, with the purpose to develop innovative approaches to learning, teaching and assessment.

SALTO (Student Active Learning in a Two campus Organization) is one of the development projects founded for the period 2018-2020. The project is based on a study where the students are divided into two campuses. The aim is to develop effective pedagogy with activity at both campuses at the same time, with particular emphasis on interaction, resource sharing and communication/collaboration. The project aims to allow students and teachers to explore educational, methodological, and technological solutions together.

A new joint master's program in "Music, Communication and Technology" (MCT) between NTNU and University in Oslo (UiO), constitutes the framework for the SALTO project. The common pedagogy, technology and shared learning space between the two Universities, is hereafter defined as the Portal.

SALTO will utilize the MCT Portal as an arena/living lab to evolve and optimize student active learning scenarios. In this paper, we elaborate on the issues, challenges and potential with three different scenarios, which emerged during the first 6 months of the project:

(1) The Opening Ceremony between NTNU and UiO, with a combo of talks and performance.

(2) A live Christmas concert connecting two high schools 500 km apart (Trondheim-Oslo).

(3) An intense cross-university course with a combo of preparations, lectures and hands-on exercises.

2. SALTO

One of the very basic premises for the SALTO project is to create a cross-campus common learning space, with a development focus on effective learning strategies to support:

1. Extensive cross-campus collaboration and communication
2. Active student participation
3. A transfer value and flexible scalability for different types of learning environments

Flipped learning and different types of cooperative learning (Case-, team-, project- and event-based) are adapted into the cross-campus learning scenarios. Evaluation, reflection and development of strategies to overcome the challenges with students working together cross-campus, will evolve during the project in the framework of the new MCT master`s course content and structure, and Portal development.

3. THE SCENARIOS

For the first time, we have a joint master's program between NTNU and UiO. This is a unique opportunity to create an interdisciplinary, cross-university learning space. A chance to share a pool of human, technical and pedagogical resources, to enable student active learning and to develop new types of cross-University learning scenarios. The illustrative scenarios represent a sample selection from the first semester of MCT and highlights the issues, challenges and potential in relation to the SALTO project.

(1) The Opening Ceremony between NTNU and UiO, with a combo of talks and performance.

The Ceremony was an important event in order to perform the symbolic «connection» between the two universities, done by Rector Svein Stølen from UiO and Rector Gunnar Bovim from NTNU. Students, technical personnel and teachers worked together to create a common arena between the two universities. Several types of interconnected artistic performances were done by teachers and students located in Trondheim and Oslo.

(2) A live Christmas concert connecting two high schools 500 km apart (Trondheim-Oslo).

The Portable Portal is a concept which promotes the ideas behind SALTO and MCT to external users, partners and potential new students. The students are responsible for the technical setup, concert and documentation. They need to work in cross-campus teams and get valuable experience in many fields regarding technology, production of events. Type and use of collaboration and communication tools are adapted to the local facilities of the event. In other words, find and use the right tools for the job. This scenario can be described as an event-based project with a dissemination profile

3) A cross-university hands-on course

We present here one of the MCT courses that exemplifies the combination of lectures and hands-on activities, the MCT4048 Audio Programming course. The aim of the course is to provide a solid foundation in digital signal processing and audio-based application development. The lectures provide an overview of the fundamental concepts of audio programming.

The hands-on workshops are based on building web applications based on Web Audio technologies, both individually and in team. The evaluation of the course is based on the daily activity and two mini-projects that incorporate the theory and practice learned over the course. During the first week, the students develop an individual mini-project, whilst in the second week, the students develop a group mini-project. The MCT students have a student-led blog (https://mct-master.github.io) related to MCT's master program. As part of the assessment, they publish blog posts related to the projects developed by the students.

The benefits of teaching courses in the portal is that the ecosystem supports team-based learning and a cross-campus experience. The students can form cross-disciplinary and cross-campus teams based on project interests and not limited to their locations. Supporting different levels of communication (from lectures to demos and performances) is a key element for a successful class of these characteristics.

As challenges, we still need an instructor for each site that supports the on-site learning experience, even more if it implies the development of technical skills. Another challenge is to satisfy both beginners and experts in programming, which is irrespective of the portal. However, the emphasis of team-based learning in the master's curriculum should be helpful to see the different students' backgrounds as beneficial and not a hindrance. Another observation is that the portal technologies are still under development, and so it is unavoidable to keep trying different setups in parallel to teaching, as part of the ongoing research of this new ecosystem.

This aligns with previous results from other courses and workshops held in the Portal. Reflection is an important aspect of this master's curriculum, which should include the students' and teachers' experience from the perspective of communication, and as part of the SALTO framework. We thus need to formalize feedback channels from students and teachers across the different courses to be able to reflect and improve the next iteration of the courses and master's edition.

4. AUTHORS' BIOGRAPHIES

Robin Støckert

Is an Audio-Visual expert and have more than 35 years of experience in design and creation of arenas for interaction, experimentation, collaboration and communication. Has been engaged in several EU-projects with design, construction and use of future learning spaces and interactive tools in higher education. He is the designer of the Portal at NTNU and the project manager of SALTO. Member of AES, AVIXIA and Flexspace.

https://www.ntnu.edu/employees/robin.stockert

Alexander Refsum Jensenius

is a music researcher and research musician. His research focuses on why music makes us move, which he explores through empirical studies using different types of motion sensing technologies. He also uses the analytic knowledge and tools in the creation of new music, with both traditional and very untraditional instruments. As chair of the NIME steering committee, he is a leading figure in the international computer music community. He co-directs RITMO Centre for Interdisciplinary Studies in Rhythm, Time and Motion, an interdisciplinary centre of excellence at the University of Oslo. As a member of the Young Academy of Norway and the EUA Open Science Committee, he is also involved in pushing for modernizing the way research is conceived and conducted

http://people.uio.no/alexanje/

Anna Xambó Sedó

is a researcher and an experimental electronic music producer. Her research focuses on interactive real-time systems for music looking at live coding and generative computer music, collaborative and participatory interfaces, multichannel spatialization and real-time MIR. She is an associate professor in music technology at NTNU, a visiting lecturer at the Centre for Digital Music, Queen Mary University of London, and co-founder and chair of Women Nordic Music Tech (WoNoMute).

https://www.ntnu.edu/employees/anna.xambo.sedo

Øyvind Brandtsegg

is a composer and performer working in the fields of crossadaptive performance, algorithmic improvisation and sound installations. He also produces software for audio processing and performance, e.g. *ImproSculpt*, *Hadron Particle Synthesizer*, *Partikkel* and *Featexmod*. He is a Professor in music technology at NTNU. As musician and composer, he has collaborated with a number of excellent artists, e.g. Motorpsycho, Maja Ratkje, and he runs the ensemble Trondheim EMP. The latest release with Trondheim EMP is "Poke it With a Stick" / "Joining the Bots" on the Crónica label in March 2019.

https://innsida.ntnu.no/person/oyvinbra

Acknowledgements: This work was partially supported by the NTNU SALTO project (80340480).