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EMERGE 2022

Emerging Education – Emerging Technology:

Exploring the Emerging University

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Report

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Preface:

This report sums up experiences from the first year with the EMERGE Centre for emerging forms of education and technologies. EMERGE was formed in 2021 by teachers at several departments at the SU-faculty, coming together with the purpose of establishing a centre for outstanding education. In different ways, we were all engaged in exploring new ways of teaching and new technologies in education. From the start, people from Departments of Social Anthropology, Psychology, Geography and Teacher Education formed the core group. Staff at BLINK Faculty Support made us aware of each other and contributed to make this initiative possible. During the process, the Department of Pedagogy and Lifelong Learning joined with teachers and researchers from Uniped and IMTEL. In the future, we aim towards increasing our research group further.

EMERGE is a centre which consist of a network of academic staff that test and implement innovative teaching methods in university courses. It is based on ongoing activities at the different departments, and, in close collaboration with the support functions at NTNU, such as BLINK, Centre for Learning Support, Section for IT strategy and management, The Future Campus, The VR lab, Breach VR and the administration at the SU-faculty.

At NTNU's many departments, teachers and researchers are trying out new ideas about teaching and exploring with new immersive technologies. Many of these find themselves being a bit lonely at their departments, their colleagues are not necessarily very interested in their activities. This in turn make some of the activities vulnerable; When the individual enthusiast sooner or later disappears or the funding of the project ends, the initiative tends to collapse. Here, EMERGE offers an opportunity to find like-minded people across departments and professional groups, making continuity possible over time. EMERGE also offers a possible way to do experimentation consistently over time by systematically gathering experiences from year to year, presenting them in the annual report you are now reading, and sharing them across departments and disciplines. By this we aim to contribute to a direction in the development of the university. However, the experiments we do in the various departments teach us that each discipline and each course has its own specific requirements. Producing standard solutions to fit all is not the way to go. EMERGE is more like tailoring; by joining we offer a community that will help other to develop their solutions and to systematically document own experiences from similar activities. Our aim is to be open-ended, and to share our experiences between colleagues in EMERGE, and others that may be interested in carrying out similar experiments.

Tailoring or not, we also find a lot of common experiences across departments and disciplines, especially regarding the practical side to experimental teaching. For example, those who introduces forms of VR technology in their teaching encounters issues related to GDPR, software security and issues related to copyright when collaborating with private actors. Further, everyone who tries

something new at all in teaching, must deal with several practical challenges that arise in the encounter between new solutions and an established university organisation. For example, how do you order technology that is not already known to NTNU's purchasers? How is it possible to set up an exam so that it supports a subject's pedagogical philosophy without violating any rules? How is it possible to book classrooms that fit exactly the scheme you want to try out? In this area, it is valuable to have contact with people who have already encountered the challenges and made experiences when things fail.

In this area, NTNU's established support functions are essential. BLINK supports the development of new forms of learning, The Centre for Learning Support helps with technology and questions regarding privacy and so on. Nevertheless, both teachers and the support teams experience that the contact is not always so easy to establish. The support teams would like to know how they reach out to teaching staff, and to be more visible and accessible to them for support. Teachers would like to know more about what kind of help they can get, and where to find it. EMERGE aims to make the distance between teachers and support staff shorter. This is done through the practical teaching and the experiments we do together. We meet, discuss and share experiences; we get to know each other. Teaching activities are at the heart of EMERGE. As such, EMERGE is not a support function, EMERGE *is* the teaching and the teachers themselves.

The students also play an important role in EMERGE, both as co-researchers in the experiments we do and as participants in the EMERGE project. A good part of this report is written by students at the departments of social anthropology, geography, and psychology. In this way, EMERGE also seek to serve as a link between students and teachers at NTNU. Through EMERGE, we explore the role of students both through student-active forms of learning, and not least, through the use of student-employed learning assistants in teaching. You will find chapters on this in the report. The establishment of a dialogical relationship between students and teachers is essential for EMERGE.

An overriding goal of EMERGE is to develop practices that enable the university to better cope with continuous change while conducting the daily activities in teaching and research, a way to make transformation part of the daily practices. This must happen while avoiding the university losing itself and the particular qualities of the academic disciplines. We need to ask, continually, what a university is and should be; we need to develop and utilise technology without being swallowed by it; we need to transform teaching practices, without losing our professional depth and identity to popular trends blowing across campus.

This report summarises the experiments we conducted the autumn of 2021 and the following reflections the spring of 2022. These experiences shall form the basis for new experiments to be conducted in the autumn of 2022, bringing it all one more step further. The goal is to carry out experiments and publish a report of this kind every year. In the long run, we aim to establish a centre for outstanding education, with the aim of spreading this practice of systematic testing also outside NTNU.

EMERGE is supported by the SU-faculty, NTNU top education, all the departments involved, and from NTNUs support functions, as well as the projects VR-learn and Classroom Laboratory.

Dragvoll, May 30th 2022

Håkon Fyhn

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Guide to report

In the first section of this report, we elaborate and describe EMERGE as an cross-disciplinary research group, with a focus on innovative and explorative teaching methods. We highlight our objectives, methods, learning philosophy and goals for research and collaboration. We address different challenges we have experienced and encountered across departments when testing and implementing new teaching approaches and digital technologies in our courses. Moreover, in this section we elaborate on how we understand terms like ‘hermeneutics’, ‘classroom’, ‘laboratory’ and classroom as a laboratory. These clarifications intended to clarify to the reader what we point to when using these terms throughout the report.

In *Section II* we describe how we holistically approach learning and teaching activities in our courses, and emphasis that we must consider the whole learning context when we explore with new and innovative teaching methods. This section is divided in four chapters. First the Department of Psychology frames EMERGE’s theoretical approach to teaching, and thereafter describe how this is done in practice in one course at the department. The next chapter in this section is from the Department of Social Anthropology where it is described how exploring with open-ended student assignments is developed and implemented in three courses to increase student involvement and increase student responsibility for own learning. The third chapter in this section comes from the Department of Geography, and it is described how they reflect around innovative teaching practices, and which potential possibilities could emerge by implementing such more systematically at the department. The fourth and last chapter in this section is from EMERGE’s partner, BLINK faculty support. They describe how they have experienced their role as a facilitator and sparring partner throughout the first year of exploration.

In *Section III* the Department of Social Anthropology, Geography and Psychology describe empirically how the use of emerging technologies is used in teaching. All chapters emphasis the use of technology as a tool for learning. Meaning, learning outcomes always comes first, and technology is only implemented in such a way that is don’t interfere with student’s learning outcomes. Technology is only implemented as a means to increase learning. At the Department of Social Anthropology, it is described how different technologies as Virtual Reality (VR), Podcast, Digital Platforms etc. is used as collaborative tools. The aim has been to equip student with the competence to critically examine the use of technology in teaching. In chapter two of this section it is described how innovative technology as VR, StoryMaps, 360 videos etc. is used in courses in social geography, physical geography and Erasmus+ courses. Building on experiences from these courses it is described how the use of emerging digital technologies not only increase student’s learning outcomes, but also how the use of these tools

increase student involvement. The third chapter of this section elaborates on how the use of immersive technology in Psychology could provide students with ‘close-to-real-life’ experiences using an interactive video in VR. It is especially described how use of immersive technology as VR could strengthen students’ soft skills for future working relations. The last, and fourth chapter in this section describe how BLINK Faculty Support have experienced working with EMERGE on questions concerning ‘proper’ use of technology, purchase and storing of equipment, and generally approaching complex challenges when working across departments. Further it is addressed how to approach implementation of new teaching activities and the use of technology in teaching.

In Section IV we present our common experiences and reflections with the use of student employees (teaching and student assistants). Throughout the research term – Autumn 2021 – and through writing this report, we discovered the need to look further into how student employees are used at the faculty. The first chapter of this section deals only with the surface of this theme, and we make reflections that would serve as the basis for research in the second annual cycle I EMERGE – Autumn 2022. The second and last chapter in this section is written by students from the Department of Social Anthropology, Geography and Psychology. They describe their own experiences with courses and reflect around the use of different technologies in teaching. This chapter is valuable for further research in EMERGE, as the student address important questions concerning teaching methodologies and the use of technology in teaching.

In *Section V* two collaborative partners of EMERGE is presented, and they describe their ongoing projects at their own departments which has similar objectives as we do in EMERGE. The first chapter is a description from Teacher Education at NTNU, and the second from IMTEL research group at the Department of Lifelong Learning, NTNU.

In *Section VI* we address and identify how EMERGE will continue to explore with teaching activities, teaching methods, technology, organisation and student employees in the second annual research cycle – Autumn 2022.

Section I - Introduction and methods



Chapter 1

EMERGE objectives

1. Unite learning resources in an on-going practice and exploration of learning, technology and organisation.
2. Make exploration a part of teaching through a dialogical philosophy of education.
3. Make students able to continue exploring in a lifelong perspective.
4. Support enthusiastic individuals across departments that want to explore similar experiments.
5. Ongoing development.
6. Discipline-oriented.
7. Develop a culture for explorative practices in teaching.

Introduction / Background

We live in a world of rapid change. Technology changes, society changes, the student composition changes, and the way they study changes. As teachers¹ at the university, we strive to be up to date in an ever-changing world. We often find ourselves stretched between disciplinary traditions, university organisation and bureaucracy, and emerging possibilities. In EMERGE we recognise that there is a need for experimenting with new approaches in teaching, as well as a need for exploration in educational activities. This need is also addressed by *Kunnskapsdepartementet* (Meld. St. 16, 2016-2017) and by *the Fremtidens HUMSAM*-project at the faculty (Fremtidens HUMSAM, 2022). The exploration should be implemented in close cooperation with the IT-department, the faculty, and the supporting services at the University.

The mission of EMERGE is to explore emerging technologies and pedagogies through an open and crossdisciplinarity approach, creating a framework and infrastructure for systemic change towards teaching, and research on teaching. We will always strive for best practice and maximised outcome for the students, staff, and administration. Figure 1. shows the mission and overall goals for EMERGE visualised. The core team of EMERGE is currently a group of academic staff and administrative employees at the Department of Social Anthropology, Geography, Psychology and BLINK faculty support, as well as student assistants.

As will be described in the coming chapters, the eagerness to explore and implement such activities in teaching is present in all disciplines in EMERGE. We shall also point to some challenges that the group have encountered by implementing such activities. We want students to discover an interrelation between disciplines and traditions at the university and the world we live in.

¹ We consistently use the term ‘teacher’ over the term ‘lecturer’. This does not mean that we do not recognise the research-oriented expertise connected with the term lecturer, rather we recognise that in EMERGE our lecturers are both. We therefore stick to teacher in this report.

In order to stay relevant and to explore emerging possibilities teachers strive towards, we have tried out new approaches in teaching, such as testing and implementing emerging technologies, involvement of external partners in teaching activities, new forms of collaboration and new ways to engage students in more active roles. Such experimentation is not always straightforward.

Doing things differently means running into barriers such as the architecture of classrooms that is not designed for these teaching methods, rigid university bureaucracies and room coordination plans, exam-regulations suited for a 'traditional' teaching paradigm and time-lag between ideas and possibilities for course implementation due to subject plans and their role in the course structure. Being innovative means running into frustration, increasing the chance of giving up – especially if the innovator lacks support. Challenges are felt across project disciplines in EMERGE when we try out new technology and teaching methods in their courses.

Project mission

The EMERGE mission is to increase the likelihood of innovative teaching initiatives being successful through establishing a practice for continuous and systematic development of practices for teaching and learning by sharing experiences across disciplines. To achieve this mission, EMERGE will be developing a physical and digital on—site infrastructure, as well as an academic infrastructure. Concretising this means creating a shared community of experimentation with an organised leadership through academic-administrative staff, as well as students and student employees.

At the front of the mission are the students themselves as explorers of emerging technologies and paths towards learning. The goal is to improve universities and other learning institution's ability to facilitate continuous development of learning methods.

This involves the use of technology, evaluation of organisational processes, the use of rooms, and how to approach methods of learning and assessment based on established or on-going research. A dialogical teacher-student-relation is central, motivated by shared matters-of-concern in the exploration of an emerging world. This is achieved through taking an experimental approach to teaching wherein the classroom (or whatever field teaching and learning occurs) is considered as a "laboratory" – a space where we not only learn together, but also discover how to learn.

Across project disciplines a broad variety of teaching methods and technology is utilised and tested. This is done by a continuous focus on improving and develop teaching methods and courses. The aim is to draw upon research experiences across disciplines (geography, psychology, social anthropology, and teacher education) to overall improve the quality of teaching.

The EMERGE research cycle

At the heart of EMERGE is annual cycles of experimentation and evaluation, where ideas are tested during teaching in the fall term, together with data gathering. In the spring term the experiences are analysed and presented in a report. The present report is the first, based on experiences from autumn 2021². In addition, a conference is being held in the spring term to disseminate and discuss the experiences with external parties who may be interested in learning from experiences or who are conducting similar experiments. Also, during spring term, new experiments are designed for next autumn.

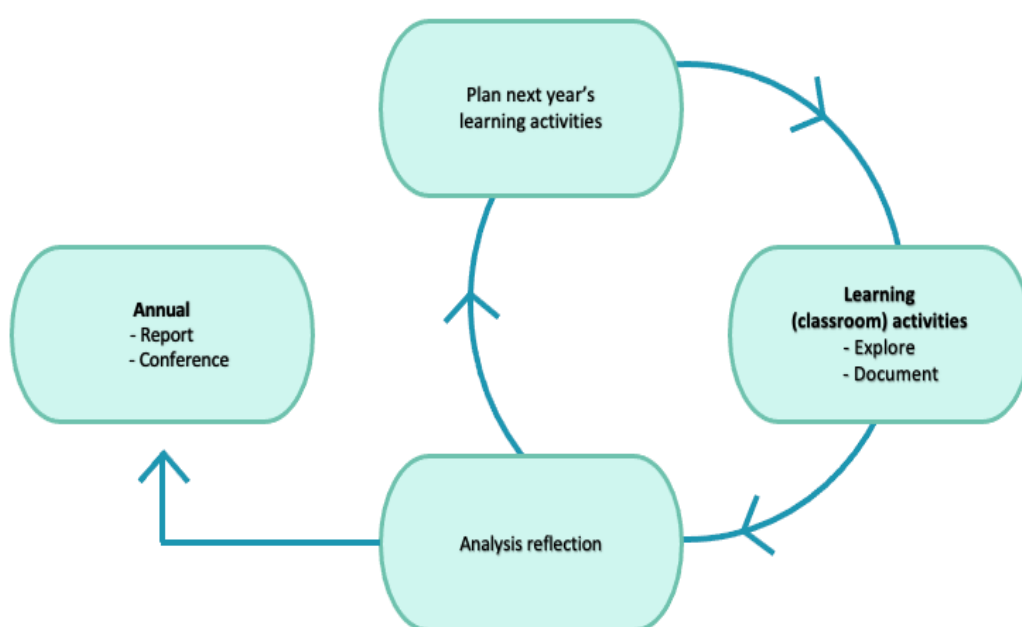


Fig. 1: The EMERGE hermeneutic-deductive cycle, a yearly cycle moving between learning, analysis and planning: leaning is exploration and documentation of teaching activities, followed by analysis and reflection, moving to planning the activities of next cycle. Each year also produces a report and an experience chairing conference.

Through this cycle, EMERGE functions as a cross-disciplinary network for sharing practical and educational experiences, as well as a location for coordinating the various recourses available to teachers. EMERGE is set up to ensure continuous and unwavering research activity that is not dependent on one single enthusiast or a project grant, and with the ability to gather experiences annually and thus develop teaching methods and technology through the on-going teaching in a cyclical manner.

² At the Department of Social Anthropology these experiences date back to the early 2000's, with classroom laboratory research.

However, it is worth mentioning that even though we share experiences and adopt approaches from each other, it is paramount to EMERGE that the disciplines retain both their interest fields of research and retain disciplinary characteristics.

Evaluation and sharing of experiences from on-going research is fundamental for developing teaching methods and implementation of technology. After exploring and testing new teaching methods, the effects are evaluated, and the results are used to improve courses the following semester. This is a hermeneutic deductive method where the outcome is used both within the courses and between the courses. Using the hermeneutic method secure the continuous development and maintain high quality in teaching. The hermeneutic method will be elaborated around in the following chapter.

It is through various ways of collecting data – such as surveys, interviews, and observations – that the results are evaluated. Experiences from the previous semester (autumn 2021), upon which this report is based, show that the use of technology in teaching activities makes students more motivated, increase their engagement in learning, as well as the overall learning outcome.

The teachers involved in EMERGE report that the use of educational technology brings their teaching to a higher level as the students get to experience and solve real and work-relevant situations that is often lacking in the social sciences. Moreover, teachers involved in EMERGE report that the use of technology and new approaches to learning methods increase student involvement in all courses (cf. section II of this report).

The EMERGE philosophy

EMERGE consist of several partners with different concerns, but certain ideals bring us together.

At the heart of it all is a certain understanding of what a university is and should be: The university is understood as a place for learning and of exploring the world: shaping society. Learning should take place in a *dialogical space* (Fyhn 2009) between students and teachers where disciplines and academic ethos are at the centre. From this follows certain principles of teaching:

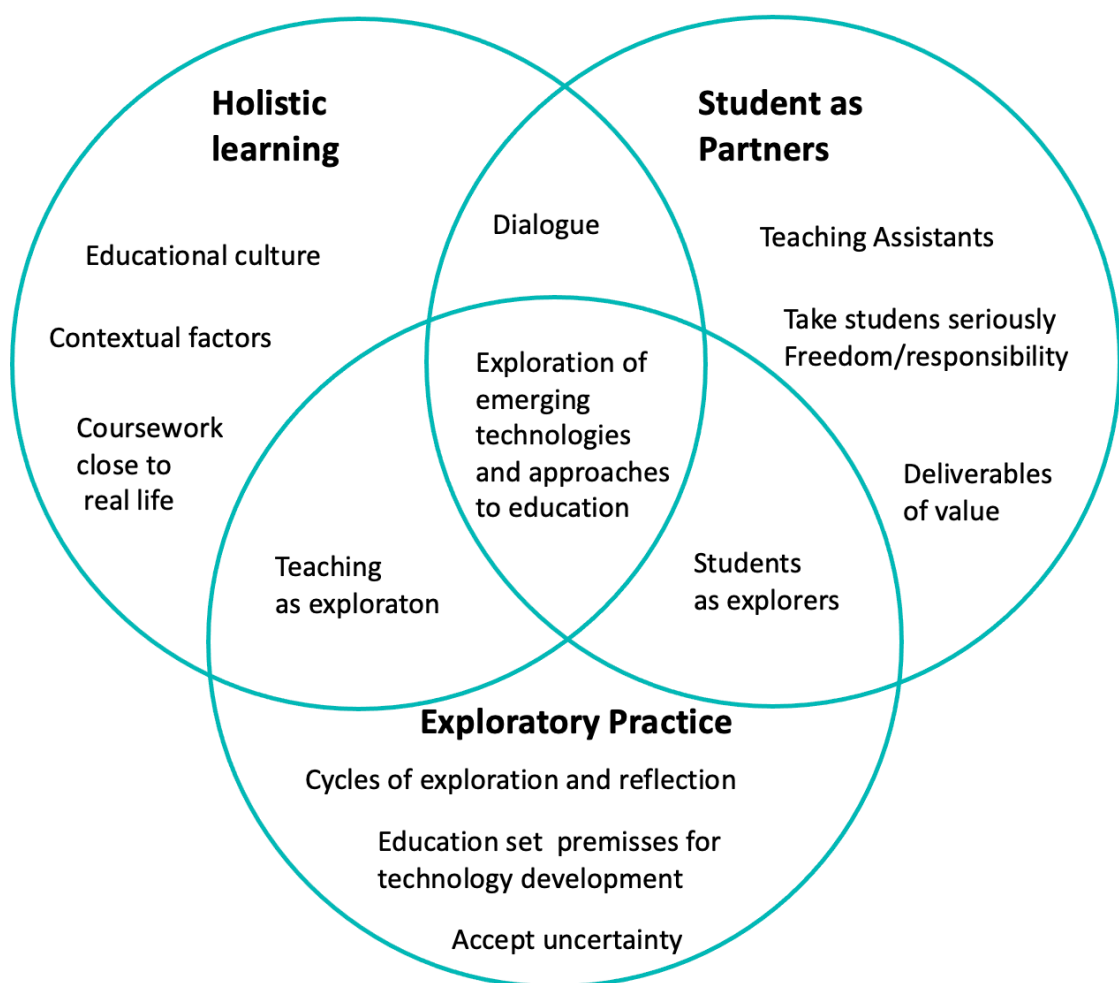


Fig. II: Dimensions of the EMERGE philosophy.

Centre

- At the heart of EMERGE is exploration of the emerging university: Emerging ways of teaching and learning, and emerging technologies.

Holistic learning

- EMERGE will contribute to develop and maintain an educational culture where disciplinary and academic values, curiosity and mutual respect is at heart.
- EMERGE approach education holistically, taking all contextual factors into consideration: Organisation, administrative practices, physical spaces, technology, the social life of students, educational culture and disciplinary idiosyncrasies.
- The work and exploration of EMERGE takes place through coursework set as close to real-life challenges as possible.
- EMERGE put emphasis on creating a disciplinary dialogical space between teachers and students.

Students as partners

- EMERGE place great emphasis on promoting motivation, curiosity, and independence among students by taking them seriously and give them responsibility and freedom. Students are not pupils and the university is not a school.
- Students should create deliverables they experience as having value and making a difference beyond the specific course context (i.e., published books, podcasts, products, etc.). Presentation of student work should take place in events where experiences are shared among students and teachers.
- Teaching assistants form a large and important part of education in EMERGE and are given much responsibility.
- The students are themselves active explorers of the emerging world.

Explorative practice

- Through EMERGE, knowledge development takes place in cycles of testing and reflection following the structure of the academic year.
- We must accept and accommodate a certain level of uncertainty, though this shall never disrupt the educational ambitions of the involved students. EMERGE give support in handling uncertainty.
- Educational and disciplinary perspectives set premises for technological development.
- Emerge seeks to develop ways of teaching where exploration is inherent.

Holistic approach

Approaching teaching and learning from a holistic point of view does not only consider students and their lives outside of campus. It also involves (as elaborated above) the challenges that teachers encounter in relation to university bureaucracy, administration, purchase of technology, economy etc.

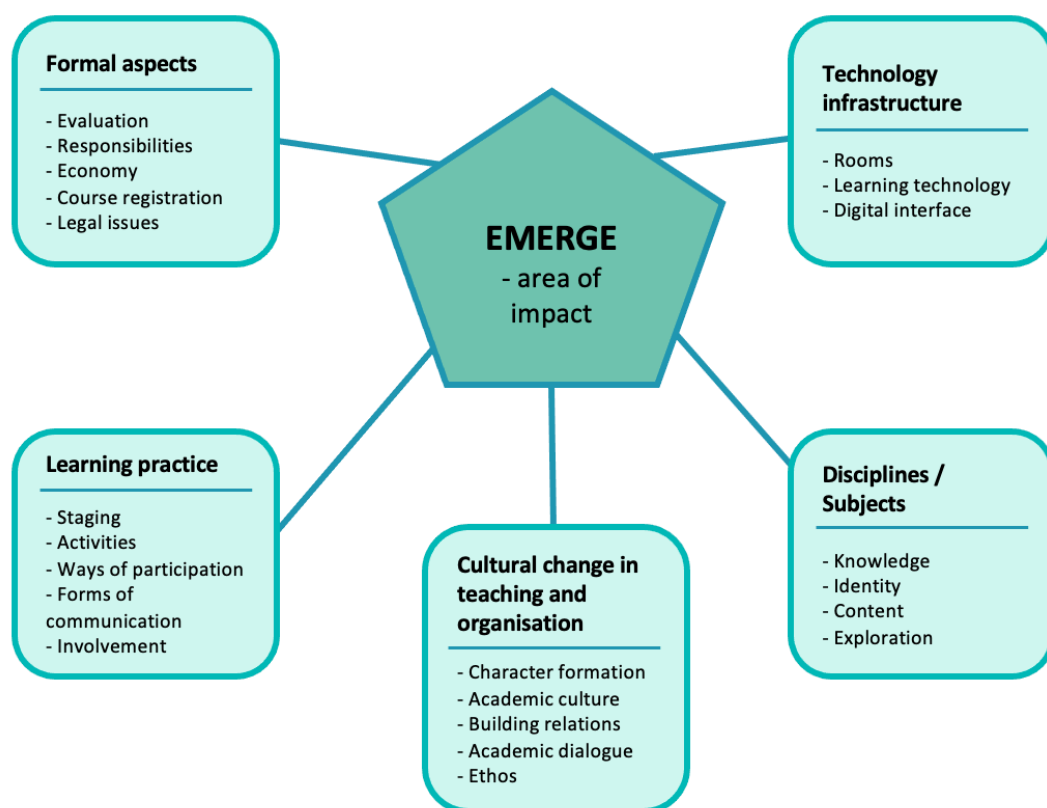


Fig III EMERGE's area of impact: The pentagon approach to organisational studies indicating relevant areas of research and impact

What are the challenges

All disciplines involved in the EMERGE describe that they run into various challenges when trying to implement technology and exploring with new teaching methods in the classroom. However, many of them are recognised by all disciplines, and are further described below. In this report and in EMERGE we base these challenges on actual and experienced obstacles.

Exploring with emerging technologies in the Department of Geography

At the Department of Geography we experience that testing of technology-intensive teaching is characterised by enthusiastic staff who use their time to apply for grants to purchase equipment needed to test new teaching methods. The same applies for the use of student employees and collaboration between employees. The lack of discipline-administrative collaboration makes it difficult to test technology with students and in turn to evaluate it. This “missing link” affects all levels of integration – from user access, software security, hardware compatibility, as well as students and teachers’ opportunity to test the technology. Today some teachers go back to ‘the common of teaching’ teaching because software programmes are outdated, hardware needs updating, and other teacher-friendly technologies demand charging and password access. Administrating all these different technological challenges in teaching is by several teachers not prioritised as they instead want to use their time and energy on developing high quality academic content. If this trend is to last in the decades to come, and innovation continues as it does today, it is feared that initiatives from individual teachers, results from EU-projects or nationally funded projects or department specific initiatives would lose valuable opportunities for the future. Innovation is not in itself a goal, but developing teaching methods that recognise innovative thinking is interconnected with providing students with a work-relevant education and it provides them with competence to solve future problems. The university, and thus also teaching, should be research based. It is important to always explore what is ahead of us and to explore the unknown.

There is a noteworthy lack in academic resources (PhDs, post-docs. and researchers within didactics, learning methods, and content related pedagogics) and administrative staff with enough time and resources to connect departments with other academic environments to solve challenges to teaching. This hinders the sharing of experiences across disciplinary fields, something which would be of benefit to everyone. However, as of today there are several novel initiatives in some departments. We would benefit if these are formalised into holistic frameworks where resources, experiences, research, and development of methods could be shared, saved for the future and further developed.

Experienced challenges at the Department of Psychology

At Department of Psychology we experience similar challenges. Based on experiences from teachers, the various use (different kinds) of technology is problematic. There exists some research regarding the use of technology in teaching, but it is a challenge to get everyone to use the same technology and the result is several individual projects using diverging technology. The vast amount of technology in use makes it challenging and time-consuming for both students and teachers to make use of new forms of technology in teaching and learning environments. Moreover, on an already tight time-budget, such time-consuming factors cause teachers to lose the incentive to implement new technological tools. Tight timeframes in projects where teaching methods are tested also causes a lack of exchange of experiences

and collaboration across academic groups internally in the department. To establish a centre that works towards updated knowledge about, and experience with, different technological teaching solutions, could make it easier for teachers to make use of it. This can facilitate ease of adaption for teachers making them more willing to try out different ways of teaching without it becoming too time-consuming. Additionally, experiences from students themselves will be of great value, while at the same time giving them an opportunity to affect the testing of technology in courses.

Challenges with experimental teaching in Social Anthropology

At the Department of Social Anthropology, we have tested new approaches to teaching and technology for many years, over several periods. One experience is that the trials are vulnerable because they are linked to few people. If a scheme is successful, it still tends to stop if the initiators disappear (as they often do if they are employed in temporary positions). Addressing this vulnerability is an important goal for EMERGE.

The practical implementation of teaching programs also offers certain challenges if it differs from what the organisation "expects" in the sense of what it is rigged for. Examples of this are schemes that make special demands on rooms – for example a room with a capacity for 50 students that has a flat floor/surface. Such special requests are difficult to get through in NTNU's centralised and automated room booking system. The same goes for time. For example, the desire to have four hours of continuous teaching, rather than two hours of lectures and two seminars, is something we have had to fight for. This can be described as a struggle between pedagogical principles and the organisation's bureaucratic machinery. It is not only the sole responsible person who experiences this problem. The administration at the department also experiences being in a squeeze between pedagogy and machinery.

For example, the attempts we have made to coordinate the timetable for NTNU and a university in Romania because the students were to collaborate with each other underlines this. Here we experienced that these two rigid systems stand against each other, and the opportunities to achieve meeting points required a disproportionately large amount of effort from those involved.

Experimental teaching arrangements can also involve alternative forms of examination. This is an area that is strictly regulated. Nevertheless, it has been difficult to get through for pedagogically justified wishes if they break with the established exam categories.

Exploration of new technology also presents challenges. We have experienced how purchasing new systems such as VR glasses has been difficult because there are no agreements on deliveries of them. Here we have experienced the so-called "ring emails" where we are sent from one unit/person to another because no one dares to approve the order.

We have usually solved the problems, and the experience is that everything is usually possible, but it takes a lot of effort. We see great potential in sharing experiences through EMERGE where those

who have gone up the path can showcase it to others. This sharing of experience should also involve the administrative staff who know of the problems to the same degree as the teachers.

Reflections on challenges from BLINK

BLINK faculty support for teaching activities reports that disjointed testing of equipment and software does not provide superior knowledge or sharing of experience. This affects new knowledge about what kind of technology could contribute to positive outcomes for learning. Technology in our understanding is used on its own, and often there is no reflection around *why* it is used. It can be challenging for teachers to develop practical competence in how to use technology to promote good learning outcomes. BLINK experience that the feedback from teachers is two-fold: 1) limited time to carry out this kind of developmental teaching methods (including sharing of experiences and learning), 2) individually, teachers do not possess the level of digital competence needed to discover, explore, and utilise opportunities that are available through the use of technology. As a result, the use of technology is often limited to test-projects, and without the practice of sharing experiences as a basis for further development. As a consequence, new learning methods are limited to individuals and smaller groups, and do not result in change beyond the specific contexts where these practices are tested and developed. On the organisational level, the support has been fragmented and silo-based, and not considerate of user needs. We ask ourselves if NTNU, as of today, is an organisation that can support certain kinds of innovative, explorative, and novel activities that EMERGE aims towards. To participate in this work, we need academic communities that are willing to challenge organisational boundaries, and an administrative structure that develops in a manner that supports new practices.

Summary Challenges

Running into challenges is something all disciplines in EMERGE encounter when trying out new approaches in the teaching context. These challenges are important to recognise and identify if we are to continue with classroom experiments. We see that challenges occur on several levels at NTNU. In EMERGE we have identified several; tight time schedules for teachers/researchers, lack of openness between individuals running experiments, pedagogical regulations, teaching rooms and administrative structures. Through our holistic approach towards the whole learning context and openness between participating disciplines and BLINK, enables us to start the work of identifying barriers researchers may encounter when wanting to explore innovative teaching methods.

Chapter 2 - EMERGING research practices

Håkon Fyhn, Jakob B. Cyvin and Håvard R. Karlsen

Cross-disciplinary research

EMERGE consists of people from different disciplines with different approaches to research. We all aim to improve the teaching of our courses through testing emerging technologies and teaching methods. A systematic approach to research is necessary for us to be able to gain experience annually and know the effects of our practice. Nevertheless, EMERGE will allow the specific approaches of the various disciplines to research with their peculiarities. The goal is not to use the same method across the board, but to ensure that the methods speak to one another, and that we are able to share experiences across disciplines. This can be described as *triangulation*, where different methods correspond to different perspectives. In this manner, the phenomenon is illuminated from different angles. The cross-disciplinary research presupposes that we are able to effectively communicate with each other, something which requires (1) a common room for understanding, (2) a structure that makes the meetings between disciplines possible, and (3) that we familiarise ourselves to a certain extent to each other's methods.

1) A space of understanding is what linguists often call a temporarily shared social reality (Romeltveit 1974), or a "diatope" (Evensen 2012) where we together develop an interpretive and interpretative framework and points of reference that make us understand what we say to each other in the same way (Fyhn 2009). All joint activities in EMERGE contribute to the development of a space of understanding through becoming acquainted with each other, the methods we use and the disciplines we represent. This room is becoming a valuable "treasure" we manage. 2) Cross-disciplinarity presupposes a structure that creates meeting points between the disciplines. The annual research cycle is the most important structure of EMERGE, where we together develop experiments we will conduct in the various courses, discuss them along the way, and reflect over them together through work with a report and a conference the following term. Through this cycle, meeting points are structured alongside the emergence of experiences. One goal is for the experiences to be as common as possible.

3) EMERGE aims to share research methods in that the methods of the various disciplines are also applied to courses in other disciplines. In the autumn of 2021, for example, questionnaires from psychology were also used in anthropology courses, at the same time as techniques with group interviews from social anthropology were applied to psychology students. In addition to the empirical value, this contributes to increased insight into each other's methods.

Although each discipline has well-established methods, the cross-disciplinary approach is still under development. The development of a cross-disciplinary methodology for research on teaching, based on the disciplines, is an important goal for EMERGE.

The «Classroom laboratory» metaphor

The word classroom laboratory must be understood in an extended, almost metaphorical manner. It gives associations to both old-fashioned classrooms and the laboratory experiments of the hard sciences. In reality, we promote a very flexible form of teaching and the methods are largely closer to the so-called "soft" disciplines. We use the word in the absence of a collective term for the exploration we organise.

The word "classroom" refers to where teaching/learning takes place. This can be a teaching space at NTNU at a given time each week, a virtual room set up for students, or a field course in geography. There may also be activities that cannot be linked to a specific point in time and space. Nevertheless, "classroom" is a word that signals some setting where learning takes place, often with a certain repetitive character, and where there is some systematic intention behind this particular setting, whether it is a physical space or something completely different. This is where we explore emerging forms of learning and technologies.

When we talk about the "laboratory", this must also be understood metaphorically. The laboratory is a place where you can simulate reality and test hypotheses about it. The experiments we do can be understood as assessing hypotheses about learning, although the methods we use vary widely. The assessment does not necessarily have the hypothetical-deductive method's character of strictly defined hypotheses that are sought to be falsified. The trial can rather be regarded as a form of hermeneutic method, where experiments are drafts of understanding that contribute to the development of a holistic understanding in various ways.

The classroom is not a simulation of reality. For students and teachers, it is reality, although parts of what goes on can be understood as practice in the real world through a simulation of it. What classroom research, on the other hand, has in common with a laboratory is:

- The subject of study is a relatively limited unit with certain frameworks.
- It is possible to introduce certain variables or try out things we decide on a long time in advance.
- The activity has a certain repetitive character from year to year which makes it possible to carry out systematic tests with a gradual development from year to year.
- Not only are the research topics adjusted from year to year, but also the "laboratory setup".

Despite this, things are constantly happening in the classroom that remind us that we are dealing with real life. This requires that we put the rigidity of the experiment aside to enable adaptive research that responds to what actually takes place.

Everything we do in teaching has real consequences for the students. Thus, we can never think of what we do as pure laboratory research. *Action research* may be a more apt description symbolising constant translation of our understanding in an attempt to change the situation. According to Finset (1973, p.17), action research is a connection between traditional research and targeted actions. This interconnection means that the research becomes more explicitly value based. It is therefore important that the researcher strives for a reflective attitude towards research, and constantly make their values and attitudes explicit. In this way, the researcher must seek to present (to their informants and in the research result) what interests the project serves.

We further emphasise that students are given a role that is more like fellow researchers than "research objects". Our goal is to draw students into the research process in as many phases as possible. In this way, it is ensured that their interests are considered and that they themselves will benefit from our "experiments" or "actions" – even when these turn out not to be particularly successful.

Wholeness and hermeneutics

In the following chapters from the various disciplines, we go into specific methods used by the individual courses in the research. Through the triangulation of methods, the discussions between us, and the annual cycle, we are also looking to achieve a form of common understanding of what we have learnt. Whether the methods are quantitative or qualitative, they aim to contribute to an understanding of what we are investigating. The development line of this understanding is something a little different than the results of the individual methods and thereby brings us into the domain of hermeneutics. Hermeneutics can in this context be described as the art of understanding (Gadamer, 2003; Ricoeur, 1991).

The hermeneutic circle corresponds to the annual cycle of trials and reflection, where we constantly operate with a holistic understanding that is tried and developed through the experiments in the classroom: we design a research plan and come up with a pre-understanding that frames the experiences in the classroom, at the same time as this pre-understanding ends and develops as we experience in practice. This is how the development of understanding takes place through cycles.

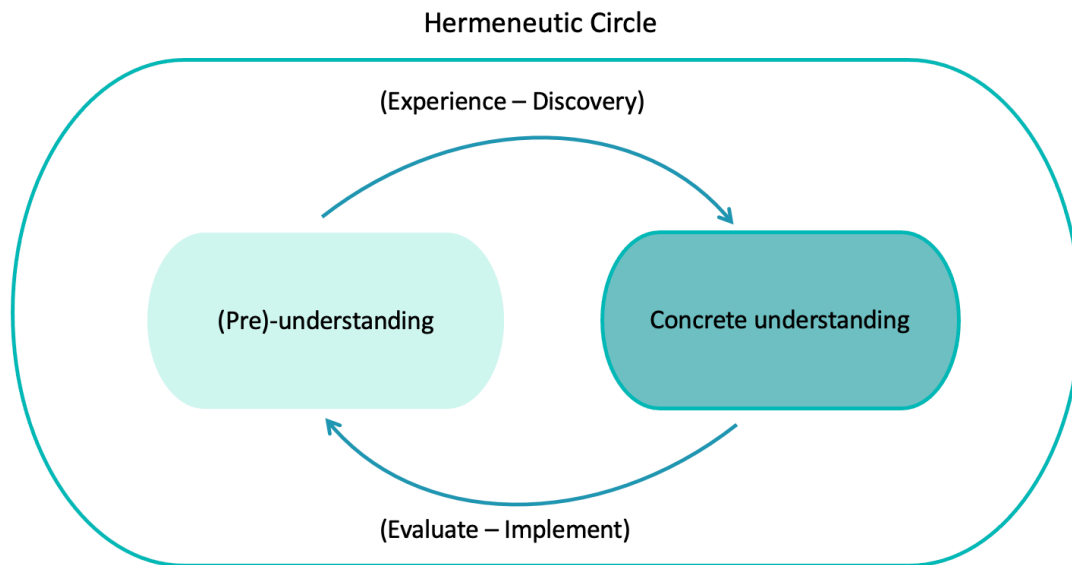


Fig IV The hermeneutic circle for development of understanding, illuminating EMERGEs research cycle.

Holistic perspective

Universal hermeneutics is always about wholeness in one way or another. In addition to the fact that understanding as a phenomenon is inherently holistic, the holistic perspective also relate to the trials beyond the pure understanding. Testing an idea or a hypothesis is not only about whether a measure works or not, but also about what we have learned and experienced beyond the original research questions, and what this may mean for our overall goal (cf. Wallin, 2020).

The holistic perspective also means that we not only focus on exactly what takes place in the classroom or in a learning situation, but also consider the holistic context in which the learning takes place. This means that we are equally concerned with the bureaucratic organisation that facilitates teaching regarding room distribution, admission and exams, the physical design of the classroom, training of student staff, the students' lives and well-being also outside the teaching, the methods for the development of teaching-related technology, and so on. Holistic thinking requires a methodical recognition that everything can be relevant to the teaching here and now.

Research ethics

Research with students brings several research ethics issues to the fore. In this way, some precaution should be taken to secure the participants against the unfortunate consequences of participating in the research.

Formal criteria and Norwegian Centre for Research Data (NSD)

All research in EMERGE must be done in accordance with NSD's³ guidelines. We try as much as possible to avoid the processing of personal data. However, when personal data is processed, permission is sought. This is done locally by the researchers involved in a specific project, when the experiments involve students from other disciplines. As there is great variation in the research methods, and when the individual sub-projects are as independent and self-governed as they are, we consider it unsuitable to apply for a joint research permit for EMERGE. To the extent that research data is shared between academic environments in EMERGE, these must be anonymised.

Anonymisation

It is important that all empirical material and all results are anonymised as early in the process as possible, so that personal information cannot be traced back to the informants.

It is extremely important that the participants receive sufficient information about the research project they are participating in. The information consists of the target of investigation, why and how we want to investigate this. Such information should be provided as early as possible (preferably before the course begins), so that the informants can have the opportunity to reserve themselves from participating.

Role clarifications

In a research project where teaching and research are closely linked, it is important that the research role is clearly defined for the informants. It is important, for example, that observations and results that the research group finds do not in any way influence the assessments of the students' academic results. An open dialogue between students and teachers about research throughout the term is a good insurance. This is especially important where students are to some extent “co-researchers”.

Feedback

The development of research experience should benefit students as quickly as possible. The experiences from a term should result in a better teaching plan the following year, not just a better research plan. Feedback should also benefit students during the current term.

³NSD recently changed their name to Sikt, however, we will stick to NSD in this report.

Compensation

When the research uses the time of the students in activities that are not directly related to the teaching, for example in group interviews, we should consider compensation of some kind. A common practice is to serve pizza or other goods when conducting such activities.

Remember that students are here to study

In general, it is important not to forget that the informants, in this case students, do not enrol in a study programme in order to participate in a research project. If the research somehow compromises the study programme for someone, either because they learn less than they would have done or because they end up with a worse grade than they otherwise would have achieved, this is completely inexcusable. If the research project must come at the expense of the informants' learning quality, it should be deserted. To the extent that there is a risk of disruption, it is important to ensure that this does not affect the learning outcomes or grades.

Sensitivity

It is important that the researchers are aware of, and register, the mood among student, as well as how the research is received among them. This should of course be a natural part of any teaching process, but in this case, it is extra important because such research is not intended to be a part of the teaching in the first place. The point is to draw attention to the students' well-being and adapt the research accordingly.

Positive effects that flow over to the students:

Research ethics tends to focus on possible problems. However, we must not forget that research may also have positive effects on students. There are several reasons for this:

- The results of the research will benefit later cohorts of students.
- Some of the resources available to the research project benefit the students in the form of, for example, better equipment such as VR headsets.
- The research project seems to be a motivating factor for both students and teachers in that the course is perceived as special (something happens) and that someone is interested in exactly their experiences.
- Interviews and conversations with students may in many cases increase the learning effect by stimulating reflection over both the academic content and the learning process itself.
- The research becomes an extra outlet for students to give feedback on the teaching and comment on things they are not happy with.

Anthropological research methods

Anthropological research practice consists of several concrete methods, or techniques, that are triangulated in ethnographic descriptions. Participatory observation is the most well-known method related to the discipline. On the other side, interviews and conversations are also important, along with more quantitative studies and the use of other sources. The choice of specific methods depends entirely on the situation and the problem in need of addressing.

One goal is to be able to see from the native's point of view - see what our informants see. In the classroom laboratory, this means trying to see what is happening from the perspective of the students.

The method involves, on the one hand, observation. In anthropological research, this means systematic observation and recording of what we observe, i.e. what happens (Madden, 2017, pp. 95ff.). What is recorded can be anything from description of places, things, technology, people, and events (Emerson *et.al.*, 2001). The state of the art is to get in a position that allows us to observe what is relevant and manage to document this along the way. "Observation" can also be done with senses other than the eyes, all impressions count (Pink, 2009).

Participation means that the observer participates in the situations that are observed, this is a position that gives "orchestral view" to what is happening, at the same time as it presents certain challenges (Madden, 2017, pp. 75ff.). For example, it is not always possible to write notes while participating in a situation. It can also be a challenge to constantly switch between the gaze of a participant and the observer in cases where the two are not attuned. Participation requires that role clarification and reflection on one's own position and relationship to the others is taken into account, at the same time as a certain amount of training is often necessary (Grasseni, 2004).

Participation offers a number of opportunities that observation from a distance does not offer. It especially allows for the opportunity to constantly be able to ask the people you are researching, or those you are researching together with, about their views on what is happening. This is important in order to be able to see from the other person's point of view (Madden, 2017 pp. 59ff.).

Participation also means that we talk to those we study. Methodologically, such conversations can range from formal interviews (mostly semi-structured) to more informal conversations (Bernard, 2006), such as when one asks the other about something that is happening there and now. The interviews also involve jotting down information.

In addition, it is common to include methods such as document studies and exploration of the context of the situation in focus, in what is called an extended case study (Van Velsen, 2017).

All these methods can also be implemented in digital meeting places such as social media and virtual spaces (Pink, 2016). Digital media can also be used in documentation work, audio recordings, film, photos and so on.

The point is that the concrete methods are triangulated through the development of understanding. The overall method can be described as fundamentally abductive (Reichert, 2004). While deduction is about confirming / refuting a hypothesis and induction is about ending from a limited number of cases to a general insight / rule, *abduction* is about the very formulation of the hypothesis - the creative movement from empirical experience to the formulation of a hypothesis is what makes the experiences understandable. Ethnographic method usually involves elements of all three forms of inference, but it is the abduction that most clearly characterizes the method. This is because the method is to such an extent characterised by an explorative process.

The exploratory nature of the method means that the anthropological fieldwork constitutes a path towards understanding where one cannot fully predict in advance what will happen. This means that we emphasise flexibility in order to be able to adapt the research to what is happening at any given time. The concept of serendipity describes this principle and implies an openness to let meaningful coincidences guide the development of research (Fine and Deegan, 1996). Not in the sense that everything is based on pure happenstance, but in that the fieldworker's attention to the problem and the purpose of the research means that unforeseen events that occur can become important keys to interpretation and understanding.

In a classroom setting where new things are tried out, unforeseen events will always occur, making this method fruitful. Even if nothing goes as planned, the research will still be able to give tangible results.

Research methods in geography

Within the field of Geography, fieldwork is an essential activity. Learning outside, close by relevant landscape features, objects, cultures, and situations, gives unique opportunities for students to learn more or in other ways than what they would do in a classroom. Research about learning outcome, motivation and priorities in teaching is hard, due to subjectivity. At the same time its not allowed to separate the class in two, and teach in two different ways to each group; this could influence exam results. Self-perceived learning outcome is not the same as the long-term learning outcome measured in a thorough way. Triangulation between quantitative and qualitative methods is therefore one of the ways to reveal how students perceive different kinds of teaching utilised at the department, see for example; Midtaune *et al.*, 2018; Cyvin *et al.*, in review, Cyvin *et al.*, 2022; Favier *et al.*, 2021; Rød & Nubdal, 2022). The vast majority of the publications at the department is about geographical themes, not about teaching practices, or educational development.

The discipline of geography has always been technology intensive. From the early development of maps and earth's surface measurements to the modern days' spatial analytics within both social and

physical geography using both GIS-software and satellite imageries. How to optimize the teaching about, and training with, these tools is not fully explored and research is needed.

Activating students through the use of student-centred teaching methods indicates increasing their learning outcome and/or motivation for learning (López-Pérez, López-Pérez, and Rodríguez-Ariza 2011; Midtaune *et al.*, 2018; Freeman *et al.*, 2014), and has been the background for parts of the development of the geography education at the department. In multiple courses, the roles and practices are turned from a classic speaking-teacher and listening-student, to a collaborative approach, working inquiry based throughout the term. Implementing research on the experiences, learning outcomes, motivation, teacher attitude towards active and innovative teaching, use of technology, internationalisation and other aspects of education and student-university contact and relations is not appropriately developed to meet the demands of future teaching. Teaching should be research based. That also includes teaching methods, use of technology and always striving towards optimising learning for all students. Collaboration between different departments working with affiliated themes within innovation in teaching would be a way to accelerate the needs for further R&D.

Research methods in psychology

In psychology there has long been a strong tradition for experiments. Under controlled conditions, research participants are manipulated in some way to produce an observable effect. Examples include the Stroop effect, in which there is a delay in reaction time between congruent and incongruent stimuli, such as when participants are asked to read the name of a colour written in a different coloured text. The environment in which experiments take place are often called laboratories, but they may also take place in public places. Researchers must balance the need to control the environment against the benefits of a more ecologically valid experiment.

Other forms of quantitative methods are also frequently employed by psychology researchers, like the analysis of tests and survey data, and the analysis of brain physiology with functional magnetic resonance imaging.

Qualitative research methods are becoming more common as well. Especially semi-structured interviews to analyse motivations and feelings of identity.

Psychology has for a time grappled with the implications of the replication crisis, in which several well-known and foundational studies failed to replicate. It has invited further scrutiny about the methods used to research topics. Triangulation via the use of several different research approaches to the same topic is one promising method to produce valid findings.

As in other parts of the social sciences, heterogeneity exists in the definition of research objects. There is often no obvious or natural way to define a concept like consciousness, and each researcher is

left to create a working definition for their paradigm that will in time be criticised by others for failing to capture certain aspects inherent in their own definitions.

An element of psychology that makes it complicated to teach is that most of the research objects are invisible: thoughts, cognitions, feelings, emotions, personality. Some are visible, but not necessarily easy to demonstrate, like mental disorders and behaviours. As such, students mostly learn by hearing about these concepts, rather than seeing them.

Students learn research methods in part by practicing them. They collect survey data, do interviews and run experiments for their own projects, with supervision from academic staff. Some psychological experiments are also available as software or online apps, allowing the students to, for instance, try the Stroop test based on the forementioned Stroop effect.

By engaging with the research methods and the collected research material, they internalise the contents better than they would by solely reading about it.

Summary chapter 2

In EMERGE our main methodological tool correlates with the annual research cycle, which means that our experiences throughout the term are systematically documented and evaluated after each term. These evaluations are basis for our analysis and final report. To manage this, we try to create a space of shared understanding between disciplines, subject and methods. Based on this we meet in dialogue to coherently reflect upon each other's experiences. Out of this we have, and are currently developing, a cross-disciplinary methodology where we define and use terms like 'classroom', 'laboratory' and 'experiments' to refer to our research practices. Our shared theoretical standpoint in EMERGE is to follow the hermeneutic deductive principle, which spin in a circular movement. This could be understood systematically in the way that we implement experiments with a 'pre'-understanding, then along the way, our experiences and discoveries give us new insights, which again result in a 'new'-understanding. This 'new'-understanding is then our new 'pre'-understanding, which forms the basis for next term's implementation of experiments.

In Social Anthropology the main research method is participant observation, informal and semi-structured interviews. The anthropological research method is in such a qualitative approach to discovery. Additionally, qualitative methods are triangulated with quantitative questionnaires, borrowed from Psychology. In Geography research on teaching practices and educational development is still narrow. However, the discipline has substantial experience with triangulating qualitative and quantitative methods. In Geography they emphasis more research on teaching practices of the future, and this has begun to develop as a part of EMERGE. In Psychology the focus in research has for a long time, and still is, grounded in quantitative methods. However, a shift in the discipline has emerged, and now more and more researchers triangulate their experiments with qualitative methods as well.

By identifying our different research approaches and methods, we are able to learn from each

other, and take use of each other's methods. In EMERGE we will continue to strive to learn and share from and with each other in the time to come.

Section II – A holistic approach to teaching



Introduction

EMERGE's philosophy on exploratory practices in teaching bring courses from Psychology, Social Anthropology and Geography together in a shared space of testing new approaches to teaching methods, especially through the use of emerging technologies in various forms in the classroom. For all participating disciplines the overall aim is to increase the quality of teaching in higher education, and to increase student's motivation to learn and to better their final learning outcome.

The three following chapters will describe how the different courses approach teaching methods from a holistic point of view. Moreover, as the EMERGE philosophy in chapter 1 emphasis, the exploration of technology is only one aspect of teaching, technology is seen as a tool for increasing the quality in courses, and therefore it is used only as tools for extending the classroom into 'real-life' contexts. Common for all chapters is that using technology in teaching involves approaching students in new ways, i.e., as partners in academic discovery and as active contributors to subject and course development.

In all courses the use of student employees (student assistants, teaching assistants, seminar leaders and master students) are recognised as important resources in the exploration of teaching methods. In EMERGE our ethos emphasis openness between researchers / teachers by sharing methods, results, observations, and experiences. Additionally, we strongly emphasis the same sharing and openness from students employed in the participating courses. Even though learning theories and standardised research processes lay the foundation for these practices, we have experienced – whilst working on the results from last term, which this report describe – that without student voices and their feedback on activities it would be problematic to develop teaching approaches that enable a learning environment which is 'student-centred', opposed to 'teacher-centred' (the use of student employees is further discussed in chapter 12). Therefore, all courses involved students on various levels throughout the research process.

We will see that even though the courses differ in their experiments and disciplinary expression / character, we all share the same motivation. How can we make courses more relatable to the world outside of academia, and how can we triangulate and explore our teaching approaches to educate students to become 'life-long-learners'? All courses emphasis to some degree student freedom, and thereby demand of them to take responsibility for their own learning outcome. By approaching students and teaching methods in such a way, the goal is to enrich the students with 'generic skills' (Meld. St. 16, 2016-2017) beyond the discipline.

Teaching and research form a unity in the EMERGE practice by evolving together year by year. Questions arise and are tested in the classroom. New insights and new questions arise, and gradually new ways of teaching emerge. Ways which include the experimental aspect as integrated in the teaching.

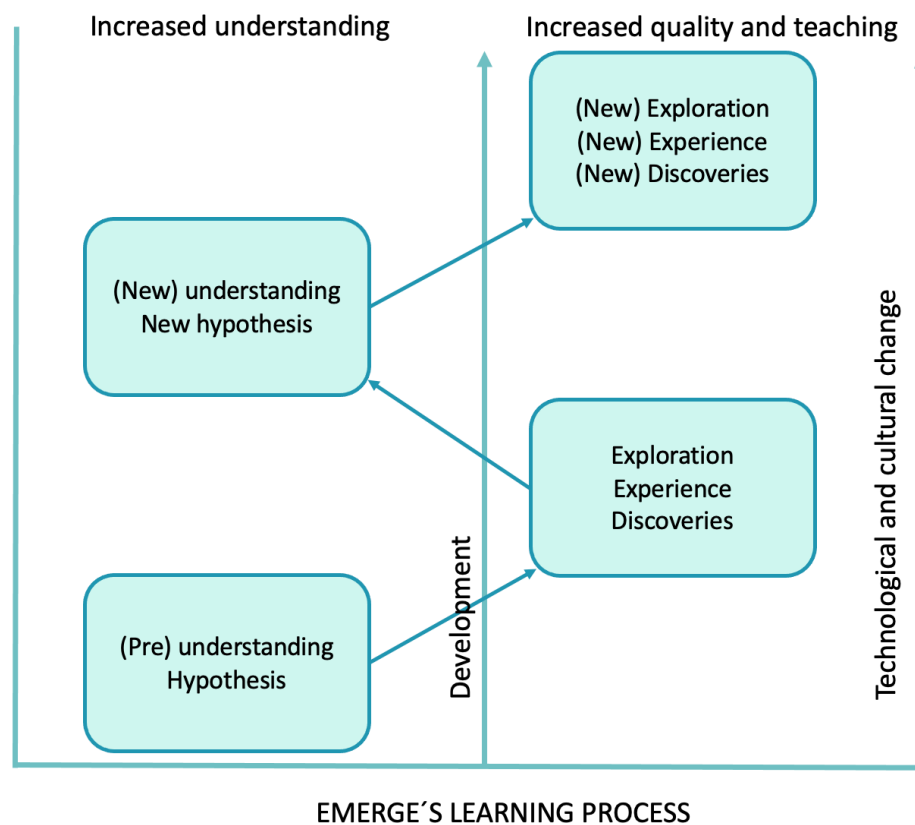


Fig V: EMERGE's learning and development process, evolving from semester to semester

Chapter 3 – Teaching from a psychological point of view

Tuva Fjærtøft Lønne

The following chapter will deal with the issues of teaching psychology students focusing on practical understanding and student involvement. The Department of Psychology (IPS) is a part of EMERGE as the philosophies on exploratory practice, the use of technology and student involvement line up. The department has previously relied heavily on passive, theoretical driven lectures, whereas some courses now focus more on student-centred ways of learning. Theoretical knowledge of the way we learn most efficient, form the basis for this chapter.

Learning may be defined as “an inner process that involves a relatively lasting change in experience and behaviour as a result of previous experience” (Evenshaug & Hallen, 2000, p. 435). Changes due to normal maturation or temporary change, such as getting taller or being hungry, is not defined as learning (Woolfolk, 2004). This definition implies that learning is based on the individual's behaviour and knowledge. Experiences you can reflect over together with others may also give useful input that makes the situation easier to handle the next time. Such experiences are now included in the course *Work and Organizational Psychology* (PSYPRO4502) as a scenario experienced in virtual reality (VR).

There are several different theories about how we learn, why we learn and when we learn best. Some key theories of learning are behaviourism, cognitivism, and socio-cultural learning theory. Under these main theories, there are several principles (Woolfolk, 2004). Two of these are situated learning and experiential learning theory that put a great focus on learning through experience. Repeated studies show that learning through practice or by methods close to practice may contribute to increased learning outcomes (Anderson, 2008; Loeng *et al.*, 2019). Feedback from the students also reflects this. The students report that having realistic scenarios and experiences makes it easier for them to see the relevance of theoretical knowledge and gives them a nuance to the theory that is difficult to extract on their own.

According to Brown *et al.* (1989), knowledge may be described as situated. That is, knowledge is a product of activity, context, and the culture where it is developed and used. This is also reflected in the EMERGE philosophy of exploratory practices. The skills and knowledge learned in a situation are therefore linked to the learning situation and may be difficult to apply in new contexts. Thus, much of what is learned is specific to the situation in which it is learned (Cobb & Bowers, 1999). Based on this, they argue that knowledge should be acquired in real life and relevant context to provide the best

learning environment. In the technological world we live in, VR may help create such a context that is remarkably similar to the real world, as will be discussed further in chapter 10. This means that students themselves may learn in the same context in which the knowledge later will be used (Winn, 1993).

The American philosopher, educator and psychologist John Dewey was a strong critic of theory-focused teaching. He pointed out that learning must be relevant to real life issues and the importance of experience (Dewey, 2011). Together with other key learning theorists such as Piaget and Vygotsky, he believed that people learn best through experiencing real-life situations. They experienced that the passive teaching in the schools led to the students easily losing motivation (Säljö, 2018). The epistemological way of thinking, constructivism, has a close link to these central theorists. Constructivism claims that the user should be an active part of the learning, and not passively absorbing knowledge (Huang *et al.*, 2010). The students themselves should be involved in the learning, allowing them to construct new understandings based on already existing knowledge. By this, the knowledge is not passively received, but actively constructed (Taber, 2006). Practicing this is an important part of the EMERGE philosophy. We want the students to be seen as partners rather than passive receivers of the teacher's knowledge. By doing this the students themselves may contribute to their own, and others, learning.

In Norway, Loeng *et al.* (2019) report that higher education suffers from uninspiring teachers who use outdated teaching methods and thus deliver poor teaching that does not inspire learning. At the same time, the authorities have given universities stricter requirements for teaching that promote students' learning outcomes and motivation. To achieve this, student-active forms of learning and new teaching methods are required (Loeng *et al.*, 2019).

Most psychology students get into work where interpersonal relationships are central. They must handle situations that are demanding, challenging and difficult. It is important that they bring the right tools and have experienced similar situations before. Therefore, first-hand experience and practical learning is particularly important. This is in line with the concept of exploratory practice, as is an important principle in the EMERGE philosophy as well as a central part of preparing psychology students to handle future situations.

In the field of psychology, learning how to best interact with different people is a central part of the teaching. Reading about theoretical situations in a book does not mean that you become well-equipped for the actual situations with real life humans. The more the opportunity to experience real-life situations is offered, the closer one gets to the real-life experience and the understanding of such interactions from a first-hand perspective. As in psychology, this is a central part of the teaching in the other departments connected to EMERGE too, such as the department of social anthropology and the department of geography. Thus, it may be useful in the study of psychology to let students experience different situations they may encounter in working life. For students to experience real-life situations is often expensive, time consuming and difficult to organise. Due to this, very few courses offer this as part of the teaching. Especially in courses about interpersonal relationships, this may be central in the

understanding of different real-life situations. This may be in management and interaction where such understanding is particularly important. Sensing how others feel, experiencing conflicts, and making difficult choices is key. Gaining a good understanding of this may be challenging through theoretical teaching as experiencing such situations yourself may be far more useful than reading it in a book or hearing about it from others.

The course PSYPRO4502 is traditionally theory-heavy and is a good example of a subject that will benefit from a more practical teaching approach. The department of psychology (IPS) followed, for many semesters, a less engaging form of teaching with lectures interspersed with some case assignments and discussions. This way of teaching does not sufficiently motivate the students and practice a teacher-centered way of teaching instead of a student-centred way of learning. The latter being the heart of the EMERGE-philosophy. Placing students at the centre of their own learning could increase motivation for, creativity in, and reflection around, the curriculum of the course. This way of teaching applies to other disciplines of psychology at NTNU and elsewhere as well. Many students do not manage to see the relevance and reality of the course until they get to practice it in real life.

To change the teaching focus from predominantly theory to a more of a practical approach, PSYPRO4502 is now more focused on practical scenarios from the real life than previously. This is done based on experience from the teacher and feedback from the students. The students are more involved in the learning, as well as in the development of the learning material. The goal is to involve the students in the learning process, give them a better understanding of how to learn, understand how organisational psychology works in interpersonal situations, and finally to give the students the right tools to use their competence. This gives the students more responsibility and freedom, which promote curiosity and independence. As every student learns differently, more responsibility and freedom may fit some students better than others. Nevertheless, we see that the exploratory way of teaching makes students more confident in their skills and field of study.

In the course PSYPRO4502 learning through realistic scenarios is central in teaching. Various teachers who are experts in their field have been brought in order to provide experience-based teaching. The syllabus includes a textbook (Saksvik-Lehouillier & Vaag, 2020) based on different characters and realistic scenarios from real-life work and organisational psychology. In the book the students get to know the employees of a fictional organisation in the full where important themes have their own chapters. E.g., the theme of work-related interpersonal conflict and how to handle it is learned through getting to know Olaf, an employee in the organisation. Based on this character, a VR scenario has been developed so that the students themselves can experience being in interpersonal situations relevant to work and organisational psychology. The scenario is intended to be used as a basis for further discussions in groups.

As a way of checking whether the implementation of VR is purposeful, a research project has been initiated. A master student is part of the project to research whether the VR-scenario is a positive contribution to the course and to give the master student an opportunity to be part of a research project

at the department. This master student also acts as a student assistant in the course and a research assistant in EMERGE. As a result, both the students taking the course and the master student gets valuable research experience. The master student gets a chance to contribute to the course as an “expert” in learning through VR and the students in the course get a chance to experience research up close as well as learning and discussing the use of VR as an educational technology.

As an assessment in the course the students write a paper where they discuss a subject relevant to the course. All students must share their findings with the other students as an important part of this exercise. This gives the students the opportunity to practice presenting theoretic information in a way that is easy to understand for others. Other students may also learn relevant theory without having to submerge themselves in the specific subject. In this way, each student can specialise in a particular part of the theoretical framework given in the course, which may provide motivation amongst the students and the opportunity to take control of their own learning.

The course is evaluated each year based on feedback from the students and written reports from students and the teachers. Changes are implemented to make the course more engaging and motivating for the students according to findings in the reports. Feedback from the students is essential to develop the course further and ensure its relevancy to the students. This follows the hermeneutic circle of EMERGE by through an annual cycle of experimenting in the classroom and adjusting the course based on feedback from the students. The students give feedback both during the course and after. This feedback is used to adjust the course so that it becomes better for the next students.

In last year's course report, the students pointed out that having “experts” as teachers was inspiring and that it was interesting to learn relevant theory by other means than reading. This information is crucial for the teachers to get as feedback from the students are one of the important sources utilised to ensure positive development of the course. Such evaluations from the students makes the course develop in accordance with what is important both to the students and teachers. This makes sure that the students themselves can influence how the course develops both during the term and for the next years students.

To summarise, the importance of teaching in a way that engages the students, makes them more motivated and teaches them real life skills is clear. Theoretical frameworks show that teaching with a focus on practical and realistic scenarios may contribute to this. In the field of psychology where the students are going to work with interpersonal situations, such a focus may be extra important as it is hard to get this experience from reading about it through theory. By implementing the philosophy of EMERGE, the goal is to maintain teaching excellency and continue to inspire students through an exploratory practice.

Chapter 4 – Learning how to learn: Exploring with learning methods in Social Anthropology

Tonje Mørtzell

Introduction

This chapter deals with experiences of classroom experiments in three separate courses in social anthropology. Approaching teaching methods and learning outcomes from a holistic perspective give insights of how students themselves can become more responsible for their own learning progression. Students are considered partners in exploration of teaching methods and the development of courses. This chapter draws on participant observation, student assignments, student feedback (in forms of qualitative surveys, questionnaires, and student interviews from autumn 2021) and the use of learning assistants. Teaching assistants is an important resource in these courses and their role will be mentioned briefly in this chapter. However, we will deal with this topic in chapter 12.

The department of social anthropology has a long history with classroom research and cross-disciplinary collaboration that covers use of campus rooms and course development across departments and faculties. From the first classroom experiment started in 2000 (See Hildre *et al.*, 2002a; Hildre *et al.*, 2002b; Fyhn & Sund 2002) the aim has been to explore teaching methods in different courses at NTNU. Approaching teaching methods from an anthropological perspective indicates a focus on interactional processes between students and between students and teachers. Experiences from previous classroom experiments indicates/show that when teachers try to implement and test out new teaching methods they often run into organisational challenges (cf. chapter 2).

A holistic approach to the whole learning context is the overall ethos in classroom research within anthropology, and at heart in the EMERGE philosophy. As described in chapter 1, making changes, testing out new approaches towards teaching methods / activities, and implementing classroom experiments is often carried out by enthusiastic individuals that more than often encounter various of cultural and organisational challenges. However, in EMERGE the dominating character is that enthusiastic individuals work together in a cross-disciplinary research group, making it easier to point out and overcome some of these challenges. Despite this, there still is a long way left to go to establish an institutional framework and organisational culture that makes it easier for teachers across disciplines to test similar and innovative activities in their courses.

All classroom experiments follow the EMERGE research cycle, which is defined by the hermeneutic method, which is described in chapter 1 and 2. Every term draws on the experiences from

the last, by evaluating what researchers and student assistants, teacher assistants and scientific assistants have observed and documented throughout the term. Based on experiences new ideas are developed (cf. chapter 1) and thereby enables the discovery of new explorative activities to implement and test in the following term. Through this cyclical movement of implementing, evaluating, and discovering, teachers gain new knowledge about teaching activities that help them develop new activities for the following term.

For example, in the course SANT3600 distant collaboration between students are part of the learning process, and thereby teachers – based on previous experience – implemented voluntary use of VR headsets for some of the students. This is further described in chapter 7.

Using participant observation as the main research method in these courses, teachers, researchers, and teaching assistants systematically document their observations and conversations with students. Additionally, we invite students to participate in focus group interviews to understand how they experience their learning environment. As part of a cross-disciplinary research group we also triangulate qualitative methods – which is characteristic of anthropology – with quantitative methods (by, for example, handing out pre-defined questionnaires). Student reference group reports and course reports are also used as part of the documentation that this chapter builds upon. Using various methods enable us to adapt to a dynamic and changing environment as a classroom (Hildre & Fyhn, 2002; see also chapter 2). Being able to adapt *with* the environment is important when we explore with emerging technologies as a tool in teaching, not just because this is new to both teachers and students, but also because the learning result of its use is still not fully explored. Documentation is gathered together in a ‘resource-pool’ and evaluated after the final exams. Evaluation follows the hermeneutic cycle and forms the foundation for next semesters’ implementation of experiments. It is however worth mentioning that theories of learning can and often is discipline specific. And as Ingold (2018) emphasis, “. . . the first place to find education is not in pedagogy but in participatory practice. . . (Ingold, 2018, p. 17)”, with this he does not reject pedagogy, however, he questions that knowledge could only be transferred through a *transmission* process carried from one generation to the next (Ingold, 2018). Rather he argues, as anthropologists, we should acknowledge that learning takes place between individuals that learn from each other, and thereby learn together.

Moreover, classroom experiments are not just developed for the sake of research; they are likewise developed to increase quality in teaching and increase learning outcomes for students. As emphasised in the EMERGE philosophy and described in chapter 8, experiments are developed in such a manner that they do not interfere with students learning outcome in any way. The aim is to contribute to new understanding / discoveries of what high quality in teaching is today and what it could be for the future in social anthropology and in other subjects that is a part of the EMERGE project.

One important tool for reaching the goals of classroom research and exploring ways to increase quality in teaching is to develop a *best-practice* for systematic development of teaching strategies. And as mentioned above, this is achieved by careful documentation that is evaluated annually.

Another important tool / resource in classroom experiments is to establish a practice of openness between researchers and research communities. In EMERGE we emphasise the importance of cross-disciplinary openness by sharing experiences and documentation from each other's experiments. This enables teachers and researchers to evaluate / analyse their results broader and between disciplines, which again could increase the learning outcome for teachers as well.

Using students as research resources has proven itself to provide insightful perspectives / outcomes in all three courses (that this chapter deals with). Student researchers (as researchers in general) have different perspectives about learning environments, and most importantly student researchers are closer to the empirical situation by solely *being* students. Combining perspectives and observations from student researchers and researchers / teachers is important when evaluating what high quality teaching looks like and should / could look like in social anthropology. Teachers and student researchers come together almost every week after lectures and discuss their observations and share their reflections. This enables teachers to be dynamic if they have to make changes in their lectures or in the research approach throughout the term. With dynamic we refer, in anthropology, to the *nomadic* characteristic of the discipline which "... drives anthropologists from one idea to another, transcends boundaries, shifts involvements and transforms commitments... (Hazan & Hertzog, 2012, p. 1)" as they wander along in the field⁴. This *nomadic* characteristic is closely related to anthropology and its serendipitous movements (Hazan & Hertzog, 2012.), which is the discipline's ability to practice "... empirical and theoretical mobility... (Fabietti, 2012, p. 15ff)" as the social environment in the field unfolds.

By approaching learning methods from a holistic perspective, a focus on the teacher-student relation has emerged as an interesting scope to explore. This has resulted in a focus on 'breaking' with the habitual boundary that we often witness between teachers and students in academia (professor – student). This we have experienced has contributed to establish a shared *dialogical space* (Fyhn, 2009) between teachers and students that is less hierarchical and that often is an intertwined part of university culture. Put differently, by actively approaching the students as partners we have managed (more or less) to establish a more relaxed and open environment where teachers and students come together in a shared space, and thereby discover the curriculum together (we will elaborate more about this below). Hopefully this encourages not only students' motivation to learn, but also a shared student-teacher professional community to unravel.

By making an effort to 'tear' down the student-teacher boundary in these courses, combined with substantial student freedom to develop their assignments and projects, the overall experience is that students are compelled to be more active and more responsible for their own learning outcome. All

⁴ The classroom as any other social landscape is treated as a fieldsite.

three courses that this chapter is based emphasise significant student freedom, making them in charge of their own learning.

Moreover, we perceive students as fellow explorers as well as active contributors of course development. Since students have the opportunity and freedom in their term assignments many of the perspectives they introduce are novel for teachers and researchers. This contributes to new disciplinary perspectives and development of next semesters' course curriculum. For example, students from these courses have shed light on phenomena such as, *mom bloggers* on Instagram, *Incels* on digital platforms and dating apps like *Tinder*.

In all courses the students must present their projects/assignments verbally, though there are some course specific differences that will be elaborated below. Teachers makes an extra effort to facilitate a ceremonial environment for the presentations. Feedback from students have been positive, and they report that they are encouraged and motivated by presenting their assignments in alternative forms than they are used to from other courses. One student explained, on behalf of her group, that “[t]his is actually the first time we have had the opportunity to present anything orally.” As students studying their fifth term at NTNU they contemplated that this was a positive experience for them and gave them the opportunity to get familiar and confident with talking in front of others, and thus an opportunity to exercise how to translate written theoretical knowledge to verbal forms. Teaching assistants have played an active part in all three courses; they have guided students through their projects, contributed to research activities, in forms of documentation and participating in workshops and meetings in EMERGE. Teaching assistants, seminar leaders, learning assistants, and other terms they may be described as across the university, have contributed more as student researchers in these courses and have contributed with valuable insights and observations throughout the term that has shown itself to be beneficial for the overall research experiments in EMERGE.

Implementation of classroom experiments in social anthropology:

SANT3600 -Cultural Understanding and International Work Relations

The course “*Cultural understanding and International Work Relations*” is developed especially for master-level engineer students at Gløshaugen campus, NTNU. The course is developed to offer engineering students a metacultural understanding in international work relations and to explore learning activities through group based and distance collaboration. By giving students an opportunity to work with objectives that are set to mirror real life as closely as possible, the aim is to equip them with analytic and generic competence to handle various social and cultural situations they could encounter in their future work relations.

Lectures are scheduled one time a week alongside a connected work-based seminar. Lectures and seminars are scheduled as four-hour bulks on the same day, and often somewhat overlap. At the beginning of the term, in one of the first lectures, students were asked to form groups that they would be working in towards their exams. To pass this course the students had to complete two oral group exams. All groups presented their projects at the same day, in front of each other, teachers, and learning assistants. Each group had about twelve minutes to speak, before every other group, in turn, asks questions about the presentation / project.

Based on experiences from previous terms, we have seen that giving students responsibility to form groups by themselves was a double-edged sword. Many of the students knew each other from other courses that they were taking, and they formed groups easily and worked well together throughout the term and without any further obstacles to collaboration. On the other hand, some students did not know anyone in the course beforehand, and for them, it became challenging to form groups and to establish a flourishing work environment in the beginning of the group project.

The formal requirements of the two group projects were loose, and the aim was to encourage students themselves to figure out how to ask questions and discover how to use the literature. The goal with the 'loose' requirements mentioned above is to enable students to develop the tools needed to be able to apply theory to practice. Approaching learning in this way could be said to be *inquiry based*, which is not to be confused with *Problem based learning* or *Project based learning* (English & Kitsantas, 2013). However, a project-based approach has been at heart since the 'Classroom laboratory' (Fyhn & Sund, 2002) projects started in the early 2000s. New discoveries have been made and new practical knowledge gained since then, and the approach to learning has shifted towards a more inquiry-based learning.

Freedom to choose and to form their own projects is offered to strengthen students' self-motivation, identity, and to foster a sense of responsibility for their own learning outcome. The students are meant to learn how to approach and solve real life challenges that could occur in working relations when people collaborate across cultures and industries and organisations.

The first exam project was based on a fictitious collaboration with a Chinese or Japanese company. Their task was to develop a product or to design a technical solution that made the Norwegian students need the expertise from foreign engineers or software developers. The requirement was that the product had to be innovative and possess a function that was needed in Norway or in the country from which their make-believe partners came from. The project was presented plenary as an oral exam. One of the main learning outcomes of such an exam set-up is to create a space where students can share their experiences working with their projects. Moreover, giving students the opportunity to present in front of the other students and teachers in the course is considered as something out of the ordinary and thereby holds a 'ritual' character, by standing out. Students learning outcome is always at the centre, and the obstacles that occur along the way may facilitate for additional learning. The students could choose to present face-to-face or by using VR headsets and do their presentation in a virtual room.

One obstacle several groups encountered was to figure out how to get different skills and various people to work well together (co-operate). The aim was that the students would manage to identify possible barriers as well as to identify similar, concrete, solutions for these make-believe barriers. The students had to follow the syllabus and line out cultural peculiarities that could challenge or problematise the make-believe collaboration in one of the countries. For example, one group participated in a make-believe co-operation with engineers in China where they were in need for Chinese expertise to finalise their product “Sound based covid-19 self-test”. During their presentation they explained to the audience how they continually encountered cultural / social challenges with their Chinese partners. To identify different challenges, they actively used a model from one of the syllabus texts. They arranged the different challenges by navigating through a three-folded model. In other words, they demonstrated through the use of this model that they managed to put theory into practice.

Another group chose to present their project dramaturgically. They had established a fictitious collaboration with a Japanese company that was to help them build a house without using nails in Norway. As with the other groups, this group also used the same model to explain and identify the challenges that occurred in the make-believe collaboration. Instead of explaining how these processes unfolded, the group presented their work through a theatrical play and played the roles of the different partners.

Even though some groups initially wanted to make a product to “sell” in the other country, their process of identifying cultural peculiarities made them understand that it would be easier for them to develop a product or solution for Norwegian customers, because their cultural expertise lies within their own culture. During this process the students had to identify their own expertise to bring it into their fictitious collaboration. The groups demonstrated great independence and creativity when they worked on this assignment. In the beginning almost all students in the course struggled a bit with deciding on what syllabus literature to use in their projects and how to use it. Nevertheless, after just a couple of seminars, all groups seemed to have a good idea of what to use and how to use it. Teaching assistant and student researcher played an important part in guiding the students through their project development. In seminars, the groups presented their ideas and elaborated on their process to the teaching assistants, and through discussion with the assistants the students gained new perspectives and discoveries to continue forward with their projects.

As described in chapter 2, the main method in anthropology is participant observation, and thereby both teacher and teaching assistants used the seminar time to walk around in the classroom, observing and talking *with* students. Whilst walking around and talking with the students during their work it became apparent to us that they were exploring more and more of the course literature to solve their projects. They used the literature to ‘make up’ challenges they meet with their make-believe partners. When they encountered a fictive problem they conferred with the literature, and if the literature did not solve their problem, they simply changed the challenge to fit into the literature. In the context of learning, this is an important implication; the student projects were to be their ‘path’ to start a dialogue

with the syllabus. In other words, it is through the process of developing their projects and encountering different situations that they discovered were to find theoretical solutions by working their way through the literature.

During the first oral exam all groups had solved their assignment. They applied literature on Japanese and Chinese business culture to solve their projects. And several of the groups had through the process managed to identify Norwegian peculiarities in working relations as well, which, perhaps, it the most challenging part of the learning process.

The second assignment began the week following the first exam. For the second assignment, the students collaborated with real partners from West University of Timisoara (WUT) in Romania, rather than make-believe partners. The purpose of this project was to take the students learning outcome to another level, by giving them an opportunity to solve a real-life challenge. Moreover, one of the goals was to improve the students cultural understanding and to work on their cultural sensitivity by collaborating with students from others disciplines and from another country, and which was studying on a bachelor's level. Through this project cultural peculiarities and barriers were concretised and the students had to demonstrate their ability to create and uphold a process that ultimately resulted in a solution (either in the form of a prototype societal service or a form of technology) that could have a positive impact on the lives of vulnerable groups in the city of Timisoara. The groups were evaluated on how skilled they were at utilising the human resources in the most fruitful way in the collaboration. In other words, they were evaluated on their ability to demonstrate their collaboration skill across disciplines, and across cultural and geographical distance. Moreover, their project was to be realistic, meaning that the solution plausibly *could* be implemented as a real project in Timisoara. SANT3600 is a part of a research consortium with WUT called the *Classroom Laboratory* ⁵ (<https://classroomlab.uvt.ro/pages/Joint.html>).

The first student collaboration began in autumn 2020, but due to the pandemic some collaborative issues appeared. There were few Covid related restrictions in Norway at this point in time, and, besides a couple of students in quarantine on the day of the exam, the whole class was present. However, in Romania the situation was quite different, something which became a real challenge to the collaboration. Firstly, the distribution of VR headsets to the WUT students did not work out as initially planned. Instead of providing all students with a set of VR headsets, they were given one pair to share in each group. Secondly, because of the pandemic, universities and campuses were fully locked down in Romania. As a result the WUT students were not able to meet up physically with their class or their group members. Third, several of the WUT students had to take up employment to help provide their families as their parents had lost parts of, or their whole, income. The next term (Autumn 2021, upon which this chapter is mainly based) teachers and students from both countries had, because of the pandemic, become familiar with working digitally and over distance. The students came across as being

⁵ Classroom Laboratory, Project No 18-COP-0016, EEA Grants 2014-2021.

inspired and motivated by working in a *real* (not a make-believe) project and to be working with a group of students from another country. The reference group in this course reported midterm that “[We] think it is genius how the subject is set up for learning through lectures and reading on your own, and moreover, the practice where we can use what we have learned directly,” referring specifically to the WUT-NTNU collaboration. Whilst they were working on their project, another group shared that the learning outcome from this course, having to collaborate and to solve social barriers and identify cultural peculiarities along the way, would benefit them in future work relations.

After the groups were put together, we discovered that the groups were too big to manage properly. The NTNU groups were between four to six students and the WUT groups was approximately between six and ten. Several of the NTNU groups explained that their WUT-group usually had one student doing all the talking, whilst the others were quiet, or in some cases, completely absent. Based on experiences from autumn 2020 where the students did not get a chance to present themselves to each other before the collaboration, NTNU and WUT teachers moved this to the next term (autumn 2021). The first day of the WUT-NTNU collaboration, all involved students and teachers meet digitally over *Google Meet* to present themselves to each other through the screen. The NTNU-WUT groups never met physically through the entire duration of the project. Most groups meet through screens and chat through using various digital platforms such as *Google Meet*, *Zoom*, *WhatsApp* and *Facebook Messenger* (see chapter 7). The NTNU students presented themselves and their field of study, while the WUT groups had ‘gone the extra mile’ and made visual presentations. Several of the NTNU students expressed that this caused frustration on their behalf, making them feel like they were introduced to a group project where the one group was prepared and the other not. After students and teachers had presented themselves to each other the groups were told to establish contact on their own with their assigned groups from the other university. This is an experience we should take with us when planning for the autumn 2022 term.

Walking around in the classroom talking with the students shared with us that they were unsure on how to get in contact and who was supposed to initiate it – NTNU or WUT students? Before the *Google Meet* meeting ended, one of the Romanian teachers shared a document which included names, e-mail and *WhatsApp* information to all students, making it easier for them to know where and how to contact each other. The NTNU students were uncertain whether they should be the ones to establish contact, or if they should wait for the WUT students to reach out first. Both teachers and teaching assistants encouraged the NTNU students to approach their WUT partners and to take ‘leadership’ in their groups to get things moving. At the end of the day, we observed that all groups were chatting with their new partners over a video call (google meet or zoom).

Early on in the project, several of the NTNU groups shared their frustration over the collaboration. One thing particularly stood out: the NTNU students (not all of them) wanted to work on the project on weekdays between eight am and four pm, whilst the WUT students expressed that they

wanted to work in the afternoons and at night-time, as well as in the weekends⁶. Other factors, like having different time-schedules at the universities and organisational barriers, played a role in this as well. For example, the students at NTNU and WUT course is spread around faculties and departments. The NTNU groups expressed their frustration over the lack of engagement by their WUT partners. At some point the frustration was so intense that one group asked if they could do the project on their own instead. Similarly, the first semester (autumn 2020) students were distressed and feared that they would end up doing the whole project by themselves, considering the lacking response from their WUT partners. Other groups clearly did not know how to solve the problems that occurred and did not always appear pleased when we told them to find solutions on their own. As a part of their learning outcome, students are encouraged to take responsibility for their own learning, and that includes identifying and solving problems they encounter in the process.

Further on, more challenges seemed to flourish in the groups. The VR group explained to teaching assistants that the meetings between them and their WUT partners had gone well, and that after these meetings they were positive towards the process, which again could prompt skills of ‘life-long-learners’ to develop. However, as they explained, between the meetings, several of the agreed upon tasks were left undone. This made the mentioned VR group question whether they could continue their project without their WUT partners. As some of the NTNU groups told us, in meetings with their WUT partners, assignments had been agreed upon and delegated between groups and between group members. However, the NTNU students experienced that nothing was done between the meetings from the WUT side. The NTNU students therefore felt that the work stagnated time after time, increasing frustration. Providing the groups with a detailed framework for the process would probably have made the collaboration more efficient and easier to manage. However, that would have decreased their ability to acquire the level of cultural understanding and collaboration skills that this course intends to teach the students. The initial idea is to give the students the acquired resources they need to handle unforeseen obstacles that may occur when they work with people from other cultures, with other tasks and other approaches. Even though we had encouraged the Norwegian students to take charge in their projects, we witnessed that the NTNU students tended to let their WUT partners decide, to make the project easier to handle and finalise.

Whilst wandering around in the classroom chatting with the students, we observed that the problem with the syllabus literature was even worse in this project than the first. Several of the students asked explicit about which theory or model was the right one to use in their project. One student even said something about it being easier to alter make-believe situations to fit into theory, rather than analysing actual situations *using* theory. Empirical data always prefigures theory, as we will see below in SANT1019 and SANT2020 as well.

⁶ The NTNU student all came from various disciplines within Engineering and studies on master’s level, whilst the WUT students were bachelor students studying in various fields in the social sciences.

SANT1019 - Human, technology and dialogue

In the course *Human, technology and dialogue* student freedom and responsibility to choose topics for semester assignments are strongly emphasised by the teachers. The students attending this course consisted mainly of bachelor students from social sciences and humanities. And as we learned throughout semester, many of the students came from disciplines where formal requirements are the standard, whereas in this course the requirements are specified in looser terms.

To be allowed to take the final exam in this course the students had one group-based semester assignment that had to be approved. The assignment is approved in a “ritual” presentation in front of their fellow students and teacher’s mid-term (similarly to SANT3600). As in SANT3600 and SANT2020⁷, this course emphasises students as partners, and as such puts them in charge for their own learning process. Which means that they are taken as serious explorative contributors to subject specific development, something which is at heart of the EMERGE teaching principles (cf. chapter 1). As most exams during and post pandemic, the final exam was a home exam that stretched over several days. Guiding students through their semester project and following them up in seminars was demanding in other ways than the two other courses, precisely because of the number of students taking this course.

Creating a shared space for disciplinary conversations between students, teachers and teaching assistants requires more coordination when the student group is bigger, as well as more seminars leaders and employees to coordinate⁸. Bigger student groups mean less time per student. Measures to facilitate high quality teaching activities taken by employing more student assistants – which in turn were hand-picked by the teachers – and ensuring that new student assistants were trained by assistants from the previous term. In SANT1019 there has been an emphasis on teaching and learning through group activities and group discussions. Furthermore, teaching assistants in this course and the others in this chapter could be described more as learning resources that provide processual guidance, rather than working in-depth with syllabus texts. Moreover, SANT1019 being a course with many students, it was sometimes challenging for the learning assistants to have enough time to guide each group separately in their projects. However, learning assistants and course researcher did what they could to make sure that every group had the opportunity to discuss their project in each seminar. Our experience is that if student assistants have been properly trained in the process guidance, the learning outcome for the students participating in seminars increases. The weekly lecture in this course could not slide into seminars like it did in SANT3600 and SANT2020; rather, seminars were spread throughout the work week.

⁷ In SANT3600 there is an average of 25-30 students each term, in SANT2020 there is an average between 10-20, and in SANT1019 on the contrary it is an average around 100 students.

⁸ However, it is worth to emphasis, in SANT3600 and SANT2020 the challenge is that it is usually only one teaching assistant, which make other obstacles to occur.

Seminars are, as in all courses, voluntary. However, we experienced that students' who participated in seminars formed groups easier, and their final deliveries were of higher quality than those who did not participate. Students were themselves responsible to form groups and take initiative to get started on their projects. Some managed this well, but many students expressed their frustration about it too. It was especially those students who did not participate in seminars who struggled to find a group. However, in SANT3600 this was not as challenging. We can only speculate why this is so; it could be that maturity of student's bachelor versus masters' students, or it could be caused by the pandemic. Many of the bachelor students were physically present on campus for the first time since they started at the university, and thereby not been socialised into the everyday campus life. Nevertheless, as university students they are expected to take responsibility for their own learning.

One of the main goals of handing students the freedom to choose a topic that they found interesting, and in some way part of their everyday life, was to motivate and encourage them to take responsibility for their own learning outcome. The aim was to give them first-hand experience to apply theory to practice. Moreover, the overall aim of the course was to give the students the right tools to enable them to critically analyse technological phenomena in the contemporary world, and thereby learn how they could practice basic philosophical and anthropological literature to explore new phenomena that surround them in everyday life⁹. This is a way of enabling the students to develop generic skills, not just limited to course specific tasks, but skills to utilise in their future work life. This perspective is closely connected to the notion of 'life-long learning'.

At the beginning of the semester, about three weeks before the deadline of their presentations, several of the students reported that they were not pleased with the open design of the project – nor with how the syllabus was organised. Several expressed that they wanted a *how-to* list when developing their project, and a *where-to-find* specific literature to explore the specific phenomenon they wanted to examine.

Learning assistants and seminar leaders help by guiding the groups throughout the process, from the phase of finding a phenomenon, to developing an argument, and finding relevant literature. At the beginning and all the way throughout the mid-term, the general feedback from students in the seminars were mostly negative. This had to do with the confusion of what literature to use for which phenomenon, and the loose requirements of the semester task. However, when the deadline for the group projects approached¹⁰, the majority of students seemed less frustrated and more motivated to finalise their projects. During this process we could see that student motivation increased, alongside their academic understanding. By talking to the students about the observed changes, it also became evident that their understanding of the syllabus grew. Now they seemed to understand why and how theorists

⁹ An overall aim is to make the students competent in critical thinking. Meaning, that they are able to discover how they could make use of philosophical and anthropological literature to shed light over technological phenomena in the contemporary world.

¹⁰ It is difficult to say something about students not participating in seminars or students contacting seminar leaders or teachers.

and philosophers from the mid 20th century could shed light on technological phenomena in the contemporary world. They now managed to participate in a dialogue with the literature and the empirical phenomena they were exploring. This seemed to energise the students (participating more in group and class discussions) and to motivate groups to put in the extra work to finalise their product (which in most cases was the production of a podcast). For example, one group made a podcast about the digital platform *Instagram*. To explore the way in which people presents themselves on the platform, to understand this empirical phenomenon the students used the Goffmanian notion of ‘frontstage-backstage’ from the late 1950’s. Throughout the semester, students shifted from a state of frustration to being overwhelmingly motivated. It is however worth mentioning that frustration and motivation are not binary oppositions. Rather, for many students, frustration can be a motivating factor as well.

The students were encouraged to use situations from their own life to throw light on how technology is an intertwined part of their social environment and everyday life. In this way, the student does not only bring academia out into the world, but also, they bring the ‘real’-world into academia. The students were free to choose what kind of medium they wanted to present their projects through, as long as it was group based, and presented it either visually or verbally. As we describe more closely in *chapter 8*, technological tools were extensively used in student presentations, and most of the groups chose to present their projects by producing a podcast. The students were themselves responsible for recording (with the opportunity for professional help offered by one of the scientific assistants employed in EMERGE), writing manuscript, and to present their final product for fellow students, teachers and learning assistants.

Dialogical lecture

Lectures were normally given in two-hour bulks once a week. However, in this lecture the teacher gave a one-hour lecture, and in the second hour he invited one of the course researchers to participate in an informal chat around the topic in front of the class. This resulted in a lecture where the teacher and research assistant enthusiastically discussed different perspectives from the previous hour.

This lecture was on one of the more difficult themes of the course, and the teacher improvised and gave a rather unusual lecture. The verbal feedback from students after class, in seminars and the written in the reference group report, highlights this lecture especially. Students were overwhelmingly pleased with the form, and many reported this as being extremely encouraging and a state-of-the-art lecture. Our experience of this lecture was that students became unusually active in posing question and offering opinions, discussing the lecture topics amongst themselves equally as much as with the teacher and research assistant. One learning assistant (student researcher) was present to observe and to take notes. The student group in this course had never been so active before, and several of the students present did not only pose interesting and hard questions, but some, and especially one student, challenged the teacher’s explanation of things. At some point the student even expressed that he questioned the social

sciences' ability to say anything about anything, explaining that he felt that the teacher was saying "this is so, because I say it is". Taking into consideration the form and openness of the lecture, the student felt comfortable enough to question not only the social sciences as fact-based knowledge, but also the teacher themselves. Ingold (2018) emphasis that it is in the *coming together-ness* that we can create a shared space of meaning, and in such we can "... make meaning together (Ingold, 2018, p.4)." Furthermore, by trying to invite students in as active partners in learning, it not only provided an opportunity for increased student motivation, but also, increased their learning outcome and generic skills (Meld. St. 16, 2016-2017) for the future as well.

In retrospect, if students do not feel comfortable in posing hard questions in lectures, disciplinary and course specific (basic) misunderstanding would probably not be discovered and solved, and at worst translate into a failed exam for one or several of the students. By taking students seriously as explorative partners, we may develop more future oriented courses and developed theoretical perspectives from a student point of view. During this dialogical lecture, it became more evident than any other lectures that students that actively participate in academic chatter are more than 'listeners' of knowledge; they are active explorers that understand and develop new perspectives in the course as well. This is what Fyhn (2009) discusses regarding cross-disciplinary collaboration. Namely, that there is a need to create a shared space for understanding, a shared *dialogical space* (Fyhn 2009), because it is through understanding each other that we can create together.

SANT2020 – Anthropology of technology

In the course *Anthropology of technology*, students are encouraged to explore technological phenomena in various contexts (Røyrvik *et. al.*, 2019a; Røyrvik *et. al.*, 2019b) throughout the semester. Anthropology of technology "could be understood as an *empirical philosophy*" (own translation, Røyrvik *et. al.*, 2019b: vii) and the course is designed to offer students an introduction to the philosophy of technology from an anthropological point of view. Moreover, it is considered a major investment to establish the course as a focus area within the discipline. Anthropology of technology is a discipline-oriented course that places great emphasis on the exploration of technological phenomena in the contemporary world through anthropological and philosophical perspectives. There is also an emphasis to provide rooms that encourage discipline-oriented discussions. When the course was launched in the autumn of 2018, most of the lectures and seminars were located in one of the International Space Station's control rooms, at the Centre for Interdisciplinary Research in Space (CIRiS), NTNU Samfunnsforskning. This was not mainly to stimulate for disciplinary discussion, but also, from a learning perspective, to let the students come close to, and sit down in-between, the technology-dense environment. Allowing students to come close to and participate in such environments does not only promote exclusivity, but it also encourage motivation for learning and academic curiosity. The idea is, being in an environment which has unusual facilities for a university course, the students may find

themselves in a position where disciplinary perspectives on technology could unfold naturally. Such an environment and teaching setting does not only bring ‘real-life’ up close; it brings the world of research up close too.

Throughout the term, students immerse themselves in topics or fields they find interesting, and thereby carry out an anthropological study in relation to technology. Similarly, with SANT3600 and SANT1019, this course also emphasis student freedom and taking responsibility for their own learning outcome. Contrary to the other two courses, the student’s in SANT2020 carry out their own anthropological study, and have significant freedom to choose and carry the responsibility to get their work finalised.

This course, as with SANT3600, lectures and seminars are scheduled on the same day once a week, and slide into each other. This course emphasises ontological, philosophical and anthropological perspectives. Moreover, presenting students with philosophical literature at an intermediate level is unusual in social anthropology, as well as in the social sciences in general, and this is challenging for a lot of the students.

The activities in this course are three folded. The students are to conduct a mini-fieldwork on their own. This means that they are encouraged by the teachers to choose a topic for their fieldwork, reflect over how to conduct it, where to conduct it, and how to enter into a dialectical dialogue with the literature, as well as practice how to verbally communicate their ideas to the class and to the teachers. This is a process that invites the student(s) not only into the discipline, but also into the academic sphere of research. In many ways this could be considered as more than students as partners. Seeing students as partners in explorative activities signifies that we also recognise them as active contributors in research activities and thereby as ‘novice researchers’. As a part of the student’s final grade in this course they have an oral presentation of their project – about two months into the term – and this presentation is a part of a folder submission alongside an academic paper based on their fieldwork. The article makes up 50 percentage of their final grade. Their final exam is a school exam. Nevertheless, due to Covid-19, the exam in SANT1019 has been a home exam in the last couple of years. The home exam in SANT2020 was designed to be a school exam where the exam opens at nine am and closes one pm – in other words, the time frame is the same as if they had conducted the exam in NTNU’s exam facilities. The last 50 percentage of their final grade is based on this exam. Experiences from student progression in this course is two-folded. On the one hand, students that are interested in participating in academic chatter and showing up to every lecture, often improve their learning outcome through the process of working on their article. In turn, these students show in the final exam that they have matured in the discipline, and thereby their understanding and final result showcases great progression. Students who are not so interested in their work with the article do not show the same level of academic growth during the term.

The idea of asking students to write an academic article is to facilitate them in making scientific arguments and thereby help them learn how to develop their argumentation through discussion with

others (fellow students and teacher). Our observation is that active and self-regulating students mature enormously throughout the term, and their final exam result clearly reflect this. Moreover, from the beginning (autumn 2018) this course has evoked inquisitiveness in students, and several of them have continued exploring anthropological perspectives on technology in their master's degrees. One of the students of the 2018 term submitted the first master thesis on this subject in the autumn of 2021, and several master students are currently following suit. Giving students this kind of freedom at an intermediate level is demanding as it pressures the students to regulate their own learning process and demands self-discipline and academic maturity. In other words, the students are fully responsible for their own learning outcome. The students are as such reckoned as serious academic explorers and considered as partners in exploring the anthropology of technology. Their final written ethnography is peer reviewed, and these articles are formally published as an article in a student anthology.¹¹ The articles are peer reviewed by the teacher and course researcher, and they take on the work of putting together/uniting the anthology. They make sure that everything from editorial work, the preface and printing is done accordingly to academic standards. Taking the extra step to publish the anthology opens the opportunity for future students to be inspired by previous student projects. Moreover, when the book is published, future students can use the articles as references in their own assignments, as supplementary literature in this course or other courses they are taking. The anthology is published in a book launch event where other students, academic staff and others who may be interested are invited to come and listen to students talk about their fieldworks and to discuss their subjects further. The whole event could be described as a social "ritual", where the teacher and research assistant take it upon themselves to "initiate and anoint a newcomer to the discipline" (Van Maanen, 1988, p. 14). At the event, students and teachers, and others who may come to listen-in, share a meal together after the presentations, and the whole night is set up to be a good and social experience for every participant.

One of the endeavours of this course (as in SANT1019) is to 'break' with the formal boundary we often witness in academia between students and teachers. Students are treated as partners in discovering new perspectives and theoretical understandings of the course literature. Moreover, students are treated as exploring novice anthropologists that are given both freedom and credence to carry out their own fieldwork. It is necessary to note that this is an important part of the learning philosophy. By creating a social event like this, the aim is to encourage disciplinary discussions to unfold outside of campus.

Several times during the semester students and teachers meet up at a local pub to discuss topics and perspectives in a more relaxed environment than what campus rooms often yield. Furthermore, other rooms are rented for lectures and seminars to break with the everyday grind of being in a 'traditional' classroom. Often, the teacher offers the students something to eat as well. In anthropology we have always emphasised the importance of eating together with our informants. It is a well-

¹¹ It is voluntary for the students to participate and publish in the anthology.

established ‘fact’ that sharing a meal together is considered less formal, and thereby people tend to loosen up. This course, as well as the others, is part of several different research projects, so the act of renting rooms and covering other additional costs is covered through project funds. These research projects focus on exploring different aspects of the anthropology of technology in some way or another. As such, the link between research and teaching is ever present. This also gives broader opportunities for the teacher to facilitate off-the-grind teaching experiences for students enrolled in the course.

The student anthology is implemented in the next term as a part of the course syllabus. Student work is as such not only to assist students through the course nor to create scales of x number of students to run through the course, but instead student work is considered an actual contribution to theoretical development and course development. As in SANT1019 the focus is placed on a specific empirical phenomenon by the students own choosing, and learning takes place by active use of theory to explore and explain these phenomena.

Summary

Throughout this chapter we have built on and described our experiences of classroom experiments in three separate courses in social anthropology. By following the EMERGE principles of learning, we describe how learning take place and is approached from a holistic perspective. In this way we consider the whole learning context, which involves the student-teacher relation, teaching rooms, and the students’ freedom to explore with the literature. We especially emphasis in Ingold’s (2018) terms a *together-ness* between students as teachers. As we have seen in SANT3600 and SANT2020, the teachers and student employees make an extra effort to facilitate a shared disciplinary *dialogical space* (Fyhn, 2009) between students and teachers. This space is emphasised in SANT1019 as well, but because of the number of students some extra measures are implemented to give students enough processual guidance in their projects. This shared space is at heart in the EMERGE learning philosophy, and the initial idea is that such a measure could offer the students a learning environment that motivates students to take responsibility for their own learning outcome. It is showcased how a holistic approach towards the whole learning context is intertwined in all courses, and that one of the main objectives is to make the students the focal point.

As part of the learning philosophy, we perceive students as partners in academic discoveries. This is enabled in all courses by giving students *open-ended* assignments and giving them the responsibility to solve their projects accordingly. Our experience is that students create deliverables that are motivating to work with and which appear valuable beyond classroom walls as well. Several students (as mentioned above) have confirmed this. Moreover, several of the students who felt frustration in the beginning of the projects ended up both enthusiastic and motivated about the projects too. This is closely related to the third learning principle in EMERGE, *Exploratory* activities. By giving students the freedom and reliance to develop their own projects they participate in exploration of

contemporary phenomenon's and with the subject literature. As a result, they immersed themselves in 'real-life' phenomena / context and thereby increased their learning outcome with generic skills that go beyond disciplinary specific knowledge. By taking students seriously as partners in explorative activities, they become more than 'listeners' of knowledge, transmitted from the teacher to the student (Ingold 2018), more importantly they become contributors to discovering new insights in theory, but also contributes to course development. In this, students are no longer seen as mere 'listeners' or 'transmitters' of knowledge given to them by the teacher. Rather, students are perceived as active partners in the learning situation and are thereby given great freedom and responsibility in their own learning process.

By following the experimental approach of the EMERGE philosophy, our experience is that students overall learning outcome could increase when we approach the learning context from a holistic point of view, i.e.g., we do not learn *from* or *to*, we learn *with* – *we learn together*. Exploring ways of approaching students differently, and drawing on experiences from previous terms, student feedback and course reports, these approaches seem to evoke positive experiences for both teachers and students. Furthermore, their academic results at the end of the term reflects this as well.

Group based learning, and processual guidance from student researcher, teaching assistants and seminar leaders have been an important teaching tool in these courses as well.

Chapter 5 - Geographical education at NTNU; reflections upon practices, possibilities, and obstacles

Jakob B. Cyvin

Introduction

Learning activities supported by digital tools, fieldwork, active inquiry-based learning and international student cooperation is essential in geographical education. This chapter will elaborate about some theoretical background about why these perspectives are important and describe how courses at the Department of Geography are trying to develop in accordance with these principles of learning.

Digital tools

Geographical education includes familiarising oneself with different software's, hardware's, and measurement technics. How teaching and learning is carried out can be discussed and the practices can always be improved. Together with technology, fieldwork is one of the major activities within the discipline of geography. There are many ways of conducting fieldwork with students; from old fashioned outside lecturing and “excursions” to what could be defined as didactical more modern inquiry-based fieldwork where students themselves are seen as explorers and knowledge developers rather than passive listeners. Inspired by publications by Remmen & Frøyland (2014; 2015; 2017) among others, in multiple courses at the department, during the recent years developed practices for focus, not only on field courses in itself, but also thorough and student active pre- and post.-work. Implementing elements of virtual fieldwork is motivated by possibilities for expanded and active pre, or post, fieldwork or as a way of concretising content knowledge (Nielsen & Brandt, 2018; Vinje, 2022; Caliskan, 2011). Virtual reality is also a means to visit places that would be beyond reach due to high cost, safety, long distance travels, or crises like Covid-19. The use of geographical information systems and geovisualisation tools has until now been focused on, but recently the use of virtual reality has entered the department corridors as a tool for development of immersive field related teaching and learning.

In higher education, we might think that individual customised learning is not in demand, instead being something sought for the lower levels of our school system. Nevertheless, these principles are also grounded in the political foundation of higher education (Meld. St. 16, 2016–2017, p. 21), and we should take them seriously. Diversified learning situations and assessment is one of the tools which

will enable this. In the course *Earth's Natural Environment* (GEOG1014), one of the exam deliveries is the creation of a StoryMap (a map-based web-page tool) where the students are asked to create what could be described as a multimodal text. This task enables students with different preferences for communication and knowledge production the possibility to perform at their highest level, even if they are better in e.g., creation of maps or drawing of models rather than producing academic text. This diversifies the exam deliveries and hopefully contributes to customised learning and assessment.

Fieldwork

Building on previously mentioned fieldwork activities hands-on learning in geography is often referred to as outside activities, and more often solely as fieldwork. There are within this broad term multiple more specifically defined terms describing how students might learn while working outside; from field excursions, field research and field study, to project work and discovery fieldwork (Fuller, *et al.*, 2006; Oost *et al.*, 2009). The degree of student involvement and possibility for self-exploration is vital, and the model of involvement described by Oost (2009) is a great framework both for assessing teaching and learning activities and planning of student activities. Do we want our students to be knowledge consumers – provided knowledge by an external actor – or active inquiry-learner – explorers and knowledge producers (*fig. VI*). Fieldwork is expensive, and the learning outcome should therefore be maximised. The considerations about how to build the fieldwork activities are therefore important, and the considerations might be coupled with *Blooms taxonomy* (Bloom, 1956). At the Department of Geography, there are in multiple courses chosen to increase the level of activity while preparing and conducting fieldwork, where the role of the lecturer is also expanded out of the role as knowledge providers; trying to guide the students upwards in the learning pyramid of Bloom. The model of Oost 2009 (Figure xx) sketches how fieldwork might be placed in different categories based on the role of the teacher and the student, and it might be a good tool while planning and evaluating these learning situations.

Field-based learning is an approach to give students the ability to watch space and landscapes at the same time as learning about, and interpret history, geomorphology and social structures. These elements are contributing to form the so called physical space. Building on theoretical approaches by Remmen & Frøyland (2014; 2015; 2017), it is vital to see fieldwork as one out of the multiple affiliated activities where the work conducted as preparation and after-work is important elements to gain the whole possible learning outcome from the field activity. Fieldwork is not a part of all geographical courses and other approaches to learning are of course important within the education of future geographers. Again, looking to the model of Oost (2009), *Fig. VI*, is it also vital to actively decide what kind of fieldwork that is appreciated, and appropriate for the specific course and learning situation(s).

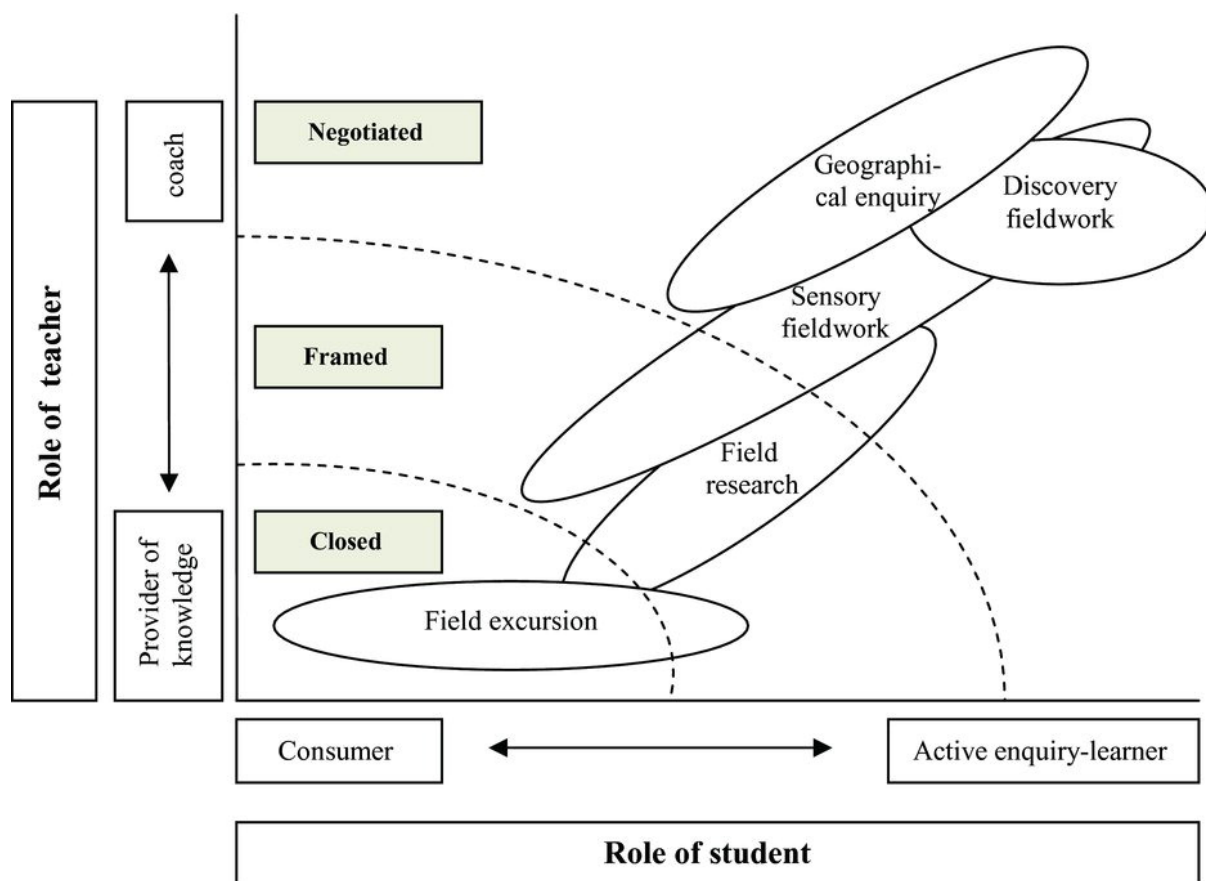


Fig. VI

"Enquiry driven field work". Figure based on Caton, [2006](#); Foskett, [1997](#); Job et al., [1999](#); Roberts, [2003](#), modified by Oost et al., (2009).

The projects Digigeo, Educhange, Educhange 2.0, VR-Learn and field courses in GEOG1014 and *Introduction to Human Geography* (GEOG1011) are examples of courses where fieldwork and preparation/post-work could be analysed and developed towards even more student centred and activating learning, using the model of Oost (2009) as a model to create awareness around the course and fieldwork structure. The structure of these courses are further elaborated in chapter 10.

Inquiry based learning and international learning

The activating learning method which is explored within the EduChange projects asks the students to conduct "research" by themselves, presenting their results as a multimodal text: research-based poster: Brew (1988, p. 2) states that "*Research is learning. [...]*".

Conducting research in pairs might prepare students for the academic reasoning. Harsono, Rosanti, & Seman (2018) found that this activity increased the learning outcomes for 35 senior high

school students in Indonesia, with a control group of 36 students learning through attending lectures. Students created posters following the 4D model (Thiagarajan, 1974), defining, designing, developing, and dissemination. The same trend is found by Primavera (2017), Larasati & Harsono (2017), and Lynch (2017). The feedback from the students taking the courses EduChange and EducChange 2.0 is continuously extremely positive towards this way of learning; of flipping the classroom and asking the students to conduct their “research” in groups at home while presenting and discussing their posters during on-site meetings in an international student environment.

Exploration of innovative learning methods in an international learning environment (traveling with the students outside Norway) as a mean for learning is one of the main activities within EduChange, EduChange 2.0 and Digigeo. We are here proposing to use the outcome of these projects (www.educhange.net;) as inspiration for further development of the geography program at NTNU. Special emphasise should be drawn to educate students as future agents of change within stubborn or so-called wicked problems.

These three paths of learning – active inquiry-based fieldwork, international student cooperation and learning activities supported by digital tools – will be further developed at the Department of Geography in close cooperation with students and with support from the EMERGE project. Expanding the toolbox for learning activities is vital for a diversified and customised education suitable for all students enrolled.

Great diversity internally at the department regarding themes, teaching methods, course organisation, and the use of digital and analogues tools is a problem, and for the students diversified learning through their studies is perceived as something positive. At the same time, it is challenging to develop, evaluate, and continually use digital tools and learning practices while technology concurrently develops in terms of both software and hardware. This issue also makes it difficult to correctly evaluate and discuss the use and development of teaching practices at the department regarding emerging technologies. This is in itself a motivating conclusion for the development and contribution to EMERGE, creating a framework and infrastructure for common transdisciplinary learning, evaluation and support regarding the use of emerging technologies for teaching and learning. Other departments at NTNU are dealing with similar learning objectives and research themes as the Department of Geography are. Closer cooperation will be positive for academic staff as well as students.

Chapter 6 - BLINK learning hub

Marte Nubdal and Karen Engen Økland

Introduction

BLINK learning hub is a dynamic, network-based unit, providing teaching and learning support for educators at all levels of experience and technical proficiency at the faculties of Humanities (HF) and Social and Educational Sciences (SU) at NTNU. Established in 2019, the concept of a “learning hub” itself represents an innovative approach to forming a support environment. BLINK takes an active role as facilitator for building supporting environments for educators interested in developing innovative education projects. Its staff offers practical support for purposeful use of technology, building on practical experience to develop a user-focused service. Acting as an advisor, a “critical friend”, and sparring partner for educators, is central to BLINK’s work. Starting at initiatives and ideas from the academic communities, the learning hub seeks to identify and address central problems and risk areas that arise from innovative activity. Matching groups that are working with similar or related areas – such as partners in EMERGE and related units – is an important part of this work.

This chapter will outline the BLINK perspective on EMERGE’s holistic approach to activities and experiments, and what role the learning hub has played so far in EMERGE. The learning hub has taken on many roles in its collaboration with EMERGE, including acting as a facilitator, sparring partner, and networking agent. BLINK’s mandate to support departments, projects and processes stretching across NTNU means the learning hub has a perspective spanning outside EMERGE. This helps with strategic positioning as well as discovering blind spots while operating in a complex context. At the same time, working closely with projects like EMERGE offers valuable direction for developing a “learning hub”, thereby benefiting the organisation at large and contributing to strategic ambitions for digitalisation.

BLINK as a facilitator for experimental and innovative activities

In its collaboration with EMERGE, BLINK has tried to take on a facilitator role for the project’s experimental and innovative activities. Effectively, this means navigating any practical, formal, or organisational obstacles in realizing EMERGE’s suggested activities. BLINK has, among other things, supported purchase of technological equipment for several of EMERGE’s partners, identified funding opportunities, navigated organisational guidelines and legal requirements, and contributed to building

a solid support environment through suggesting viable partners or competence clusters useful to the project staff.

Innovation in teaching and learning can in some cases mean using new and exciting technology, as EMERGE has done with VR and related technologies. Simultaneously, BLINK finds that innovation in educational practice frequently means using familiar tech in new ways to develop different teaching practices or support better learning processes. These changes of practice are innovative in the sense that technology is not simply seen as something new, or something useful, but something that is utilised in a practical setting (Meld. St. 30, 2019-2020). In a broad sense, these aspects are all important in EMERGE as the project both challenges old practices and identifies and explores new uses of technology (Hernes, 2010; Sørensen, 2006). What is familiar technological practice to some partners can be new and unfamiliar to others. EMERGE's experimental approach builds the experience and knowledge that are necessary conditions for meeting open problems and creating change (Oddane, 2017).

Implementing new practices often uncovers new problems. EMERGE is no exception, generating problems and issues that are just as important as their solutions when it comes to generating change in a larger perspective. Many technical solutions are developed for the private market and are simply not enterprise ready in terms of practical use in teaching and learning on a larger scale. To handle such problems, it is necessary to interpret what the technology means, understand to what purpose we want to use the technology, and simultaneously develop pragmatic solutions that work in the local and organisational context (Sørensen, 2006). One of these problems has been EMERGE's use of VR technology and software within the changing legal framework through GDPR. While some formal obstacles and frames can be avoided or handled, others require large-scale structural and organisational changes. It is therefore crucial to involve a broader selection of relevant organisation parties in this work. The effort required may seem excessive or simply be outside the scope or capacity of a single project or experiment. BLINK and its extended network facilitate access to capacity and competence available in the organisation and elsewhere. In turn, EMERGE helps BLINK fulfil its mandate to support and develop projects that are both of excellent academic quality and (hopefully) more sustainable in the organisational context, as well as to contribute to organisational development.

Digitalisation and the practical use of digital technologies is an explicit goal for all HE institutions in Norway (Kunnskapsdepartementet, 2017; 2021) as well as the Norwegian public sector as a whole (KMD, 2019). Digital competencies for students are viewed as central in building relevant competencies for a future work life (Kunnskapsdepartementet, 2021). EMERGE is one way of operationalising and translating the strategic goals into practice. To create a lasting effect for both the EMERGE participants and other interested parties, experiences need to be shared in a larger context. BLINK actualises insights and experiences from EMERGE through connecting relevant projects and clusters to EMERGE faculty and support units in a larger network. The learning hub also contributes by spreading use cases from EMERGE through relevant forums and communication channels, spanning

academic and administrative staff, student bodies and other support units. The goal for BLINK is to contribute to open science and education through the sharing of experiences and new possibilities. In this way, the learning hub aims to help build a culture where valuable lessons and experiences are shared openly, rather than kept within the local context where they tend to be forgotten once project funding runs out.

In order to contribute to a change on a larger scale, the organisation needs to be capable of supporting innovative activities. Support units, administrative staff and faculties (evt. the faculty) need to develop an understanding for the range of challenges facing innovative projects, and the competencies required to facilitate innovative, open-ended and flexible processes in a fluid context (Carlsen, Clegg & Gjersvik, 2012; Hernes, 2016). What is required needs to be defined through interaction and negotiation between the involved parties to balance the requirements and goals of invested groups and the organisation at large. Experience dictates that this balance is notoriously difficult to predefine and needs to evolve over time. The relationship between EMERGE and BLINK is a good example of such a collaboration that can be fruitful for both parties.

BLINK as a sparring partner

One of the ways in which BLINK serves projects like EMERGE is through a role of being a sparring partner. This entails providing a space to discuss ideas, thoughts, or challenges that can be further concretised through dialogue, both for EMERGE and other projects. This helps develop concepts or problems to a point where they can be acted upon and discover how faults and problems means that plans or concepts need to be changed. BLINK is a demand-based service in that the help and support offered by the learning hub is dictated by its users. This is in part due to the complexity of the organisation; different departments and fields relate to teaching and learning through differing approaches, which provides a large variation in needs towards teaching and learning support. Different groups of users also supply different impulses to the learning hub, in turn shaping what the hub has to offer other users. This constant exchange of impulses provides an experience-based foundation for dialogues between the learning hub and other organisational units, making BLINK an ideal sparring partner for technology-oriented projects such as EMERGE.

In a setting in which educational technology is both exceedingly present and available, it is often difficult to discern what types of technology are beneficial to the teaching situation in question, and what is simply digitising without qualitative change or transformation (HK-dir, 2022; Letnes, 2021). It is important to recognise that there is a significant distance between first-time users in digital technology and experienced digital educators. For many, the first steps towards using technology in teaching must be small, while for others, giant leaps forward are both feasible and motivating. BLINK does not attempt to push technology upon educators with other goals and motivations, or to force a collective competence increase by reaching all educators within its related fields. Rather, the learning

hub emphasises balance between technological advance and more traditional teaching methods, and is focused on how to apply relevant technology as a tool to raise the overall quality of education. Throughout its dialogue with BLINK, EMERGE has been oriented towards the quality dimension of using technology. This has provided a basis for exploring technology within a sound pedagogical framework, both for the EMERGE partners and, through the learning hub, several other educators and projects in the two faculties. The EMERGE mindset, combined with BLINK's encouragement and support, has provided a sound framework for curiosity-driven exploration of technology within the social and educational sciences and humanities at NTNU.

Through the role as sparring partner, users of BLINK take part in shaping the learning hub's role in the organisation. BLINK has since the beginning taken an exploratory approach to what it means to be a supporting environment for teaching and learning and exists in a continuous state of adjustment towards the needs of the users. One of the current needs identified through this approach is the need for supporting process leadership for education projects. In its partnership with EMERGE, BLINK has led both short workshops and longer processes related to risk assessment, application support, and general project specification and management. The learning hub has developed and adjusted several frameworks for process and project support, many of which are based upon the Osterwalder model, used mainly in innovation and business modelling (Osterwalder & Pigneur, 2010). The purpose of these frameworks is mainly to help the user organise ideas, find simple solutions to complex problems, and identify "holes" and discrepancies in their project layout. These frameworks are also important for developing a more general capability for supporting a range of different projects and their need of support.

BLINK as a network builder

BLINK has amassed a considerable network of educators, project leaders, other support environments and adjacent professionals both within and outside the organisation. This provides the learning hub with a unique ability to connect likeminded academic environments with each other, and with relevant support units within the organisation. This allows for collective learning and development within an interdisciplinary framework that strengthens both the individual academic environments and the university at large. Several of the EMERGE partners have connected through BLINK, creating a basis for further growth independent of the learning hub.

Interdisciplinary efforts like EMERGE are likely to run into organisational and formal obstacles to collaboration, where finding solutions require networking efforts. Like many other universities across the world, NTNU is marked by the formation and perpetuation of organisational silos (Meld. St. 30, 2019-2020; NTNU, 2022). These silos exist both between faculties, between departments and even within departments, impeding interdisciplinary research and education, collaboration in large-scale projects, and sometimes even simple communication. There is a consensus that these silos are a

hindrance to operations at both ends of the scale, and many attempts have been made to break down the silos and facilitate interdisciplinarity across the organisation. While some of these attempts have been successful, many efforts are never implemented in practice. The target of breaking down silos has been dominant in BLINK's work. Internally, the learning hub exists as a partnership between different organisational units and seeks to employ teaching assistants with academically diverse backgrounds. Externally, BLINK takes an active role in connecting actors across different scientific disciplines and organisational levels. EMERGE provides BLINK with an opportunity for hands-on experience from relevant cases within a project, while BLINK aspires to promote use cases from EMERGE to challenge the contextual framework.

NTNU consists of a myriad of academic environments, administrative units, networks and support environments, where the correct pathway from a project or idea to the corresponding unit or network is not always obvious. In addition to connecting like-minded educators, BLINK attempts to help this situation through facilitating connections between different levels of the organisation. This often means acting as a guide to help identify and activate the correct specialised unit for a specific need. In this way the organisation itself is strengthened through the formation of new networks independently of departments and silos. Educators are relieved from having to spend time navigating the organisation to find the support they need. Additionally, this also relieves support environments across the organisation of the time-consuming rerouting inquiries. Due to trust-based relationships and good communication, BLINK has been able to see and anticipate the specific needs of EMERGE from the organisation. This entails connecting relevant resources at appropriate times, mapping possibilities for funding and support from the faculty and organisation at large, and identifying relevant connections in units such as the IT department, Section for teaching and learning support (SLS) and the Educational Development Unit (UniPed).

Conclusion

For BLINK, contributing to EMERGE's efforts towards a holistic approach to teaching and learning is at the core of the learning hub's very purpose and mandate. Within EMERGE, BLINK aims to help realise the academic and pedagogical visions of the project and its partners, as integrated parts of NTNU. In an organisational context we aim to connect different individuals and groups that can become relevant units for each other, and to build on resources made available through such collaboration. As there is no recipe for how to do this, the open and exploratory approach through EMERGE is a valuable contribution in sustaining and developing this work.

Summary Section II

As the EMERGE philosophy clearly state, approaching teaching from a holistic perspective is paramount when exploring objectives like ‘students as partners’, ‘explorative practices’, and approaching learning methods in new and exciting ways. It has been described throughout these chapters how all participating courses from Psychology, Social Anthropology and Geography explore using technological tools in teaching, and thereby explore an increasing student ‘hands-on’ experience with ‘real-life’ situations that they may encounter in their coming work-life. In the Department of Geography, they for example use Virtual Reality (VR) to prepare students for fieldwork. At the Department of Psychology they use VR as an interactive tool to let the students experience conflict at the workplace. In Social Anthropology the students explore with different kinds of technological tools to present their work (Podcasts) and to collaborate over distance (VR etc.). All these ‘hands-on’ practices are implemented in the different courses to increase student learning outcome that stretches beyond the classroom and discipline specific theory. The overall philosophy is to explore how to increase student motivation to learn, increase their generic skills that again can make them become ‘life-long-learners’. Despite our disciplinary differences, we have several common grounds in EMERGE’s learning principles that not only bring us together, but enables us to learn from each other’s differences to evaluate and analyse our experiments across fields. In this section we have tried to underline that the use of technology or other exploratory activities should never compromise with student’s learning outcome nor their competence development. Therefore, it has been cardinal that all our experiments are deeply grained in theoretical approaches towards teaching and learning. Exploring new ways of teaching should, as we have tried, to encourage and increase student’s motivation to become self-regulated learners.

The chapters of this section have described how the different courses in IPS, Department of Social Anthropology and Department of Geography emphasise different ways of presenting our teaching approaches. Psychology, for example, has more of a theory-oriented approach when exploring teaching methods that are close to ‘real-life’ contexts. The chapter from Geography describe how their teaching slides from theory-oriented lectures to more ‘student-centred’ active forms. In Social Anthropology we see that students are given substantial freedom to develop and finalise their projects, which also point to a ‘student-centred’ way of teaching. However, this is not to say that Psychology does not practice ‘student-centred’ ways of teaching. On the contrary, they to describe ways of teaching that is ‘student-centred’, whilst at the same time being deeply ingrained in theoretical perspectives.

Accordingly, then, our differences thus become our strengths in EMERGE. As illustrated in this section, we learn from each other’s approaches, methods, and experiences and thereby convert / adapt them into our own courses where this makes sense in our own disciplines. By doing this, we are able to evaluate and identify new contexts in the learning context, and thereby enabling us to approach

exploration of new teaching methods across disciplines and departments, and this is what makes the approach holistic.

BLINK Learning Hub has a paramount role in providing EMERGE with insights in organisational boundaries and how to solve challenges that occurs along the way. BLINK navigates EMERGE through the institutional framework at NTNU, and connects the group with relevant departments and networks of people when activities are planned and implemented.

Lastly, our common ground is to find the motivation to explore and implement experiments in the classroom. As these chapters point to, we all share the will to increase student's motivation to learn, to increase their sense of responsibility for learning, to make them more self-regulated, and in turn increase their final skillset. This we all do through, involving students as serious partners in teaching, in explorative activities and research, and by recognising them as actual contributors to course development for future terms.

Section III – Using technology as a tool in learning



Introduction

In section II we described that one of the main focuses in the EMERGE philosophy is to explore new teaching methods, and to approach the teaching and learning context from a holistic point of view. In EMERGE we explore emerging technologies in different and various ways to enhance teaching across the disciplines of Social Anthropology, Geography and Psychology. In this section we shift the focus towards on the usage of such technologies. The aim is to increase the overall learning outcome for students. Technology is understood in various ways across disciplines and in society, and the most common understanding is often instrumental. Meaning that technology is understood as a device with one or another function (Røyrvik 2012) that fulfil a desired use or goal. In EMERGE we also understand technology in different ways. We will not elaborate on our definitions of it. Instead, technology should be understood as instrumental. Nevertheless, using technology as a tool to enhance learning indicates technology as more than a device that provides a function of some kind. It indicates a tool that is positioned into a social universe – classroom – where interaction between people (students and teachers) and technology takes place, and thereby the function / usage of the tool could mean different things in the various contexts and interactions. Therefore, technology in and of itself as an instrumental device is not of interest here. Instead we focus on and explore what it offers as a tool for learning. Moreover, how technology as a tool to increase learning outcomes could contribute to improve quality in higher education.

The following chapters describe implementation of emerging technologies in teaching, and our experiences with such. One common experience that we all share is that implementation of technology in teaching is not as straightforward as one first would imagine. We will see that implementing technology in teaching (as we also have discussed in chapter 2) necessarily means running into obstacles. These barriers would, perhaps, not have been identified unless someone tried to carry out such experiments. As such, the experiences have shown us that we need to use more resources on identifying and solving barriers that have to do with ‘time-constraints’, ‘user-friendliness’, organisational and bureaucratic frameworks, administration, resources and economy.

Chapter 7 - Using technology as tools for learning in social anthropology

Alexander Berntsen

Introduction

Technology usage is essentially a specific instance of a classroom experiment. As such, this chapter presents first how the courses in social anthropology scrutinise technological tools according to the EMERGE philosophy, and then the specific technology usage, course by course. Neither in the driver's seat, nor tacked on as an afterthought, technological tools must find their place in service of a course's learning outcome. This section illustrates how necessary it is to carefully select tools and meticulously evaluate their usage both throughout and after a course. Closely involving students proves to be a key part of integrating technological tools successfully, and this involvement goes hand in hand with the EMERGE philosophy of learning through discovery. Some additional technological usage has been motivated by a desire to do better than the minimal requirements for lecturing under Covid restrictions, something which is also explained here.

All the courses in social anthropology that are a part of EMERGE use technological tools in some shape or form that goes beyond the expected and usual use of such tools at NTNU¹². All three are detailed in the *Implementation* section. But first, this *Introduction* presents the general approach and connection to EMERGE's philosophy at large. The *Conclusion* sums up both the approach to, and implementation of, technological tools at the department of social anthropology.

Governed by EMERGE's holistic approach, learning is always leading the way whenever technology is introduced to a course. This means that the courses strive to ensure that any use of technology is subject to learning itself, and that the course is never altered due to the technological tool itself. In short: Learning always comes first.

In practice, this entails that the learning principles and outcomes are designed as foundational skills and not connected to the use of any particular tool. If, however, a certain type of technology or tool seems like it could be fruitful for enhancing the learning process, such technology or tool may be incorporated into the course in a way that it is—insofar possible—not enabled to dictate the learning outcomes per se, but rather works to augment them. Furthermore, great care is taken to avoid any anti-

¹² This is mostly limited to using conferencing software for lectures and seminars under Covid-restrictions, something that itself was far from a simple task, and a complex topic. All three courses detailed herein had to comply with these restrictions as well, but this is not outlined, as the section focuses on what makes the courses contribute to teaching excellence beyond any required technology usage.

consumer design—which, when using the tool in a university course, would be tantamount to anti-*student* design—that could entail e.g., privacy concerns, vendor lock-in, etc. Additionally, a lot of preparatory research goes into choosing a tool that upholds the NTNU rules governing purchasing that are in place to take into consideration the environment and economy, as well as fair competition.

This does however not mean that the technological tools are afterthoughts. Rather, the holistic approach is meant to ensure that the use of technology leads to an betterment of teaching allowing us to use technology in creative ways that integrate it with the course, rather than merely tacking it onto the course. Designing learning outcomes based on foundational skills agnostic to particular tools enforces a thorough deliberation whenever a tool is introduced. I.e., the tool's inclusion must be justified from the perspective of the learning outcomes.

This also means that each tool must stand up to rigorous scrutiny. So, like the experiments of the previous section, the technology usage follows a hermeneutical circle wherein different approaches are tested as experiments, and that are then evaluated both throughout the experiment as well as after. The evaluation is always considered—holistically—in regard to the course's learning outcome. Viz., does this tool improve learning in some meaningful way? It is important to note here that there are many ways technological tools may improve learning, exam marks being just one of many concerns in such an evaluation. The tools may lead to learning of a qualitatively different kind than the learning would have without them. Moreover, they may serve to make the students somehow more independent and responsible of their own course work. They may also simply make the course more fun and interesting for students. Additionally—although this is not a weighty argument in any evaluation—the tools might be good publicity for the courses, attracting more attention, and therefore also more students. It is important that evaluation takes place both during and after the course, so that the emphasis on the tools is evaluated based on their efficacy. There are specific examples of why this is necessary in the *Implementation section*.

As should be clear by now, the use of technological tools closely follows the same holistic approach and considerations of the other experiments mentioned in *Section II*. This is because using a tool is considered to be just another experiment. I.e., using technology is a specific type of experiment meriting no more, but no less, scrutiny than any other experiment. Since technology usage follows the same standards of evaluation as does other experiments, it is only natural that it also shares the same openness when it comes to sharing any experiences—good or bad, as well as any documentation of how to use and how to not use technology for various types of classes, tasks, etc.

In order to integrate the tools with the learning outcomes without compromising these, and in order to live up to the EMERGE philosophy's emphasis on discovery, open-endedness, and active student participation, students are afforded a high degree of agency and responsibility when it comes to using any technological tool included in a course. This means that the students themselves are paramount to the evaluation of the tools as they must continually evaluate whether the tools are helpful or not with regards to what they are trying to accomplish in the course. Students effectively become

researchers of the pedagogical merit of the use of technology. This is tremendously helpful in guaranteeing that when a tool is used, this tool either is an effective learning tool or that its emphasis and use is diminished—or even aborted altogether if necessary. By letting students experiment with using tools without interfering too much—neither by design, as in overly specifying any tool’s role or importance, nor as the course proceeds, as in by enforcing more or less use of a tool—they are encouraged to discover things they otherwise could not have. On the other hand, the teachers must also to some extent interfere in order to ensure that students do not focus too much on a tool, so that the tool remains in its place as a tool, and not as an end in and of itself. Moreover, generally the teachers are the ones who actually know what the students are supposed to be learning. By putting the students largely in charge of the technology usage themselves, their role as active participants responsible for their own learning is greatly enhanced.

Implementation

SANT1019 - Human, Technology and Dialogue

Technology usage in SANT1019 has had a twofold motivation. On the one hand, Covid restrictions have motivated creative solutions to hybrid lecturing. On the other hand, the philosophy of student-driven discovery has motivated a large degree of freedom as to how students present their work.

This course was offered for the first time at a time where Covid restrictions reigned at NTNU. The second – autumn 2021 -time it was offered, the first few lectures took place at a time when some of the strongest restrictions were in place. The general suggestions and requirements from NTNU basically amounted to giving lectures over video conferencing software, or, if able to lecture in an auditorium, to live stream these lectures (the latter because the university did not want to force students to travel to campus with the virus looming at large, and also because the auditorium might be at half capacity due to every other seat being zoned off, and so would not fit all students). When designing the lecturing plan for this course, it was desirable to further improve on this situation. Thus, the course offered short video lectures and podcasts, the latter of which far eclipsed the former in scope. Although meriting their fair share of work, the short video lectures were simple introductory lectures that motivated the students for the upcoming lecture.

A great amount of work, however, was put into the podcasts. Several episodes were recorded throughout the terms, hosted by one of the teachers, with the other teachers (and on a few occasions also the teaching assistants) as guests. Moreover a skilled audio engineer was employed as a scientific assistant to record, edit, mix, and publish the podcasts (this assistant was also one of the seminar leaders in the course). The choice of topics was motivated to a large degree by the impressions that teaching assistants got from the weekly seminars—by what students seemed to be confused or frustrated about

—whilst some of the podcast discussion was motivated directly by students submitting questions, either before, between or after lectures, or at seminars. These podcasts were very useful for the students in providing not just a presentation of the course’s syllabus, but a discussion of it as well—including discussion of its viability and applicability to modern phenomena, a discussion which closely mirrored the students’ semester task.

The semester task is evaluated through an oral presentation. But rather than limiting this to the typical slide show plus talking, students are free to present in “any” manner that can be argued to satisfy the criteria of being an oral examination followed by a Q&A. The previously-mentioned employed audio engineer was made available to record podcasts – which has proved the most popular choice by far, but there have been videos and traditional slide show presentations as well. Some students recorded podcasts on their own too, rather than use the provided audio engineer. Again, students are encouraged to apply a DIY ethos to their work and their learning, with teachers guiding and facilitating rather than treating the students as passive recipients of the teachers’ expert information.

The task itself focuses on human relations with technological phenomena and encourages students to focus on depicting and conceptualising the phenomenon itself. As a result, students are encouraged to use, observe, play with, and research all kinds of technological phenomena with the principal limitation proving to be their own imagination. Some examples include social media, video sharing sites, dating apps, the use of headphones on public transport, and hybrid lecturing during Covid restrictions. Students are exceedingly free to define their theme and approach, in addition to their method of presentation.

SANT2020 - Anthropology of Technology

The past two iterations of SANT2020 (spring of 2020 and spring of 2021) also took place during Covid restrictions, and so also had to think differently. The late winter probably saw the heights of restrictions at NTNU, making the spring-term course one of many victims of circumstance. Several lectures and seminars had to be exclusively digital. The course ordinarily offers four-hour blocks that start out somewhat lecture-y and end up rather seminar-y. Viz., lectures and seminars are often not as clearly divided as is traditional. They are more of a spectrum than a dichotomy in SANT2020. This works well when the four-hour blocks are allowed to take place in a physical room, where discussion flows more naturally, and breaks can occur more naturally as well. Four-hour digital blocks are much more demanding and tiresome. It is also very difficult, if not impossible, to facilitate spontaneous discussion in such a setting, when the number of people becomes excessively large.

Again, it was decided to opt for a more creative solution. The result was that lectures were recorded by the teachers who met digitally using video conferencing software. With only the three teachers meeting, these lectures were able to take on a much more conversational form than is usually the case with digital lectures, as the teachers could easily open for a spontaneous discussion. These

video recordings were then made available to the students in advance of the lecture, no later than the preceding day, so that they could watch the video applicable for the upcoming lecture and thus be better prepared. Rather than having four-hour blocks of lecture-plus-seminars, the weekly meetings instead became a short introductory / summary lecture, followed by group discussions for however much time the students felt necessary or useful. The students were divided into group chats using the video conferencing software, where they discussed some questions formulated in the introductory lecture. After some initial few minutes of letting the students get into the conversational “groove” on their own, teaching assistants would jump into these group chats and further stimulate the ongoing conversation. After an allotted amount of time, the group chats would be closed, and a plenary discussion would be led by the teacher(s), wherein a representative per group would relate what their discussion had been, before the teacher(s) and teaching assistants would then relate it all to the syllabus. This process would repeat for however many rounds of discussion was planned, typically ca. three. The discussions were remarkably creative, a fact that was attributed to the success of making lectures available (at least) a day in advance. Rather than spending four hours doing this, two-three hours became the norm.

Moreover, going back to pre-Covid, there have been experiments using VR for discussing presence and control room logic. These will continue in the future forms of the course.

Being a course in the anthropology of technology, SANT2020 has a semester assignment where the students undertake a mini-fieldwork and write an empirically focussed semester article (cf. chapter 4). Like in SANT1019, students have thus been encouraged to use, observe, play with, and research, different technological contexts—to an even larger degree than in SANT1019, as SANT2020 is a more advanced course, with a much larger emphasis on the semester task, which here forms half of the student’s final mark in the course. Some examples of technology engaged in some way by the students include VR chat software, various forums and social media, medical equipment, cryptocurrency, a network for selling semen for artificial insemination, smartphones and various software for them, and video sharing sites.

SANT3600 - Cultural Understanding and International Working Relations

As this course is largely driven by its two student projects that either simulate or actually perform a collaboration with an international group, technologies of remote collaboration have played an integral role. In the two preceding iterations of the course, there has been one simulated and one actual collaborations, this is described in the *Implementation section*. Previously there were only simulated collaborations. In simulated projects, students have had to envision how to facilitate remote collaboration, and in actual projects, students have had to collaborate remotely. Both scenarios have necessarily involved remote collaboration technology, but the role of technology in simulated and actual projects has been drastically different.

In the simulated projects students would suggest events in which communication had taken place. E.g., “we established contact with this Chinese firm via email, then we had more in-depth follow-up meetings via video conferencing software,” and similar examples. The students would in these cases usually not actually use the suggested technology. Some student groups would however make conversation mock-ups. For the above examples, these might have been to send emails to each other, and to record each other role-playing a video conference. But the emphasis in these cases would usually be more theoretical and revolve around addressing advantages and shortcomings of the tools, analysed with respect to cultural sensitivity. As the events are meant to allow students to demonstrate a meta-cultural competence, this usually means they would get into trouble somehow, and then solve the problem before moving on to the next event and its problems. An example of an event like this which would involve technology, could be disseminating information about a workshop with a Chinese firm by creating and sharing a Facebook event, when Facebook is very uncommon in China, thus effectively failing to disseminate the information. Students would proceed through the make-believe project with what essentially are thought experiments, necessarily analysing any collaboration technology used throughout their work.

In the projects where the students need to organise a remote collaboration with students at a foreign university, the thought experiments become actual experiments, as we have seen in chapter 4. In addition to analysing tools for communication similarly to how they would in the make-believe collaborations, here the students must also actually use these tools to communicate and collaborate with their international partners. This actual project is arguably even more in keeping with the EMERGE philosophy of learning through student-driven and exploratory activities. Running a simulation prior to the actual project has proven valuable in clinching the theoretical portion of the course, thereby making certain the students are prepared for the actual collaboration. In this natural next step from simulated to actual, the students must not only propose different tools and analyse cultural dimensions of their proposal but must in fact come to an agreement with their partners concerning tool usage.

In addition to students organising a remote collaboration through tools, this course has also used virtual reality (VR) technology. This has been implemented by way of one group volunteering to use VR headsets in their work, and more or less freely deciding to what extent they wish to employ these headsets in collaborating. The first group to use VR used it for a simulated project as it took place before the course started having real collaborations with remote partners. They explored using software for designing their solutions, organising the project work, as well as for conducting meetings. In the end, they even did their exam using VR, creating some public interest, including a note in the local newspaper (<https://www.adressa.no/pluss/nyheter/2019/11/17/Fra-et-rom-i-Trondheim-avla-de-eksamen-i-Alpene-20406215.ece>).

The course began using real-life collaborations the following year, and this experiment was repeated the next year, which was the previous iteration (autumn 2021) of the course. Though the original plan was to offer every group the opportunity to collaborate with their international counterparts

using VR, Covid restrictions prohibited the wide distribution of VR headsets to the students at the foreign university. The resulting setup was however fruitful in its own right, yielding several interesting results, such as—amongst other things—that using VR technology is problematic due to its lack of omnipresence as a tool, that NTNU students feel uncomfortable (morally) using VR headsets if there are more headsets available to them than to the foreign students, and that the use of VR social gatherings (playing games, etc.) can drastically improve group collaboration outside of VR. Yet another exam has been held using VR headsets.

Placing students in charge of what tools to use, and how to use them, has been crucial for both their learning and to the efficacy of their projects. As they discovered limitations of working in VR, particularly in effectively working with their international partners, they needed the freedom to dial back the emphasis on VR for their project. Some students even did not want to use VR whatsoever. In the latter case, this was usually students who were not particularly interested or captivated by technological gadgets, and so would likely have to spend a lot of their project time on learning VR, at the expense of the foundational learning outcomes. The fact that using VR was not entangled with the learning outcomes per se was thus necessary in this course to ensure that VR did not hamper the students' learning. Instead, motivated volunteers were able to reveal interesting aspects of working in VR, aspects of discovery which could not have been planned.

As part of this VR usage, there has been a collaboration with a company called Breach VR, which develops meeting room software for VR. The results of the VR experiments have been useful to them as well. Through this collaboration, EMERGE can contribute to industry development of both learning and generic meeting and collaboration software. The hands-on experience of students is and must be decisive in this development. There are plans to use the Breach meeting rooms in other courses as well.

Summary

The courses offered by the department of social anthropology have experimented with using technology by design rather than as an afterthought. Two of the three courses detailed above deal with technology directly by design and are thus motivated to find new ways of incorporating technology by design as well. Moreover, our experience is that the use of technology as a learning tool in teaching can be motivating for both students and teachers. The third course concerns culture when working internationally, which largely happens using tools for remote collaboration, and therefore this course too must somehow incorporate technology, particularly in later years when the students have had to actually collaborate with remote international project members.

Careful deliberation took place to ensure that despite technology being—to varying degrees—heavily focused on in these courses, technological tools must not be allowed to dictate the course

outcome. It has been of the utmost importance to integrate technology in a way that does not relegate the course to the premises of technological tools.

Luckily, the solution to this predicament has turned out to be already baked into their foundation, as the EMERGE philosophy's emphasis on learning through discovery requires that high degrees of freedom, with a corresponding responsibility, are afforded to the students. This has, in turn, afforded the courses with the flexibility and open-endedness necessary for ensuring that the focus remains firmly on the foundational learning outcomes. In this manner, students do not only take part in exploratory activities, but they are also considered as academic partners that contribute to course development.

Conceptualising the technology experiments as special instances of EMERGE experiments as such, means that any technology usage receives the same scrutiny as does any other experiment. It further means that the evaluation key to EMERGE's hermeneutical circle fortifies any technology usage by improving it with every experience.

Chapter 8 - Innovative Education in geographical education

Jakob B. Cyvin

Introduction

This chapter deals with experiences of implementing methodologies for active learning in multiple courses at the department of geography. The chapter includes descriptions and evaluations from emerging approaches to teaching using different digital technologies in both social and physical geography, as well as within international ERASMUS+ courses run at the department. The results are built on previous published, and unpublished research on interventions in specific courses, as well as interviews, feedback for learning assistants' teachers and newly answered surveys.

Geographical Information Systems (GIS), and broader, Geographical Information Technologies (GIT), are a part of the Bachelor and "lektor" education in Geography at NTNU. The understanding and practice use of these systems for data analysis, today mostly done with computer software is important within all fields of spatial analytical understanding and analysis. At the same time, development of the use of technology and innovative practices something is which should be an implemented part of teaching practices, not only as a tool for solving a specific problem.

Implementation of classroom experiments

VR-Learn

The project VR-Learn seeks to test, evaluate, and exploit the possibilities within the field of low-cost VR education. Active, motivating, and immersive learning experiences where the outside world is taken into the campus as virtual learning environments are in focus. The project is cross-disciplinary across faculties and campuses and seeks to develop an infrastructure for daily use of VR in field related education. The project was granted five million NOK from the Norwegian Agency for International Cooperation and Quality Enhancement in Higher Education (DIKU), now Norwegian Directorate for Higher Education and Skills, HkDir, and started in 2020 with a planned duration of three years. After the project started up, the project has also become a cooperating partner with the ERASMUS+ project Digigeo¹³. Integrated partners of the project are also in close cooperation with other projects working

¹³ 2020-1-CZ01-KA226-HE-094425), and the project is also in an ongoing partnership with the ERASMUS+ project EduChange 2.0 (2020-1-CZ01-KA203-078349).

with activating and immersive technologies for learning, among others at the department of Neuro Medicine and Movement Science where VR-Learn are sharing its experiences with the project.

The experiences from the project are so far that the use of virtual reality should be an integrated part of educational practices in multiple courses and at a variety of departments. At the same time these technologies are rapidly developing, and teachers so far need support to be able to cope with this ongoing development; from software to hardware, and not to forget the matter of pedagogy and didactics, which should come before the technology (Nielsen *et al.*, 2018; Cyvin *et al.*, 2022). Analysis of cross-disciplinary survey data reveals that the students, no matter field of science, want the departments involved in using resources of further development of virtual reality as a means for learning within their respective disciplines.

If universities are supposed to offer its students relevant and up-to-date educational practices in the use of virtual reality as a mean for active and hands-on learning, projects like VR-Learn are vital. Despite this, a project duration of three years seems too short to be able to change the attitude towards teaching practices and implementation of low-cost virtual reality as an “everyday technology” in academia, like PowerPoint is today.

Preliminary, cross-disciplinary surveys from the VR-Learn project shows that more than 80% of the students who partook, after trying out low-cost virtual reality as a learning technology, desires that the university keeps using resources to develop these technologies further as a mean of learning.

Summarized experiences with the use of low-cost VR for learning in Geography in higher secondary and from first year of Geography students: A summary of the tentative results from the master thesis of Nikolai Vinje:

“Students in geography and upper secondary students seems to be positive to the implementation of virtual reality (VR) for learning purposes. They do look at it as a new and exciting tool they want to take part in... Variation is here central. It seems like the students also are taking more ownership over the content when it is an immersive experience. One of the prerequisites is a high degree relevant content, at the same time as self-drive and self-exploration seems important.”

“The pupils in upper secondary school seem indifferent about the easy methods using their own phones and simple cardboard VR glasses. All students interviewed wanted more of this kind of learning, and qualitative data revealed enthusiasm and space for discussion and social learning in between the students as well as the need for high quality content to overcome the wow-effect and create a meaningful learning environment. The interviews also reveal need for pre- and post-work, as described by Remmen and Frøyland (2014; 2015; 2017) and a didactical plan before the development of technological solution (also mentioned by Nielsen *et al.*, 2018).”

“VR is in interviews highlighted as a promising and great tool for expanding outside of fieldwork, but not as a possible substitute. Technical issues, lack of the social dimension and the zero or low possibility of using anything other than visual senses are drawn forward as explanations. Technological barriers, like the use of the students own phones with their differences is an obstacle to overcome. At the other side, students who had visited etc. Trollstigen in VR reported that they felt more prepared to “read” the landscape geomorphology when actually going there later on during the same semester.”

“Technological skills, easy software, a fully developed didactical approach to the use of these technologies, in combination with pre- and post-work in combination with real fieldwork seems like a good starting point for immersive telepresence in geographical education.”

EduChange and Educhange 2.0

EduChange is a course where educators in geography, biology, and teacher training at the University of Olomouc, the University of Utrecht, the University of Malta and NTNU, collaborate through an ERASMUS + project supported by the EU. The project started as a three-year project and received renewed support from the EU for new implementation over three new years. This is now called EduChange 2.0 and is being carried out for the first time with our students in 2022 due to some pandemic-related delays.

The course is about exploring innovative learning methods so that teacher students, especially within geography, get a foundation for tackling stubborn problems (so-called Wicked problems) in educational purposes, with a specific focus on climate change and the use of participatory methods and gamification (Favier *et al.*, 2021).

By letting students meet in another country for a week, where teachers and students work together as a large team, the course blurs the boundaries between student and teacher, and new working methods are explored. This is largely with a focus on visualisation methods (360 film and photo, images and digital platforms) and location-based technology for data collection and game-based learning in the field.

GEOG1014 – Earth's natural environment

The course provides the students with an introduction to natural geographical processes, with special emphasis on Norwegian landscapes. The course also deals with global wind and ocean currents and cycles, temperature distribution, climate change, and biogeography. Throughout the last years, the exam has been transformed from a written exam to one of multiple deliveries, where the creation of websites / StoryMaps, and analysis of low-cost virtual reality experiences have been part, and is an increasing part of, both the exam, grading and the pre-field course activities. The students are then able to visit

their fieldwork landscape using 360photos with telepresence capabilities before visiting the geographical location as a regular field course. They are also delivering a StoryMap as one of the exam deliveries. The course is built around seminars, lectures, and field activities, with an ongoing focus on activating the students throughout all parts of the course. The Covid-19 situation has highlighted how virtual reality is an important supplementary activity when field courses are not possible to implement or attend. An issue within physical geography courses is the lack of resources available to bring students outside. In GEOG1014 there are more than a hundred students in a normal year, and every field activity is expensive. It is only in fieldwork situations, where learning is expected to happen without repetition: We cannot bring students back in field two or three times as we can do when reading a book.

By implementing digital Storytelling (Midtaune *et al.*, 2018; Cyvin *et al.*, 2022) into field-based geography courses we are trying to expand the field activities both before, and after the field courses by providing digital material, enabling the students to explore the field sites for a longer time, and multiple times. Bringing virtual reality in the form of immersive 360 pictures and film, we see as a natural “next step” in our development of these courses (Cyvin *et al.*, 2022). This is processes where technology might be able to help with expanding the field activities, but where resources are needed to be able to keep developing software, content, and practices for the use of new hardware. EMERGE might be an agent for future development of the course.

GEOG2014 – Qualitative Methods in Geography

The course teaches students about qualitative methods and their theoretical foundation. The course focuses on three main methods: observation, interview, and text analysis, and covers all phases of a research project from formulating a research question, to sampling, coding, analysis, and the final production of a text that presents the results and conclusions. The challenges of fieldwork and ethical considerations of research are central to the course. The content of the course is presented through lectures and seminars, and in autumn 2021 the students were introduced to Virtual Reality (VR) as a research tool. VR was used by the students in one of the seminars where the students were conducting interviews.

The students had prepared interview guides in advance and were assigned groups of four to five individuals. In each group, at least two students would perform an interview or focus group interview with the other students based on their prepared guide, while being filmed with a 360 camera. The underlying assumption was that this would add to the students’ learning in the following way:

- They would gain experience and reflect upon pros and cons with using video recordings in interviews.
- They would have the opportunity to watch themselves both as interviewer and informant after the interview was done and reflect upon their role and the group dynamics retrospectively.

- They would have an opportunity to discuss the pros and cons with VR as opposed to other type of recordings.

Takeaways from the VR experiment

In general, the feedback from the students were positive about the experiment, and in their reflections during the seminars and in written papers many highlighted that seeing themselves in the recordings had given them new insights and that they saw both the positive and negative sides of using a recording device in an interview situation. Both these insights were seen as useful for future interview situations and research.

Takeaways for future courses that plan to use VR:

- **Technical problems.** We experienced some technical issues with the recordings. Many of the students seemed to be unfamiliar with using VR and did not necessarily know how to handle the camera, nor the VR glasses. It is recommended to have someone in the classroom who knows the equipment in detail when using it together with students, someone who can help troubleshoot and give guidance when needed.
- **Personal data, GDPR.** By using recordings of people in an interview situation we had an opportunity to talk about GDPR and personal data, which is a relevant topic both in the course and in research in general. For the exercise at the seminar, we kept the files on the camera / phones and the students could watch the files directly on the device. This way we avoided the issue of uploading to third party platforms (even if it would have been accessible only to the students in question it is not in line with data protection guidelines). It seems like there are no easy-to-use platforms for this purpose within the NTNU internal system today.
- **How to use film in teaching?** The use of VR in teaching has a promising potential but should be tried again when someone who is familiar with the VR equipment is present. Developing the concept more, to bring out the strengths of VR would be recommended. Some students reported that for them the recording had been useful to do and to watch, but the VR part of it did not necessarily add anything extra as it was now used within the seminar; a regular video recording could have done the same job. The utility of VR versus regular video recording was examined in a master thesis at the Department of Psychology as has been a part of EMERGE as well.

GEOG1011 – Introduction to Human Geography

In this course, the students begin the semester with a fieldwork in an old fishing village Sør-Gjæslingan at the coast of Trøndelag. The main goal of the trip is to introduce the students to social geography

methods – how to “see” history, read the landscape and learn about the social development of Norwegian coastal communities in its close relation to nature resources like fish, geomorphological barriers for the development of fishing villages and today e.g., windmill park development. Through the use of StoryMaps – a digital platform for creation and publication of multimodal photo and map stories – as preparation, geolocation-based mobile applications in the field and reflection logs, the fieldwork has, in recent years been digitized to increase students' pre-knowledge, participation and benefits of the fieldtrip. During the 2020 pandemic, virtual reality was used as a substitute for fieldwork, and such elements will be included in the future trips as preparation and post-work.

GEOG1012 – Introduction to geographical information systems (GIS)

The course introduces GIS; building on a combination of practical use of the GIS-software ArcGIS Pro and theoretical elaborations based on vital terms within cartography and GIS. The content description of the course is not newly changed or developed, but the course is basically fully flipped as in regards to lectures and now contains eight modules with a combination of practical tasks, recommendations for reading, short videos, and tests. The learning situations has turned from lectures to technology rich cooperating meeting arenas. The feedback is that the students are working more than in other courses, and that their motivation for this work is substantially higher. There is no final exam, but the short tests throughout the semester give the students an indication about their acquired knowledge, and the lecturer a possibility to tailor the teaching and discussions towards challenging aspects.

EDU2001 – Digigeo

This project aims to develop online / digital / virtual Geoscience's learning. Specifically, the Digigeo project (ERASMUS+)¹⁴ focuses on transferring contact, technology- and field-based education that usually inevitably requires physical attendance of teachers and students. Therefore, it is crucial to explore and innovate practices in such learning tasks with the use of digital technologies, which will help to maintain the quality of the learning process in Geosciences.

The course is at NTNU a cooperation between staff members at Geography and Teacher Training (Natural sciences), where the main objectives of the project are to enhance preparedness in digital education in geography-related subjects (Geosciences) and to increase the digital competences of educators, helping them to reinforce the quality of contact-based training. As the contact-based training represents the key learning point of practical skills and knowledge acquisition, this project investigates digital methods and tools that ensure maintaining delivery of essential practical competencies to students they would otherwise lose.

¹⁴ Project supported by the European Union: (2020-1-CZ01-KA226-HE-094425).

The project is designed in two year-cycles with short-term physical mobilities of staff and blended mobility of students and staff. During the face-to-face project team meetings, staff will discuss and experience state-of-the-art digital education methods, tools, and practices at hosting department(s) from which optimised digital lectures designs will be developed and later mutually tested by students. This is normally done by six students enrolled each year in EDU2001. Blended mobility aims at and involves motivated students in its virtual part; students experience digital education practices at all cooperating institutions and share them during a physical part. The physical part – summer school – serves as a platform for exchanging ideas among students and between students and staff leading to a design of fully digital thematic lectures (yet still practical) in the form of compact workbooks versatile enough to be used elsewhere.

In total, there are 40 students, 11 staff members, and 40 participants attending the multiplayer event: students from all cooperating countries meeting together as a summer school or a one-week field course.

Common ground

There are similarities between the courses and projects described. Most obvious is the varied use of technology for learning and creation of learning arenas, different than a classical lecture-and-listener learning situation. Internationalisation, seminars, exploratory and inquiry-based learning, and exam situations different than classical written closed book exams is something that could be developed further, implemented as themes for geography-pedagogical research upon and spread to other courses at the department.

Conclusion

Freedom and lack of guidance might create frustration, and too little time, which could make this approach difficult for the students. At the same time, it is from a pedagogical perspective needed to challenge the students to reflect and create without too much teacher-to-learner one-way communication. Supporting factors like more seminar groups, virtual reality and diversified exam activities might be elements which could increase the learning outcome and help the students to be responsible and educated members of society.

Exploratory practices as in Digigeo, EDUCHANGE and the fieldwork in GEOG1010 and exam in GEOG1014 are examples for further development and inspiration.

Rapid development of software and hardware is difficult for the department because when trying to be in front of the technological possibilities, and implementing these in to teaching situations. Software and hardware sometimes develop more quickly than our possibility to develop it to be a tool for learning, test it, verify its usability, use it with students, evaluate and use it once more.

Considerations about juridical, GDPR and IT-security, is needed when buying and using new software for teaching. The head of department will be the legally responsible person if new software is bought and utilised. This makes the use of new software difficult, whereby even use of new software for development, research or testing meets multiple obstacles and time-delays. The process might take time, at least one year, and the software might in that period of time be outcompeted or shut down (an example is Google Expedition VR software), or the project period might see its end before it is legally possible to use the needed software.

One of the feedbacks from students in GEOG1014 and GEG1011, is that the students want a variety of different methods for learning (Midtaune *et al.*, 2018). This is a conclusion based on both surveys and ongoing feedback, as well as dialogues with students in physical and social geography.

In multiple courses the use of student assistants as fellow employees is vital for development of new teaching practices and for daily follow-up of students. This use of students as employees is mostly used within computer laboratory work but is during the last years expanded to be an important part of the department, also doing research and development together with the academic staff. Such employments, where student employees are contributing with academic work, are highly person dependent and driven by individuals in the academic staff and their possibilities to get internal or external money for specific projects.

Experiences from different courses is evaluated every term and create the ground for the methods for teaching the following term, but this circular principle for ever developing education is not the case in all courses. EMERGE might influence the possibilities for developing the education towards the future, using the students of today as sources of knowledge to develop the courses of tomorrow.

Practical note:

We have found it difficult to use personal digital equipment, due to student feedback, where it is of their motivation to focus on content rather than personal notifications when learning and working within the courses.

Chapter 9 - A psychological approach to the use of VR as an educational tool

Tuva Fjærtøft Lønne

This chapter reflects the possibility of the use of VR in teaching, with focus on the field of psychology. At the department of psychology (IPS), the course PSYPRO4502 is already using VR as a part of the teaching and has received positive feedback from the students. As a basis for this, theoretical knowledge is important, which is reflected in this chapter. VR may help the students become more motivated, give them practical experiences they otherwise would not be able to get, and make the learning more student-centred. By using educational technology in such ways, IPS reflects the philosophy of EMERGE.

Interactive education technology (EdTech) is in constant development. In recent years, virtual reality (VR) has developed at a fast rate. The technology has evolved from being available to only a small group of people to now being on the market in electronics stores for anyone who is interested. Thus, VR headsets have become both cheaper and more usable. Like most technology, VR has also found its way into teaching at many levels. Several universities now use VR as a way for students to get practical experiences without seeking out real-life situations. VR is by this used, among other areas, to teach medical students to perform surgery, engineering students to code and mathematics students to understand complex equations. VR is currently mostly used to train specific skills or understand specific concepts. Within disciplines that deal with interpersonal situations, there is not yet solid research on the application of VR. Using VR to develop so-called "soft skills" is therefore minimally studied. However, there is an emerging use of VR technology within other professions. In EMERGE, the Department of Social Anthropology is using VR as a communication and collaboration tool where students work together with students abroad (see chapter 7), and the department of psychology is using VR to make the students experience realistic interpersonal scenarios. Some research has been done on "soft skills" by, among others, Stanford University. They have researched attitude changes and found that racism may be reduced by playing the role of different nationalities in a VR experience (Roswell *et al.*, 2020).

Two key concepts in VR research are presence and immersion. These are the concepts that mainly distinguish VR from other digital platforms (Mikropoulos, 2006). Although there is still no agreement on how the concepts should be defined, it is VR research today most common to refer to presence as the subjective feeling of being somewhere, and envelopment as the objective and measurable properties of the system (Dalgarno & Lee, 2010). Presence is thus a response to a system

that has a certain level of immersion (Slater, 2003). Presence and immersion are intricately linked, and several studies have shown that higher levels of immersion are associated with higher levels of presence (Bystrom *et al.*, 1999; Faiola *et al.*, 2013; Slater & Wilbur, 1997; Witmer & Singer, 1998). Watching a video in VR includes blocking out visual and partially auditive stimuli from the environment. This may increase the levels of immersion and presence.

These two concepts are easy to see when comparing two devices such as an expensive and advanced VR headset versus a less advanced cardboard VR device. The more advanced version has objectively higher immersion as it has a high-resolution screen with two separate lenses for the eyes, auditive stimuli through integrated speakers and a pair of controllers. The cardboard version is a stand for your phone that blocks out other visual stimuli. This low immersion VR solution is based on a low-resolution screen and speakers (any smart phone) that you hold with your own hands. According to research, the more advanced VR headset – as it has a higher level of immersion – is likely to make the user feel more immersed in the virtual environment than the less immersive cardboard setup. If the user feels more immersed, it may also have a stronger effect on the learning outcome. This difference in immersion between devices shows that they have different strengths and should be used in different contexts. High immersion devices may make the user feel like “being there” in the virtual world at the expense of being more expensive and taking more time to master. The cardboard version is cheap, easy to master, but may manage less advanced learning material made for virtual reality. It is great for big groups where everybody is meant to experience a simple virtual scenario.

Although a virtual environment has a high immersion, other elements are also needed, one of which is user interactivity. It is that the user herself that gets to be an active part of the virtual environment and can influence different outcomes. Consequently, games have become a natural way to go to create learning through VR. Such games used in a learning context are called “serious games” (Checa & Bustillo, 2020). In contrast to more traditional learning environments where the teacher has control over learning, i.e., teacher-centred teaching, the user has control over learning through a serious game, i.e., a more student-centred / user-cantered teaching. In this way, the user is in control of their own learning, which can facilitate creative and active learning (Stapleton, 2004). Students can in VR-conditions actively explore the virtual environment, make new content, cooperate with other students etc. This makes it easier for the student to form the VR-experience to fit the specific needs. In this process, the teacher may become more of a facilitator of learning. Asking questions, choosing the right serious games for the students to play, facilitating group discussions etc. Checa and Bustillo (2020) found that passive experiences in VR have limited, if any, effect on learning and skill development. This reinforces the importance of user interactivity in VR.

As Checa & Bustillo (2020) states, forcing the students themselves to be active in experiences in VR, shifts the teaching from being teacher-centred to being student-centred. This may make the teaching more engaging and motivational for the students. A key factor in education is the motivation to study. Studies of VR in learning situations show that learning through VR may help to increase

motivation, commitment, and interest drastically. Even in studies where VR was shown to have a worse effect on learning than traditional learning methods, VR scored highest on motivation (Checa & Bustillo, 2020). Engagement with a learning tool has a positive correlation with learning experience as it can increase self-confidence and motivation to learn. Self-motivation is especially important in higher education where students themselves are responsible for their own learning, and in addition have a large degree of freedom (Jang, 2008; Kahu *et al.*, 2017). Whether this effect is simply “the wow effect” – where it is motivating and fun because it is new and exciting or whether this is an effect that will be there over time – is difficult to say.

Using activities and games as part of teaching has been a central way of thinking for decades (Vygotsky, 1966). As technology has evolved, there has been a greater focus on using games not only among the youngest pupils, but also in teaching students at higher levels. Today, teaching is often supported by various digital tools such as computers, internet, apps, mobile phones, and tablets (Strømme & Korsager, 2015).

In the field of psychology, the use of technology is increasing. Professors and teachers themselves are using their time to experiment with, research and test different ways of using educational technology in their teaching. By their own initiative, they may apply for external financing to use technology in new ways in the classroom. At the department of psychology, this was done in the course PSYPRO4502 where the professor applied for financing to create four immersive VR-scenarios. In the course, VR is implemented through videos based on realistic scenarios based on the literature used in the course. These scenarios are filmed using a 360-camera with actors playing characters inspired from the literature already used in the course. As a part of the teaching, the videos are made to make the students themselves experience the theoretical challenges one may meet.

The first of four videos are already in use in the course, where the subject of the video is conflicts between employee and employer. Both characters in the video are known characters for the students from the course literature. Because of this, the video is used as a realistic experience rather than just reading about it in a book. In the interactive VR-scenario the students play an employee who meets his manager in a casual chat by the coffee machine. Early in the dialogue a conflict arises, and the students have the power to steer the dialogue in the direction they may want. The video is interactive in the way that the students themselves plays the role of an employee, and from his point of view must choose amongst predefined answers which response to give to his manager. The different choices in the dialogue gives the students the possibility to test different ways of handling the conflict. Thus, the students experience which answers lead to which responses and how it affects the conflict. The same student may steer the conflict in a confrontational way where the employee gets angry at his manager and later tries to lead the conflict in a direction that results in a positive outcome. By doing this, the students get to experience more ways of handling a conflict than they would have done in real life, without having to deal with the consequences as it is a fictional conflict.

After playing through the scenario couple of times, and trying out different approaches to solve the conflict, the students may be placed in groups to discuss the scenario. They are asked to discuss the different approaches by using the theoretical knowledge they have learned throughout the course. These discussions are facilitated by student assistants and the professor. This is done to give the students a common experience through the VR-scenario which is used as the basis of the discussion. Such reflection is central in the learning process and reflects the important principles of EMERGE. After the students themselves have reflected in groups, they may present the key points to a supervisor. Through this way of learning, autonomy and student-centred learning is promoted. This way of teaching may also give the students responsibility and freedom to explore their field of study in their own way. By doing this, students may be seen as partners in the learning situation instead of passive learners.

The plan for the future of the course is to develop and film three more scenarios for use in VR and to centre the teaching more around these videos. The goal is also to let the students themselves plan and film different scenarios during the course. This may allow the students to see themselves in different situations and discuss them with a supervisor. Examples of such scenarios may be interviews, giving feedback, and other such realistic scenarios. In this case the teacher and or student assistant may supervise the different student groups as they plan, film, and discuss. To be able to do this, the necessary equipment, knowledge, and time must be available both to students and teachers. Hopefully, this is something that EMERGE may contribute to. Through virtual environments, the students may see and experience situations from different perspectives and points of view. In this way, students get a unique first-hand experience of different situations. This can be useful for learning in situations that are difficult, dangerous or in other ways problematic to seek out such as historical events, going to space or watching themselves in interpersonal settings (Pellas *et al.*, 2021).

In the field of psychology, there is a long tradition for using quantitative experiments as a part of research. When innovative technology is implemented, it is important to make sure that its use in teaching is superior to the technology already in use. With this in focus we designed a research experiment. As VR gets increasingly integrated in teaching, the question is whether this is a better way to experience interpersonal situations than 2D videos on a desktop display. This is the background for the department of psychology's research on how an interactive psychology-based scenario is experienced through a VR headset compared to a 2D video on a computer screen. The experiment was designed to test the differences in watching an interpersonal interactive scenario in VR vs. watching the same scenario on a desktop screen in 2D. To test this, the VR-scenario used in the course was thoroughly studied by a master's student to examine the effect it had on the students.

134 students participated in the study. 65 watched the 2D-version and 69 watched the VR-version. The students watched the video and answered a 42-question two-part questionnaire to measure the effect it had on the overall user experience. The quantitative data show that the students watching the VR-version had a higher overall user experience, with significantly higher levels of immersion and

presence. There was no significant difference in the physical state in the two groups, e.g., nausea or dizziness.

As well as quantitative data, the students answered three open questions about the experience. The answers to these questions illustrated that the students felt more engaged, motivated, and involved in the VR-version than in the 2D-version. The students reported that the VR-environment made them block out the real world and made them more focused on the virtual environment they were in. This made them more engaged in the scenario, and the dialogue felt more real. They also reported that watching the scenario in VR was exiting, new and engaging in a way that motivated them to learn more about the theory behind the scenario. One of the participants answered that “It created a completely unique atmosphere and feeling around me as a participant that I think is almost impossible to recreate on a two-dimensional screen. The task and the content were engaging enough for me to get properly into it, and the lack of access to the world outside the screen made it easy to concentrate on the task I was given.”. This one comment sums up the comments on a general basis given from the participants.

One of the main concerns of watching videos through VR is the physical strain it may have on the students. The students in the study did not report statistically significant higher levels of psychical discomfort after watching the video than the students watching the video in the 2D-group. Both groups reported low levels of discomfort. Another concern is that the VR-equipment is hard to use or that it takes a long time before students have enough knowledge to use them. Before the viewing of the VR-video the students got a brief introduction on how to use the headset and controllers which took approximately 2 minutes. Most students managed to put the headset on without help, while a few students needed some assistance adjusting the headset. All students mastered the headset and technology once the headset was correctly placed on the head. This shows that when the learning material is well thought out and made for the purpose of being used as an easy-to-view video, VR-headsets are easy to use even for people with minimal technical experience.

As this chapter highlights, the use of VR in education is strongly rooted in an existing theoretical framework. Theories regarding constructivism, practical learning and motivation shows that the use of VR may contribute to active learning in many ways. The use of different VR-videos to make the student active learners through otherwise unavailable scenarios, may steer the teaching from teacher-centred to student-centred. This is in line with the EMERGE philosophy and has been a great success at the department of psychology.

Chapter 10 Blink - Technology in teaching

Marte Nubdal and Karen Engen Økland

Introduction

BLINK's main purpose is to contribute to quality in teaching and learning based on strategic frameworks of the Norwegian HE-sector, NTNU, and partners invested in the hub. The use of digital technology in this context is both a strategic goal in and of itself and a means to an end. Finding a good balance between knowledge of *how* to use technology, and an awareness of *why*, is crucial for developing a purposeful pedagogic practice (Letnes, 2021). Excitement and enthusiasm for new technology can sometimes overshadow good learning processes as the main goal and purpose for using technology. Another challenge for BLINK is bridging the gap between supporting spearhead projects like EMERGE compared to supporting change for a broader group of educators. In one end of the continuum, BLINK supports projects that challenge the way we understand and utilise new technology, as well as the role as both organisation and individuals in this relationship. At the other end of this continuum, many users get the same radical experience of innovation when using mainstream technology for teaching, such as streaming and digital collaboration tools. The majority of faculty and staff place themselves somewhere in-between. Supporting innovative projects in a way that can benefit a wider community of relevant parties is crucial for reaching the levels of change and transformation envisioned for both students, staff, and the university sector at large (HK-dir., 2022). Working towards the envisioned digital transformation (Osmundsen, Iden & Bygstad, 2018; Meld. St. 30, 2019-2020) is a complex and open problem, that requires an open and explorative approach. This chapter will outline BLINK's approach to this challenge through the collaboration with EMERGE, and how the hub has utilised lessons from EMERGE to develop a more general support for use of technology in teaching and learning.

Open approaches to complex problems

EMERGE has chosen “emerging technologies” as a field of interest. As suggested by the term itself, this is an area in continuous flux. In addition to the technology itself evolving over time, the practices of academic staff and students also evolve through the use of technology (Latour, 1992; Orlikowski, 2007; 2010; Sørensen, 2006). These changes are not easily captured in more traditional university practice for teaching and learning and require a different approach to knowledge development. Efforts like an increased policy focus on student active learning are made to increase quality of teaching and learning, and to improve work relevance in higher education (Meld. St. 16, 2020-2021; NIFU, 2022).

EMERGE's application for status as a Centre of Excellence in Higher Education is another example. Utilising new technologies to support and improve learning processes has proved to be an open and complex problem, requiring open approaches (Oddane, 2017). Implementing digital tools in HE teaching and learning does not automatically lead to improved quality or transformation of practices (HK-dir., 2022). EMERGE's emphasis on technology experimentation through student-teacher collaboration is a good example of how one can work creatively to make sense of new technology as part of a learning process (Hernes, 2016).

There are also some formal limitations to using technology in a public university. On the macro level, the international legal framework that regulate the use of technology, like GDPR and Schrems II, have affected national legislation and institutional policies on IT security. It is often challenging to understand the practical consequences of these changes. Teachers and students, with the support of their organisations, now need to adapt their practices, raising a score of new questions and few clear answers. The collaboration between BLINK and EMERGE points to the challenge that lies in building an interdisciplinary and cross-sectional understanding of how to navigate this situation.

Summing this up, there is a real danger of using new tech in ways that do not support learning processes, or that become obstructions or time-consuming distractions for students and staff. Experience suggests that support units such as BLINK can only work to address these issues in close collaboration with the faculty and students, aiming to realise their pedagogic vision and academic ambitions. Working with EMERGE has made it possible for BLINK to address both practical issues such as how to select and use VR hardware and software, and legal issues regarding GDPR consequences of learning activities, within a larger organisational context.

“Best practice” in technology use

A familiar goal of supporting projects like EMERGE is to develop some “best practices” that can be implemented across the organisation, and thus contribute to improved quality of practice for a wider group. The concept of “best practice” in education is commonly understood as a set of guidelines as to what constitutes the ideal learning situation within given constraints. In relation to technology use in teaching and learning, “best practise” is often understood as good ways to connect with students digitally, keep their attention throughout digital sessions and provide a positive and effective learning environment in the digital sphere (NIFU, 2022).

Experiences from both EMERGE and BLINK suggest that “best practise” takes on vastly different forms across the university, varying with technological prowess, number of students, ambition level, field of study, and several other factors. While the access to technology is usually similar, the educators' and students' understanding of it differs, and different groups have different means of utilising technology. A current example of this is VR technology. While some academic environments, many of them present in this report, use VR technology in a way that enriches the students' experience

and enables learning experiences that were previously unachievable, many other groups who try VR do it in ways that feature the technology too heavily, obscuring the actual learning outcome with “cool” and “new” technology. Here, EMERGE has taken an interesting approach; instead of providing a “best practice” for technology use across the social and educational sciences, practice is built on the principle that technology has different uses in different fields, and that while using technology in learning is a learning experience in and of itself, the technology should enrich the learning experience and not the other way around.

NTNU is a quality-oriented organisation, periodically launching initiatives to raise educational quality across academic disciplines. While these initiatives are an important prerequisite for quality improvement, efforts need to be transformed or translated to meet the needs of the specific academic environments. BLINK aids in some of this work, by helping individual educators and groups to translate generic courses and resources into a practical setting, and by testing audio and video equipment for different teaching scenarios to make qualitative recommendations based on the educators’ specific needs. To function as a testing hub for technological equipment, BLINK relies on educators such as the EMERGE staff to borrow, use and give feedback on specific cameras, microphones and more. Here, EMERGE and the learning hub have formed something of a symbiotic relationship. BLINK and EMERGE each supply some equipment, such as 360° cameras and VR headsets, while EMERGE explores the possibilities opened by this technology. This exploration in actual learning situations is the basis for EMERGE’s in-depth assessments of the technology and its uses, which the learning hub in turn uses to provide recommendations to other educators. Both educators and students in EMERGE have tested technology in collaboration with BLINK, providing a rich foundation for qualitative recommendations. EMERGE has been an important resource in efforts to make good use of technology available and accessible to the rest of the organisation, as well as providing an exploratory mindset that makes technology seem less intimidating to the less-experienced user.

What is “innovative” use of technology?

The capacity for adopting new technology differs greatly between groups and individuals. For some, using a web camera to stream a lecture can represent a radical change. Emerging technologies, or any technology that is new or untested for a certain use in a specific context, can appear completely out of reach, due to lack of knowledge, experience, or the necessary time to adapt or develop new practices. EMERGE has an important role to play also for these groups and individuals. Technology experiments can offer valuable models for change, and most importantly, a trusted colleague that can validate a chosen course of action. This can help the educator to identify what the purpose of using technology is in the specific teaching practice. In this way, EMERGE creates a “relevant unit” (Oddane, 2017, pp. 71) for developing new knowledge, while simultaneously connecting different relevant units through its interdisciplinary partner model and extended networks.

An important dimension in the EMERGE collaboration is not only making room for sharing success, but also learning from mistakes (Weick, 1988), unintended consequences and “overflow” (Hernes, 2016) from experimentation. This kind of learning requires a minimum of trust between the participants (Hernes, 2016). Sharing one’s apparent mistakes can create a vulnerable situation for participants within an environment of new public management, or simply working within project funding, with strong focus on competition. EMERGE has over time created a common ground across different academic disciplines with a common focus. The work of developing a common framework for assessing the qualities in using emerging technologies in a range of teaching and learning practices has sprung from this process, based on a shared view that diverging views can complement each other.

Conclusion

As previously noted, it is necessary to take an open approach to meet the challenges facing EMERGE. It is also important to note that innovative use of technology focuses on the change in practices, and not only on the technology itself. EMERGE has demonstrated the value in sharing and learning from different experiences, also when these are situated in radically different academic and practical contexts. This points to the value of *good* practice rather than “best practice”. Moving forward, the EMERGE process has in a very real sense given room for how “creative collaborations between experts with different backgrounds can give room for a creative collaboration and creative results that none of the participants could have achieved separately” (Oddane, 2017, p. 25, our translation). From BLINK’s point of view, EMERGE offers an opportunity for developing new practices through an open exploration of new technologies, and an invitation for others to join in the process.

Summary Section III

Using technology to enhance learning is closely related to the holistic learning approach which were described in Section II. In the EMERGE philosophy we emphasis technology as a tool for learning, and as the following chapters will deliberate, these practices are emerging in Social Anthropology, Geography and Psychology simultaneously.

Developing courses to implement technologies in teaching, as Virtual Reality (VR), StoryMaps, Podcast and other digital collaboration platforms, have contributed to motivate students in a positive direction. Moreover, providing such an opportunity in teaching shows that student involvement increases and they become more active practitioners in their own learning process. As emphasised in all following chapters, implementing such emerging technologies in teaching make the student's more than 'passive listeners' of knowledge. Instead, they tend to become more 'active partners' in exploring and producing knowledge.

By using technology in teaching, our common experience, as shown, is that the openness and sharing of experiences between teachers and students is significant for researchers when they evaluate if their experiments have succeeded or not.

All disciplines describe that, when using technology in this way, the result is that teaching becomes more 'student-centred' contrary to 'teacher-centred'. Another experience drawn from these chapters is that the use of technology in these courses has contributed to bring the world outside of academia inside the classroom. This gives students 'first-hand' experience in how to utilise their disciplinary competence in 'real-life' situations.

By sharing individual experience from bringing technology into teaching, these chapters clearly point towards that there is a need for more systematic exploration and documentation from a holistic point of view. This could in turn, help researchers and teachers to discover more ways of enhancing teaching quality with the use of emerging technologies in higher education. Through the experiments in EMERGE, we have identified potential barriers that focus on software security, software design, user interactivity, organisational barriers, economy etc. And most probably, what we have managed to identify by encountering such issues is only the 'tip of the iceberg'. In other words, these cross-disciplinary experiences combined indicate that using technology to improve learning, increase student motivation and responsibility, is important to continue to explore if we want the university to follow the ever-changing world and the fast technological development that we witness in contemporary times. Our common ground then, lies at heart in the EMERGE philosophy; we must seek to continue to explore and to establish a *best-practice* for research on emerging technologies in the classroom. We need to be able to keep track of the technological development in society, and to make ourselves familiar with the technological world that students live and dwell in. To manage this there is an institutional need that these kinds of experiments are to continue, and that the openness and sharing of experience between research fellows and students continues to grow. In this Blink support EMERGE by making reflections

about the collaborative process from the outside, as a critical friend and organisational support.

The experiences that are described in this section show that ‘hands-on’ and close to ‘real-life’ experiences in teaching opens for the opportunity to increase students’ competence beyond the curriculum.

Section IV – Teaching Assistants and Student Reflections on EMERGE Courses



Chapter 11 – Teaching Assistants and Their Role

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NTNU states in their manual that “teaching assistants have a flexible and comprehensive function; they are to help students become aware of their own learning progress, and at the same time they assist lecturers with ‘teaching and supervision’ work. Learning assistants have as their main assignment to assist with supervision, group leadership ... they should not be imposed with independent lectures.” (NTNU, own translation). NTNU further distinguishes in their manual between teaching assistants and student assistant. Student assistants are defined by uniped as, “student assistants as a term are used on assistant positions that are more varied than the position of a teaching assistant, and that their activities are not as connected to the organised lectures with supervision and similar.” (NTNU, own translation).

Students as university employees is widely in use at NTNU and must be seen as strengthening the connection between students and the staff, helping with seminars, analysing data and in a varying degree applying, presenting and publishing research, as well as contributing to course development and project reporting. As well as a variety in employment tasks, there are a great variety of codes and regulations for how the students can and should be employed. There are a maximum number of hours that can be offered to each student each semester, fixed rates for payment and a variety of employment codes, where some of these cannot be used more than a fixed number of years while studying. Students can be employed as teaching assistants, student assistants, aspirants, and after a certain amount of credits the students might be hired as a scientific assistant. The scientific assistant role is also fixed to a certain amount of time and is therefore often hired as researchers if they are to continue working at NTNU.

Several students express that the wages they are offered in any of these roles are too low, meaning they must take on a second part-time job outside of academia to financially support themselves. Tjeldvoll (2006), described the learning / teaching assistant role for NTNU as “[r]ather than just offering help on coursework, these students should be involved in a number of tasks, such as tutoring, facilitating teamwork process, informal feedback and also assessment.” (Tjeldvoll, 2006, p. 82), and that implies that student employees participating in teaching activities is meant to increase students learning outcome. Moreover, student employees as such need to possess a high level of academic results and theoretical knowledge to help other students navigate through their curriculum to increase their level of learning. In EMERGE we have observed that low wages and recruitment is closely connected. How are NTNU supposed to attract high quality student employees when the wages are not competing with other part-time jobs outside of academia. In EMERGE we encourage to explore the roles of student employees throughout our annual cycles to analyse and evaluate how to make these (important) jobs more attractive to students. Moreover, across disciplines in EMERGE we have witnessed that the use

of teaching assistants and student assistants varies, and their use is thus not as straightforward as they are defined. Our experiences with student employees in these categories point us in a direction where there is a need to explore what tasks they undertake in teaching activities.

To be able to develop teaching and conduct research on it, in EMERGE we see it as vital to establish a practice where student employees are included in the organisation as fellow staff members and not only as teaching or student assistants. Several student employees report that they feel alone as they are not considered or included as fellow staff members, as well as their role is expanded out of solely being a student.

By evaluating EMERGE's experimental activities from last semester we see that it would be necessary to define teaching and student assistants differently. Teaching assistants have contributed to the disciplines of social anthropology and geography in a way that falls outside of the standardised definition from NTNU. Teaching and student assistants have in these courses been active contributors in developing explorational activities and in course development in general. They have contributed to develop course material, actively participated in meetings, documentation of research material, and evaluation of explorational activities in EMERGE.

Communication and contact between lecturers, researchers, teaching assistants, and scientific assistants in EMERGE has remained present throughout the semester. Based on the various roles that the teaching, student and scientific assistants have in these courses, we see that their roles do not fit neatly into NTNU's definition/description of neither learning assistants nor student assistants. Our aim for future activities is therefore to explore this role further across disciplines, departments, and faculties.

A fruitful approach towards this could be to explore and define what student employees actually do. By doing this, we could evaluate if it is possible to train and employ students across courses in EMERGE, which would give the student employees first-hand experiences in working cross-disciplinary, and thereby not only increasing learning for the students they guide, but for the student employees as well. Students employed in EMERGE would have a role that is interdisciplinary and contribute to make our research familiar to students around campus. EMERGE's intention is to employ interdisciplinary learning assistants from all disciplines within EMERGE. We see a trend in EMERGE courses already, that third- and fifth-year graduate students often are employed, therefore the aim should be to employ teaching and student assistants interdisciplinary that are currently first- and second-year bachelor students. By doing this we could offer an opportunity to engage the same student employee(s) over several semesters, and thereby give them an active role to spread information and to recruit other students and familiarise them with the activities happening in EMERGE.

Current use of student employees at departments within EMERGE

At the Department of Psychology (IPS) Geography and Social Anthropology student assistants can work up to 120 hours on one contract. These students are connected to the department, while Scientific

assistants often work part-time or full-time over a specific time period. The latter are often former students connected to the specific department.

Student assistants are typically used in the following ways:

At IPS the first-year courses often gathering more than 200 students. A group of student assistants organise study groups for the students. These are voluntary groups that the students are invited into, aiming both at creating a social arena and supplementing their learning in the courses. As such, the activities the student assistants organise are a mix of social games, quizzes and lecturing. The student assistants are typically second or third year students of psychology who recently had the same courses themselves. Future courses may also hire student assistants for various tasks.

Bachelor, master, and PhD projects typically have one or more student assistants attached to them. This student assistant can be used for data collection, for organising the student groups attached to the project, holding lectures, or working with data collection within the project. Examples of the former may be recruiting participants, conducting interviews and/or transcribing interviews. Examples of the latter may be when an experiment requires more than one person (ie. more than the master or PhD student), or when the experiment is double-blinded (meaning that the master or PhD student cannot be involved in the running of the experiment due to their knowledge of the study goals). IPS has a group of scientific assistants who work as teaching assistants. The scientific assistants organise the digital aspects of lectures (creating zoom meetings, organising breakout rooms, setting up the lectures, ensuring the lecturer share the appropriate screens, etc.). They also teach the academic staff how to better use the digital tools available. Additionally, they have produced informative videos on background knowledge necessary for certain first-year courses that have been published on YouTube. They were recruited during the COVID-19 pandemic to assist the teaching staff in digital and hybrid lectures and have remained at the department since. They are currently in negotiations to stay on for an extended period. The teaching staff has relied greatly on their support and expertise and would suffer if this is not upheld.

At the Department of Geography, there are normally less students in each class, and student assistants are used to run seminars, help out with software issues and e.g. organise peer review assessments. In the recent years, students are also hired to be project package leaders, contribute to project applications and reporting as well as conducting research.

At the Department of Social Anthropology teaching and student assistants use the classic anthropological method of participant observation, which complements the participatory learning of the courses. This means that they are establishing a rapport with the students and invest considerable energy in understanding their coursework from their own point of view. Observations are throughout reported and analysed both throughout and after the course. The students' coursework and the course research are thus similarly characterised by an open-ended approach. The seminars are mainly led by teaching

assistants, but researchers are often present as well, and sometimes also lecturers. As the student employees de-emphasise any formal prominence, are the students at Social Anthropology encouraged to formulate and share any genuine frustrations in connection to the course.

Challenges

Bureaucracy is a general challenge. The recruitment process takes a long time, presumably due to the centralisation of the HR department. As most projects are planned well in advance, this is usually not a problem. But if a student assistant quits after being hired, it is impossible to replace them in time. Some projects have been delayed or suffered in other ways due to this. A challenge is often to fit the student assistant's project goals to the student's timetable. For a typical experiment, or fieldwork, there must be sufficient overlap of free time in the schedules of student assistants and the participant(s). This is surprisingly rare. Perhaps mandatory participation in some courses is a cause. Many students also have other part-time jobs or volunteer work that takes up time.

Opportunities

As students are hired by the university, they are given a unique opportunity to learn new material, or to re-learn old material better, as well as possibilities to join project development or research. They also learn how the university works in a bureaucratic sense, and they get unique opportunities to work closely with academic staff. They also teach the academic staff new skills and techniques, often relating to technology. Those attached to bachelor, master, and PhD projects get first-hand experience with most or all aspects of research. Many of them are also invited by the project owner to participate on the scientific papers that might result from these projects, present at conferences or lead workshops. Regarding research it is important for both staff and student employees to be familiar with the Vancouver regulations for co-authorship, and follow these.

Summary

As been described in this chapter, the notion of what a student or teacher is defined as by NTNU does not always confine with the tasks they do. Our open approach in EMERGE would be beneficial to take on the task of exploring the student employee role further. Hired students are in situations where they lead seminars, at all mentioned departments, not asked to provide the students with "answers". Rather, the seminar leaders act as something like extra-knowledgeable interim group members who further stimulate the conversation by actively taking the groups' points of view. Our overall experience is that the use of student employees in EMERGE courses confines with Tjeldevoll's (2003) description of them; a learning resource that could help motivate students and improve their learning outcomes. We therefore ask ourselves if today's understanding of what a student employee, be it student assistant, teaching assistant or scientific assistant, covers the actual use and benefit from the opportunities such

employees could bring to the teaching environment. And finally, we see a need to evaluate the recruitment process, wages and competence outcomes that student employees acquire as staff members at NTNU.

There is a lot of work ahead by exploring these employment roles, and we need to explore how these jobs could be made more attractive for students that want to work in academia.

Chapter 12 - The EMERGE programmes from the student's perspective

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Abstract

Students are an important part of the EMERGE philosophy. Thus, including them in the writing of this report is natural. Students representing the disciplines of geography, psychology and social anthropology were asked to answer a few questions regarding the programme they are studying. This chapter is entirely written by these four students reflecting their views on the different programmes. The reflections are based on their personal experience and does not reflect all the modules on these programmes. These reflections come from students whose education has been deeply effected by the pandemic. This affects their experience of both their programme, lecturers, and the use of technology.

Current educational practices at NTNU

Based on feedback from students studying geography, social anthropology, and psychology, there are some common features that are more and less appreciated within the different courses at the study programmes. One significant factor that strengthens the study courses is that the lecturers are very talented and have a broad, in-depth knowledge of their field. The courses are research based, which implies that lecturers base the content on both their own and others research. Having hands-on experience with the learning materials can make it easier to convey the message in an understandable way.

Despite the advantages of research-based education, there are also some pitfalls. Being overly invested and interested in one's own research can lead to inadequate teaching on other modules within the course. Inviting guest lecturers who specialise in other parts of the field may be a solution to this problem. This creates variation in the lectures and offers different perspectives for the students. Hiring students as teaching assistants also contributes to a diversification of the learning environment. These assistants have different tasks that depends on the course, such as to host seminars, participate in fieldwork, and provide feedback on semester assignments. Being students themselves, they have a different type of insight to the lecturers and can offer other and more interactive ways of learning than what standard lectures can. Many of these assistants also have good insight into the different technology available, and how to use them. They may, however, be less capable of giving feedback due to their academic inexperience, which has in some cases been reported to have a detrimental effect on the

development of students' skills throughout the course. One example being mandatory assessments that the students need to pass before taking the exams. When marked by student assistants often receive no feedback other than whether the work is approved or not. Based on which student assistant is commenting on the work, some feedback may fail to include any reason for the given grade while other feedback is good and constructive. Hence, students may experience a varied level of feedback. Some students have experienced positive feedback from student assistants and subsequently received a lower final grade than expected. This may be a consequence of a mismatch between the student assistants' criteria and the criteria for the final grade.

Students can also volunteer as reference students. Most courses want two to five students to be in a reference group, which opens for a dialogue and collaboration between the students and the course coordinator. They are often used for both mid-term evaluation and final evaluation of a course and represent all the students attending the course. At the end of the year the students' hand in a reference group report with suggestions for improvements for the following semester (NTNU, n.d.). This does not necessarily help students in the current year but could make a significant difference for future students. The cases where the feedback is taken aboard, shows that the course coordinators care about the students' and their opinions.

One of the main findings from the student feedback is about practical learning. Fieldwork and practical learning has been highlighted as a positive and useful way of learning in all departments. The Department of Geography has implemented several field courses and has emphasised on applying theory to practice. This form for learning facilitates a greater understanding of the subject material and makes it easier to remember them for longer. Several other students from other fields of study have expressed that they would also like more practical ways of learning in their courses. For example, students from the bachelors and master's programme at the department of psychology have little practice during their years of education. Giving students the chance to apply what they have learned in practice will also give them an indication on whether they *actually enjoy* the work life they can expect.

Most study programmes consist of both mandatory and elective courses, which give the students the freedom to partially design their own course of study based on individual interests. Some feel that there is a great diversity in courses you can chose, while others may find it harder to select courses that coincide with their interests. For example: many geography students want to immerse themselves in natural geography or follow a more IT-oriented path within the geography field, like working with geographical information systems (GIS). One could solve this by doing a year of study in another subject during the second bachelor year, or supplement with elective subjects along the way. The problem with this solution is that it can be hard to find courses that are relevant enough for geography, and some courses have special admission requirements one may not fulfil. Offering an even greater diversity of courses could benefit the education programmes at NTNU. At some courses, PhD students attend the same lecturers as the master students but are given a more challenging exam. This may be possible to implement on a bachelor and master level as well.

Students also appreciate the opportunity to attend seminars and study groups to work more in depth with the material that was presented during the lecture. These can be both mandatory and voluntary. Some students benefit greatly from this form of learning, while others work better independently and do not feel the need to further discuss the material. These seminars also serve as an arena for feedback and constructive criticism from a teacher/student assistant before the exam, which can be reassuring for many students. Independence is important at this level of education, but guidance is also important to ensure that the learning objectives are achieved. For example, students producing text is great for learning, but feedback given on course work is essential for students' understanding of their capabilities and progress and to help them prepare for exams. NTNU could benefit from having a greater focus on pedagogy when hiring teachers and designing the study programmes. Even though there are many highly skilled professors and researchers at NTNU, how they manage to reach out to the students varies greatly. Unfortunately, some professors spend a significant amount of their time on their research and do not necessarily spend enough time on the quality of their teaching.

How technology is used across the programmes today

Technology is inevitably a part of all programmes as students must use a computer to access and read articles, write assignments, download documents, respond to emails, etc. NTNU generally uses platforms such as Blackboard, Innsida, and student email for basic organisation of the everyday and information flow between lecturers, student assistants, and students.

Technology is also in prolific use during teaching at the different programmes. Most lecturers decide to base their lectures on a power-point presentation with pictures/animations and key words and then to elaborate from those. It can be beneficial to keep it simple, since many are not skilled enough to implement more technical solutions as seamlessly as required to improve the lecture. In recent years there has been a growth of applications and tools that can be used in a range of learning situations, i.e., Mentimeter, Kahoot, YouTube videos, discussion forums, VR (virtual reality)-technology, and podcasts. Such media contribute to a more diverse and interactive way of learning and engage the students in other ways than a traditional lecture does. They encourage reflection, discussion, and evaluation from the students – which can be very beneficial.

The shift to digital learning has presented a great deal of challenges over the last couple of years. For example, not all lecturers can use the equipment (PowerPoint, microphones) without assistance. Across the programmes, there is a great deal of technology being used as a teaching aid. One example is from the department of psychology who wanted more practical learning in the study programme. The programme offered little to no practice, even though interpersonal relationships were truly relevant in future employment. Good skills in interpersonal relationships are hard to attain without practical experience, but since the study course did not offer this, implementation of technology was an option to cover this area. In this specific programme, the lecturer took it upon herself to create such

learning materials. Today, the course uses VR as a way of letting the students experience relevant interpersonal scenarios. VR is also being used in different courses in geography and social anthropology.

Some lecturers in geography and psychology use Mentimeter as a way of creating interactive lectures. By using Mentimeter actively throughout the lecture, the students are engaged while the lecturer explains the curriculum. All the students in the room have the opportunity to ask questions and react to what the lecturer says throughout the lecture. In addition, control questions are asked that the students answer anonymously on their mobile phones. In this way, the lecturer can assess whether the main objectives of the lecture have been correctly understood by the students. A similar technique was described from a lecture on feminism on the SANT1020 course. Here, Collaborate and Padlet were used which encouraged students to write down ideas and keywords on a collective board which could be saved and kept after the lecture. This received some very positive feedback from the students.

The platform Blackboard is used across most courses at NTNU. One of the teaching resources on Blackboard is “discussion forums”. This has been used with great success in many courses at the department of geography. By using this the students get the opportunity to ask questions that are visible to everyone. The answers are also visible to anyone who has access to the topic on Blackboard. This means that students who are wondering about the same thing get help and students can help each other.

There is a big gap in how technology is used from subject to subject. Some lecturers only use PowerPoint as a tool in teaching, while others develop their own VR experiences for use in teaching. Most of the lecturers are based around PowerPoints which that are pretty basic. They help students pinpoint the key points being addressed but do not make the lecture interesting, and students feel that they lack the visual element of learning. Visual elements may increase learning outcomes by requiring students to use their eyes as well as their ears. Hence, the students must include several senses into the learning process. In addition, the learning material is presented for the students in diverse ways, which may lead to a better and deeper understanding.

During the pandemic, NTNU was initially forced to implement more technology into the teaching across all courses. With the use of online streaming of lectures (Zoom, Collaborate, Panopto), they were able to offer lectures despite national covid-restrictions. Many lecturers and courses still offer these solutions, enabling for long distance learning. This can be advantageous for those who are not able to attend lectures but still want to follow them. The downside of the streaming is that the learning environment is compromised for those who attend physical lectures. The auditoriums are less full, and the lecturer gets less feedback from the students. In addition, it makes it harder for students to get to know each other when people do not attend lectures, and there has been reported a lack of the feeling of unity between students in recent years.

Some courses have given the students the opportunity to rewatch lectures by recording them if needed. This has been both positive and negative. On the one hand, this means that a larger proportion of students have the opportunity to see all the lectures. In addition, it is a useful tool when it comes to

exam preparation. Having lectures recorded has been described as extremely helpful for students to be able to rewatch and catch parts they missed. During hybrid lectures, it is often hard to communicate with the lecturer during the broadcast which can be frustrating. Lecturers also struggle to find a middle ground between getting students to participate and making sure everything is picked up by microphones so people can hear on the recording. On the SANT1019 course, the lecturer gave a microphone to students who contributed or had questions during lectures. This was experienced positively and contributed to important discussions between the students.

In the last two years, zoom has been used the most due to the pandemic. A general recurrence has been that other types of technology have been deprioritised. Technology, such as VR-technology and apps, have not been used as much in the teaching context on the courses at NTNU.

In seminars and study groups led by students, technology is used more frequently. In this context, different methods are used to engage the students, for example Kahoot, word cloud, digital questions, etc. Other courses use podcasts, video recordings and other ways to let students produce their own content. This is not the standard for most, but a commitment from some lecturers. Some of the lecturers have also made engaging YouTube videos on complex topics to make it easier for students to learn. This video has received particularly good feedback from the students who think this presents the curriculum in a much better way, making it easier to understand than reading an article. Similarly, some lecturers at the department of social anthropology have made a podcast based on different relevant subjects relevant to the students. This podcast is greatly used by the students as an alternative way of preparing for exams.

In the vast majority of subjects, technology is used to a greater or lesser extent. Especially in subjects led by young lecturers, technology is in diligent use. It is clear that the subjects in which technological solutions are used are more engaging and engage the students in a better way than the lectures that only contain passive teaching. There are still many who stick to the traditional teaching methods of lectures, seminars, and semester assignments, which may also be a good thing.

How technology should be used in the future

Technology is constantly evolving. By understanding and using this technology, students' learning outcomes may improve. There are several technological solutions that are already used to help improve lectures. In addition, technology can be useful by making a lecture more diverse, and thereby more attractive. By implementing the right technology, lectures will be more engaging for the students. The students could then experience a shift from a passive learning process where the lecturer is talking and the students are listening, to an active learning process where the lecturer allows the students to engage and take an active part in the lecture. The shift from passive to active learning may encourage students to develop critical thinking and independent reflections instead of being fed with information from a

lecturer. This change does not necessarily include technology and may as well be done without technology.

On the other hand, technology and lectures are not always a well-established duo. Several students have experienced that the lecturers do not know the technology well enough to use it as a fortifying element in their lectures. By implementing technology without having a proper understanding of it, it can take up too much time and disturb the lecture. Therefore, it would be beneficial for both students and lecturers if lecturers got more training on how to implement various types of technology. It would also be beneficial to learn when to use the various technological solutions. Technology itself will not necessarily enrich learning unless it is used in a correct setting. For example, it will not be useful to use Mentimeter if the lecturer does not use the information they receive from the students to cover knowledge gaps and reinforce learning. It is clear that a support system is needed for those who want to use technology to a greater extent in teaching; both by setting aside time and financial resources for this to be developed, but also in the form of the lecturers being able to learn how to use more technology.

One way to implement technology in teaching is to let the students explore technology independently with guidance from a teacher or a specialist. By applying this approach, students can produce academic content in the form of podcasts, videos, reports, and so on. If the content that is made is at an academically satisfactory level, it may be further used as learning material for other students. By having complex academic content presented from a fellow student's point of view, it can be easier to understand. If this is well executed, it can be perceived as instructive for both the maker and the observer of the academic content.

As most individuals have access to computers and receive software for free from NTNU, it is useful and timesaving for both students and course coordinators to take advantage of such solutions. In classes, lecturers can make use of animated figures to explain different concepts, play videos that are relevant to the topic being covered, use AR (artificial reality)/ VR technology to let students "explore areas" they do not have the opportunity to travel to. Additionally, students are encouraged or expected to take advantage of several different programmes, websites and applications in exercises, semester assignments, and independent work. This form of technology makes it easier to gather information in one place, making it more accessible and simpler to find. This can also enable students to work creatively and create unique products using technology. Similarly, the lecturer can present the teaching in new ways and make the material easier to both understand and remember.

Technology can also be used to cover areas where the traditional methods do not suffice or where the cost of implementation is too high. An example of this is to use technology to create a stronger community with similar bachelor or master programmes from other universities. By establishing such a community, students from different countries with a common academic interest can take part in joint projects, get a broader understanding, and get more engaged in their study programme. This has been done in courses such as GEOG2500 and EDU2001, although on a small scale with few students.

VR is one of the up-and-coming technologies that are relevant for enhanced learning among students. It is also a good example of how implementation of technology has to be done in the correct situations. VR provides an opportunity to visit places and situations that are relevant for students, for example revisiting a field area when working with collected materials after a field trip in geography. By using this technology properly, it can enrich the learning outcome. However, one should be careful not to replace the original activity with a virtual reality experience. Additionally, virtual reality is not suited to all learning activities, and hence it is important to use the correct technology in the correct setting.

This demonstrates a challenge to the implementation of technology. Today there are multiple technological solutions to choose from and it is not a given which solution is the best for a particular purpose. If a student were to recite the technologies used in academic situations, they might list over ten different programmes, apps, or websites. This reflects of how there are too many technological solutions that too few students or lecturers are well acquainted with. In addition, most students and lecturers are not aware of half of the technology available. The wide range of different technologies makes it difficult for lecturers to both choose the appropriate solution and to get an in-depth understanding of all of them. Several students have experienced that this leads to a lack of knowledge of several technologies instead of thorough knowledge of a smaller selection.

Today's society is getting increasingly technological. By introducing students to technological solutions, they will be better suited for the future job market. This does not only apply to technology used for learning, but also technology that may be relevant in future jobs within a specific field of study. The type of technology will vary between different study programmes. In geography for example, increased focus on the programming tool Python and the mapping software ESRI (Environmental Systems Research Institute) may strengthen the students' future opportunities. This can be done by implementing technologies in relevant subjects and by encouraging students to learn more by having assignments where the technologies are being used. A broader technological competence will make students more attractive for a future employer than students from a similar study programme without technological skills. Therefore, technology relevant to each academic field should be implemented early in the study programme and used throughout the course of study.

Summary

Given what has been mentioned in this chapter, NTNU's study programmes have several good qualities which ensure a good learning outcome and environment. Being a science-based university with skilled researchers offers lectures of high quality and inviting guest lectures contributes with other perspectives and breaks up the normal environment. Students play a key role as part of reference groups and working as teaching assistants. Technology is already part of most study programmes, but many courses could benefit from implementing new and different forms of technology – as long as it improves and does not

interfere with the teaching. Lastly, putting more emphasis on pedagogy could lift the overall impression of most study programmes.

Section V – Projects from Collaborative Partner



Chapter 13 - Teacher Education: Learninglab 2021-2023

Mari-Ann Letnes

Background for the project

The technological development is moving at a rapid pace, where new technology changes the way we interact, learn, and express ourselves. Which in turn creates opportunities and challenges for facilitation, staging, knowledge sharing, information flow, learning and innovation in most areas of society. The school's task is to equip the student for life mastery and participation in this diverse, and at times chaotic, landscape. Life mastery is about being able to understand and be able to influence factors that are important for mastering one's own life.

The digitalisation in society creates new opportunities and new ways of learning. NTNU and the Department of Teacher Education will be a key contributor to the systematic development of teaching practice in Norwegian schools. A stated vision for the ILU is to help change and develop schools, teacher education and the field of education in line with the UN Sustainable Development Goals.

At the same time, it is emphasised in the ILU's strategy document that new qualification requirements for primary and lower secondary teachers, increased diversity in the pupil group, technological development, professional renewal, and increased documentation requirements are factors that contribute to new competence needs in schools. Establishing a learning lab at campus Kalvskinnet is one of many measures to meet the new competence needs in Norwegian schools.

The learning lab is established with the learning space of the future in mind. With this, the learning lab is a room that facilitates the opportunity to develop, experiment, explore, collaborate on, create, and share good teaching practices. Among other things, the learning lab aims to challenge different actors' thoughts on didactics, pedagogy, technology, and the design of learning spaces. Through a framework that highlights five learning styles or ways of learning, we want to facilitate the development of teaching where competence for the 21st century is highlighted.

The five principles of learning that we highlight are: presenting subject matter, exploring subject matter, interacting on subject matter, creating representations of subject matter, and evaluating both subject matter and learning of subject matter.

Both students and teachers at ILU, and other institutes at the university as well, as pupils and teachers in the field of practice will be users of the room. In this way, with this learning lab we will facilitate cooperation on an exploratory and experimentative focus on the development of good teaching practices across subjects, knowledge traditions and educational level. This interdisciplinary and inter-institutional collaboration will contribute to dynamic and co-created knowledge, developed in terms of

learning and teaching for the 21st century. The project will include both the interface between physical space and digital space, technology inside and outside the room, organization, learning methods, didactics, and pedagogy.

In the period 2018-2020, the Institute for Teacher Education carried out a development project called DigGiLU. DigGiLU aimed to increase the professional digital competence of the university teachers. One of the five sub-goals of the project was to develop a room that provides the opportunities to stage learning by using a variety of digital technologies. The room would also give teachers and students the opportunity to explore, interact and create academic content for learning and teaching. The basic ideas behind the subproject were continued in the autumn of 2021 when SU and the ILU decided to provide the project with financial capital. It is this part of the project that now forms the basis for establishing the learning lab.

Purpose

Create a learning arena that enables students and teachers to present, explore, experiment, interact and create academic content for learning and teaching.

Milestones:

- Create a classroom that provides rich access to varied digital technology
- Create a classroom that allows teachers to provide technical support in the teaching situation
- Create a learning space that allows for courses and competence development in the use of various digital resources
- Create a learning space that gathers and forms a team for a digital community among teachers and students

Framework

Through its design and varied access to digital teaching aids, the learninglab will facilitate the observance of 5 basic principles for learning and teaching, these are: to present subject matter, explore and experiment with subject matter, interact on subject matter, create representations of subject matter and evaluate both subject matter and learning and teaching of subject matter.

Presenting

The classroom of the future, teachers and students will need new tools and skills to be able to present knowledge and stage learning processes.

How course content is presented to students is an important component in reflections related to students' learning. The room must enable and facilitate both teachers and students' presentation of content in such a way that an entire group can have a common focus. This is both about the teacher's presentation of the subject content to be taught, at the same time as it is important that students get the opportunity to present their understanding of the same course content.

Through interactive presentations of subject matter with a focus on design, layout, communication and sharing, the teacher can facilitate dialogue and professional discussions related to both the subject matter itself, learning and teaching. In addition to a meta-discussion related to how to present subject matter, or how to facilitate students getting an overview or an insight into the subject matter that lays the foundation for their learning in the relevant session.

Explore

The learning lab will be a learning arena where students with the use of varied learning resources will have the opportunity to experiment with and explore established knowledge structures and maybe challenge established truths about learning and teaching. In the learning lab, students are encouraged to discover for themselves; they are given the opportunity to be active learners and participants rather than passive listeners. With this focus, educators can promote exploratory and project-based learning to improve students' ability to think critically. This requires a flexible physical room set-up that support staging of different learning strategies.

With this the room has physical zones that quickly can be reconfigured to enable work in groups, pairs or individually. Digital technology available in the room will give students the opportunity by offering rich, versatile, and authentic solutions, where students can examine and analyse various learning activities.

Interaction

In the learning lab, teachers will be able to use technology to increase interactivity and student collaboration. A challenge in the traditional classroom is to get all students actively involved; technology enables students to contribute with their understanding of the subject matter. The solutions vary from individual devices such as tablets and smartphones, to interactive whiteboards and interactive learning content. The focus of interaction involves learning based on both the teachers and the students' active involvement and participation.

Create

As society, school, and education change from a knowledge tradition where the transfer of knowledge was the prevailing idea and over to an understanding of knowledge where the idea is that knowledge is constructed by the individual, the tools, and methods we use in the learning process must also change.

The learning lab will facilitate learning with this in mind. In this way, the learning lab will facilitate students' production of content and by this the students are active in their learning processes. Students will be able to create and interact with the process of creating by using their phones, tablets and computers, and other digital solutions and technologies.

Project organization and anchoring

The project is designed with a project management and three subgroups: user group, operations group, and workgroup. The groups, participants, and mandates are outlined below.

User group

The user group includes a representative from each discipline, student representatives and the project management. The user group has the task of providing input to the content, design and use of the learning lab. It is important that the user voice is given a central place in the development and the use of the learning lab. It should both provide participation and meet users' expectations, wishes, and needs.

Using NTNU's internal website, all employees at ILU are encouraged to provide input, and regular user group meetings are also arranged. The input from the user group is taken further into the workgroup where, among others, Architect Eggen is represented. Based on the input, proposals and floor plans of the room are designed which in turn are taken back to the user group.

Workgroup

The task of the working group is to complete the physical learning space. In this group, the design of the room, budget, ordering of digital equipment, etc. are prepared. The group has regular meetings.

Operation group

The main task of the operating group is to design a strategic plan for the use and operation of the learning lab.

Chapter 14 – Immersive Technologies for Learning – Department of Education and Lifelong Learning

EkaterinaPrasolova-Førland

IMTEL (Innovative Immersive Technologies for Learning) at the Department of Education and Lifelong Learning (IPL) is an interdisciplinary research group led by prof. Prasolova-Førland working in the intersection of learning and immersive technologies and is a leading national research environment within Immersive Tech for learning. It possesses significant expertise in developing and evaluating immersive technologies for learning in varied contexts, ranging from university education to emergency and medical training and workplace training. The group collaborates actively with representatives of local and international industry and the public sector. Members of the IMTEL group have considerable experience developing VR and AR software and content. <https://www.ntnu.edu/imtel>. IMTEL group has developed a strategy of 3 ‘E’s: explore, educate and experiment. The group teaches a number of courses on or with immersive technologies: Experts in Teamwork - Virtual and Augmented Reality (VR/AR) for Learning and Training <https://www.ntnu.edu/studies/courses/PED3801#tab=omEmnet> and courses for adult learners as part NTNU continuing educations: Future technologies (VR/AR) for learning <https://www.ntnu.no/videre/gen/-/courses/nv19888> and Future technologies (VR/AR) for digital collaboration <https://www.ntnu.no/videre/gen/-/courses/nv18921> + new Uniped module on Immersive teaching and a ‘Minor/Tverrfaglig profil’ on “Digital innovation” (see detailed overview of selected courses below). IMTEL is actively engaged in supervising and co-supervising 9-10 master students every year and 2-3 semester-long team projects with students from different study lines at NTNU, all working in the IMTEL VR lab on topics related to learning with VR/AR, in collaboration with external experts from various research groups at the university, local companies, or public organizations. The group is also contributing to the development of innovative XR course on Human Security at the Norwegian Defence University College, introduced by the Prime Minister Støre at the UN Security Council meeting 25.01.2022.

IMTEL has produced over 200 international scientific publications on the topic of emerging and immersive learning technologies and is involved in several national and international externally funded projects, including 5 Erasmus + projects, all focusing on some aspects of emerging/immersive technologies. The group has developed a series of VR apps for career guidance in collaboration with NAV. The group is a part of VR-Learn project financed by HK-Dir and is responsible for developing

software for low-cost virtual field trips. The group got recently awarded EU Horizon CSA project XR4HUMAN and will work on developing European guidelines and best practices for ethical and inclusive XR. In collaboration with Dept. of Geography, IMTEL has developed ReactVR app visualizing the effects of climate change that has been recently tested with 151 students from Sverresborg school in Trondheim.

A part of the IMTEL's strategy is systematic efforts towards supporting cross-disciplinary collaboration, diversity and inclusion, e.g., actively engaging vulnerable youth in the development of emerging technologies projects (Virtual Internship) and arranging events to increase women's participation in the field of immersive technologies. IMTEL group has hosted 12 IMTEL Innovation days and stand-alone events and national/international lab visits with the focus on demonstration and raising awareness of XR/emerging technology and community/stakeholder engagement.

Dragvoll VR lab, which is managed by IMTEL group, is a unique innovative learning and research space for students, teachers, and researchers from all study programs at NTNU to explore, learn and experiment with VR, AR, and MR in learning and training. It is a top-modern and innovative lab/learning area designed, and equipped, for VR/AR, one of the most advanced labs of the kind in Norway and Europe. Since its official opening in May 2018, the lab has had a very high activity level, supporting a wide range of educational, research, innovation, and dissemination activities. The lab and the equipment there have been used for teaching several courses from (SU): IPL, Dept of Teacher Education, Dept of Geography, Social Anthropology, as well as courses from HF, MH, IE, and AD. The lab has received visits from several local and international organizations and is involved in several nationally and internationally funded projects. A part of the lab's strategy is systematic efforts towards supporting cross-disciplinary collaboration, diversity, and inclusion. Following COVID-19 pandemic, the lab has developed advanced hygienic protocols and methods for hosting hybrid dissemination activities. *(Garcia Estrada, Jose Fernando; Prasolova-Førland, Ekaterina. Running an XR lab in the context of COVID-19 pandemic: Lessons learned from a Norwegian university. Education and Information Technologies: Official Journal of the IFIP technical committee on Education 2021)*

Selected immersive tech courses taught by IMTEL:

PED3801

Is an EiT course with the focus on VR/AR in learning and training, run since 2017. As learning environments, immersive technologies afford immersive and explorative learning spaces, well suited for developing high-impact pedagogies. VR / AR technologies have been used in learning and training in very different areas, including the military, aquaculture, sports, history, medicine, chemistry, emergency training, etc. The course involved cross-disciplinary student groups from psychology, pedagogy, IT, cybernetics, geography, physics, architecture, and other subjects working towards

stakeholders from NTNU and companies, following design-thinking methodology. The students have developed a range of educational apps, supporting career guidance, teaching STEM, history, HMS, language and other subjects. As a part of the course, we have performed several innovative studies on XR for remote learning and collaboration (*Prasolova-Førland, Ekaterina; McCallum, Simon; Garcia, Jose. Collaborative learning in VR for cross-disciplinary distributed student teams. I: 2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW). IEEE 2021 ISBN 978-1-6654-4057-8. s. 320-325*) and using online VR for teaching during COVID-19 pandemic (*Prasolova-Førland, Ekaterina; Garcia, Jose. Towards increasing adoption of online VR in higher education. I: Proceedings 2021 International Conference on Cyberworlds CW 2021. IEEE 2021 ISBN 978-1-6654-4065-3. s. 166-173*)

PED6050 (EVU)

This course addresses the challenges faced by the organisations where the world and global markets are in constant change placing new demands on digital competence and adaptability. These challenges can be met with innovative technologies for training and lifelong learning. Examples are VR / AR technologies that provide several opportunities for rich and interactive lifelong learning and competence building, including distance learning, which is particularly relevant in the context of the covid-19 pandemic. This is the course primarily for leaders at industry and public sector where we focus on learning with emerging technologies and organisations. The participants of the course get regularly involved with student projects and research projects at NTNU and join our extended network.

UNIPED Module “Teaching in Immersive Learning Environments”

This module is about reflecting on the affordances of immersive technologies to supplement teaching in higher education. Immersive technologies (Virtual and Augmented Reality, VR/AR) can provide engaging collaborative environments for learning, enable 3D visualizations of complex concepts, and allow exploration of situations not possible otherwise, something that became especially relevant during the pandemic. In this module, the participants will get an understanding of pedagogical approaches most commonly associated with educational immersive technologies and the best practices that can help them use immersive technologies successfully in their teaching. By participating in this module, the participants will reflect on best practices, pedagogical approaches, and strategies for teaching physically and remotely using immersive technologies (including basic concepts, tools and procedures) in relation to own pedagogical practice. The module will identify the core research topics within the field of immersive learning, encouraging the participants to explore the connections between their existing research and innovative pedagogical practices. The module will also enable participants to decide on the adequate use of immersive technologies in their teaching and establish flexible and inclusive hybrid

learning spaces for their students. The participants will be qualified to advice and support colleagues or their teaching units in using educational immersive technologies.

Section VI – Further development based on shared experiences

Based on our experiences that are presented throughout this report, we shall now point towards topics that are central to continue to explore in EMERGE in the next annual cycle, starting autumn 2022. Our selection is based on where the demand is highest and based on the ongoing themes that are currently implemented in our classroom experiments. Moreover, feedback from researchers, students, and others involved have played a part in making this selection. The list below is not complete and should therefore be read as a suggestion to how the practical scheme and the following discussions may evolve in the autumn 2022 and spring 2023 semester.

Future development of EMERGE as an organisation and research practice

Ensuring systematic consolidation of EMERGE would be a prioritised task in the next annual cycle. These tasks refer to our research practice, collaboration, and organisation internally in the project, and how we disseminate and share our experiences to the world around us.

Research practice:

- We will systematically develop practices for research focussing on new and emerging technology and teaching methods/practices. This includes:
 - Continuing to develop those methods that are already practiced in the experiments that this report has outlined.
 - Develop a practice to use methods across the cross-disciplinary research group.
 - Continue to develop the annual cycle of exploration and sharing of experiences between experiments.
 - Explore how to triangulate joint methods to use in new case-studies.
 - Establish a cross-disciplinary forum for research methods.

Organisation:

- We shall continue to develop the EMERGE's organisation and collaboration.
 - Make sure that we have an established practice for good meeting points between participators throughout the semester.
 - Organise gatherings throughout the semester.
 - Keep being open-minded and share experiences from our various experiments.

- Strive to increase collaboration between academic staff, teaching assistants and student assistants.
- Establish a more systematic collaboration with our support apparatus (BLINK, etc.)
- Explore opportunities for co-locations between EMERGE's actors.

Network:

- Work systematically with establishing contact and collaboration with others (both internally and externally at NTNU), that desire to, or already partake in similar experiments and activities in their teaching.
 - Invite other professionals at NTNU who wish to try our experimental teaching in collaboration with EMERGE.
 - Work towards making EMERGE visible at NTNU.
 - Establish contact with external collaboration partners to share experiences.
 - Continue to develop and establish similar project in collaboration with others.

Thematic areas for exploration

Below we present some core themes for further exploration.

The role of student employees

Through our first annual cycle with experiments, we have discovered that the use of teaching and student assistants varies significantly, and we have seen a substantial potential for improvement when it comes to the use of student employees. This theme will be explored more in-depth in the new annual cycle:

- What does it mean to be a student employee, and how can they be used differently? We will continue to map the various roles that student employees fill at the university, everything from seminar leaders to process tutors.
- Recruitment: It can be difficult to recruit competent teaching assistants for the different courses. We want to explore how the recruitment process could be better through looking at:
 - Formal and motivational measures as wages, job title, and perhaps ECTS credits.
 - Disciplinary and social motivational measures like, merits and teaching culture.

- There is a need to strengthen contact points between student organisations, students, and EMERGE.
- Practical training of student employees
 - Practical training/sharing of experiences (apprentice)
 - Development of training course and organisation of student employees.
 - A connection/link to subject specific need and training.
- Co-creation of teaching
 - Involve student employees in developing courses.
- Student employees as researchers
 - When teaching is explorative there is a need to share and gather experiences. We will explore what role student employees could have as partners when doing research about teaching.

Education in a holistic context

We will continue to explore areas that make up the whole context for teaching and learning. This includes to explore the organisation, technology, physical, and social environments.

- Continue to explore organisational “obstacles/wicked problems” that we encounter when experiments are implemented in EMERGE.
 - This is based on concrete experiences from teachers and researchers, when they seek to find solutions on a higher level than the individual teachers contact with own department.
- Organisational obstacles include:
 - The ordering of rooms and time-schedules.
 - Establish exams that coordinate with the pedagogical goals in each course.
 - Ordering and use of ‘un-common’ learning technologies.
 - Using student employees in new ways.
- Buildings and rooms.
 - Campus of the future. We will continue or collaboration with *Fremtidens Campus*, despite the increased uncertainty regarding co-locating the entire NTNU campus. This especially, includes the work of developing specifications for rooms that are suitable for student-active learning forms, rooms suitable for edtech, and rooms that are organised in such a way that it also includes students psychosocial learning environment.

- The exploration of emerging technologies in teaching is one of the main objectives in EMERGE. We will continue with already ongoing research from this first annual cycle, and additionally discuss and implement new themes.
 - Continue to develop the exploration of VR-technology in different fields, based on the individual objectives that are connected to these.
 - Look for new strategies in order to safeguard privacy concerns.
 - Look for overreaching strategies to include emerging technologies in teaching.
 - Contribute to clarifying questions concerning the rights connected to the use and? development of new technology.

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