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EMERGE 2023

Emerging Education – Emerging Technology:

Exploring the Emerging University

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EMERGE
Centre for Student-Active Learning
and Emerging Technologies



Report

EMERGE 2023

Emerging Education – Emerging Technology: Exploring the Emerging University

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Preface

This is the second annual report of EMERGE. Here you can read about our experiences from the last years activities. The chapters are written by the participants which together make up this collaboration that we call EMERGE. We are teachers and researchers at NTNU, as well as students, student employees and administrative staff, engaged in trying out emerging ways of teaching and learning, and emerging technologies. The idea behind EMERGE is to come together and learn from each other's mistakes and be inspired by each other's success. By the systematics of the annual experimental cycles, we aim to gather experiences and develop our teaching further, making NTNU a better world.

I want to thank all participants for your contributions to EMERGE and this report. Also, and equally important, I want to thank you all for contributing with good spirit and great joy, it is a pleasure to work with you! Furthermore, I want to thank the faculty of social science and education for supporting us – without this support we would be unable to carry on.

Dragvoll May 16th 2023

Håkon Fyhn

Project leader

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Summary EMERGE Report 1 2022

The EMERGE 2022 report was the first report of the cross-disciplinary research group. In the first report project leader Håkon Fyhn described EMERGE as a “Centre for emerging forms of education and technologies (Mørtzell et al. 2022, p. 5). It 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 the first annual cycle EMERGE consisted of people from the Department of Psychology, Geography, Social Anthropology, Teacher education, Pedagogy and Lifelong Learning (Uniped and IMTEL), as well as the BLINK faculty support unit.

EMERGE’s first annual report was divided in five sections:

In the first we described EMERGE as a cross-disciplinary research group, with a focus on innovative and explorative teaching methods. Further we described our common objectives, methods, learning philosophy and goals of research and collaboration (p. 11) We elaborated further on our mission of exploration of emerging technologies and teaching methods, project mission, research cycle, philosophy (Cf. Figure II, p. 19 in the first report). We also discussed challenges that teachers and researchers at EMERGE encounter when practicing explorative teaching.

In section II we described our common research practices and discipline specific research practices and methods. We especially emphasised cross-disciplinarity rather than interdisciplinarity, due to our vision of keeping discipline specific approaches rather than melting our various disciplines into one “holy grail” discipline. We defined our methodology and defined how we understand terms like, “*Classroom laboratory*” (p. 26-27), “*Wholeness and hermeneutics*” (p. 27-28) and “*Research ethics*” (p. 28-30), analytically. Furthermore, we emphasised that students should be treated “more like fellow researchers than research objects” (p. 27). This implied doing our best to include and involve them in as many phases of the research process as possible. By sharing our approaches to method and theory, we have been able to identify differences and have thereby established a common space for understanding research practice – a space where we share and learn from each other.

Section III illustrated the usage of emerging technologies in teaching. In the section contributions we described how different technologies are used not for the technology itself, but for the overall aim of increasing students’ learning and motivation in university courses. Technology is in this section described as a learning tool to increase student activity in learning and giving students more ‘hands-on’ and ‘real-life’ experiences by brining life outside of academia into the classroom. Moreover, in this section we emphasise that implementing emerging technologies in teaching could be troublesome at

times, and running into different practical and organisational obstacles is a part of the process. Our findings suggested that by experimenting with such technologies in teaching, we contribute to engaging the students as active partners in exploring and producing, rather than passive receivers of academic and disciplinary knowledge (p. 103), making the teaching more ‘student-centred’ rather than ‘teacher centred’ (p. 103).

In section IV, we emphasised the role of student employees, and discussed our own experiences of using student employees as essential partners in teaching and research. In this section students from social anthropology, psychology and geography contributed with a chapter elaborating their own experiences of being students in courses where explorative teaching is a part of the course. In the last two chapters of the report our partners from IMTEL and Teacher Education illustrate and describe their research and projects which are connected to EMERGE.

The fifth, and very last section of the report suggested topics to be explored in the next annual cycle of EMERGE, autumn 2022, and spring 2023. The result of this cycle is described in the present report EMERGE 2023.

Chapter 1: Introduction

Håkon Fyhn, Tonje Mørtzell, Department of Social Anthropology, NTNU

This report marks the end of the second turn of the EMERGE research cycle. The chapters that follow present experiences, results, and emerging questions from our work during the autumn of 2022 and of spring 2023. Based on experiences from the previous year, a set of topics was pointed out for further tests and studies. These went into the planning of next year's activities to be tested out and documented in teaching during the year. At the end, they were analysed and written out as chapters in this report. These analyses also form the basis for the annual conference to be held in June this year (2023). This process constitutes what we call the EMERGE research cycle:

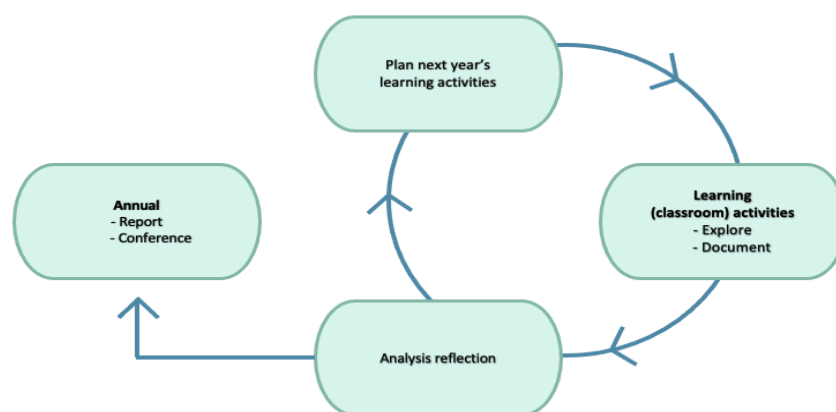


Fig. 1 - The EMERGE research cycle is further described in [the 2022 report \(Mørtzell et. al. 2022, p. 17\)](#).

The report from 2022 concluded with a set of topics suggested for further studies. These were refined during the annual conference in 2022. They can be divided in two categories: 1) further development of EMERGE, and 2) further exploration of research topics.

Development of EMERGE – organisation

Ensuring systematic consolidation of EMERGE will be a prioritised task in the next annual cycle. These tasks refer to our research practice, collaboration, and organisation internally in the project, in addition to dissemination and sharing experiences externally.

Regarding organisation

We organised two larger workshops during autumn 2023, in addition to a number of more informal meetings regarding specific topics, or with new partners. The collaboration has consolidated, but we

still see a need to meet more often to present and discuss what we are doing, for example every second month during the year.

In addition to the formal meeting, we need to emphasise that the informal contact we have had probably has been most important. The better we get to know each other, the lower the threshold is for getting in touch. One principle that stands firm, is that however we organise us, we need to make sure that we have a good time together. The social side of the collaboration cannot be stressed enough.

Including students and student employees in our organisation has been very rewarding, in particular, the collaboration with VR-learn has proven valuable in this respect (see chapter 4). However, there is still some potential for including students and arranging events led by students and student employees.

Also, our collaboration with the support apparatus at NTNU has developed during the last year. In addition to BLINK Learning Hub (see chapter 9), which we collaborated closely with from the start, we have deepened the collaboration with the Section for Teaching and Learning Support (SLS) regarding emerging technologies, and topics such as GDPR, and data security. This collaboration has been essential in order to navigate the grey zones that follow the use of emerging technology in teaching and research.

It has been important to make EMERGE something people want to join, and not another level of administration. As such, we have held an open invitation for people engaged in experimental teaching, yet without pushing it on anyone. Through this approach we have gained a new member from the Archaeology section, where they experiment in using VR in teaching for fieldwork and archaeological sites (see chapter 2).

Our research practice follows the circle-structure set up the first year, while focusing a bit more on academic dissemination and publication than last year. Several publications are on their way. We also took part in the Learning Festival at NTNU in May 2023 with four presentations/workshops. We have put emphasis on letting the different participants decide which research methods to use, all according to their own academic traditions, as long as the results can be discussed across the disciplines. Yet, there might be room for closer collaboration when it comes to methods.

Thematic areas for exploration

During the autumn 2022 and spring 2023 cycle several research topics were followed up from the year before. In particular, the use of VR-technology has played a major role in the experiments for several partners. This is also reflected in the chapters that follows.

Another topic we aimed at exploring deeper is the role of student employees. Here we sensed that there was a still great potential for development. The Autumn of 2022 we initiated a qualitative study that provided some interesting results (see chapter 6). These studies indicate the need for further studies in this area during the next annual cycle – autumn 2023 and spring 2024. We also aim to contribute to the development of NTNU's training programs for student employees.

A third topic we explored is what we may call the holistic context of teaching and learning, including organisation, technology, physical, and social environments. For example, we have initiated studies of academic social environment for students and employees, including both physical and digital social arenas, financed by *Fremtidens campus*. In addition, we have continued to explore organisational obstacles, or reoccurring problems that all engaged teachers and researchers in EMERGE seem to experience. The results of these studies will not be ready until next year's report. In the following chapters, this year's research is presented in more detail:

The chapters of this report

The first chapter of this report summaries some of the main experiences from EMERGE's second annual cycle – autumn 2022 and spring 2023. It introduces the overall goal for this year's research on teaching, consolidations of new partners, and strengthening informal bonds with existing partners. This chapter summaries the first annual Report from 2022 and briefly describes the chapters that is presented in this report – the annual report of EMERGE 2023.

The second chapter takes on the study of archaeology where they approach, test, and use different technological tools in their BA and MA program. Visits to historical sites and landscapes makes an important part of the education. By exploring with 360° footage and VR-technology, Heidrun Stebergløkken and Martin Callanan elaborate on how the use of these in teaching benefits both teachers and students. The authors emphasise that they want to equip students with abilities to understand how to annotate different software and hardware resources that they can use in their studies and future work life with archaeology. They further emphasise that the overall goal is to equip both students and teachers with the right practical tools to become adaptive users of technology in a life-long perspective. In this chapter the authors describe their experiences from their first phase of testing 360° footage and VR-technology in teaching. These phases are presented in four empirical cases, and they highlight the importance of using student employees as co-creators of disciplinary content, and of students as serious partners in exploration of how to document and analyse archaeological sites using emerging technology. The overall aim, as described in this chapter, is to provide students (and teachers) with generic skills and to become adaptive towards the use of new and unfamiliar technology. They aim to increase visual

authenticity for students not being able to go back and forth to field sites, and to make their BA and MA program more enhancing for students, and thus increase their motivation to learn.

The third chapter is from the department of psychology. Here, Ingvild Saksvik-Lehouillier, Håvard Karlsen, and Tuva Fjærtøft Lønne describe how they explore the use of immersive videos to teach their students soft skills and increase their motivation to learn and to increase the sense of presence in a work-related scenario. In this chapter the authors elaborate on their experiences from the first phase of developing and testing a VR-video with students in a MA-course. In the video students get the chance to test how it feels to be in a conflict with a manager at a workplace. This chapter highlights former research, contemporary and future research in the development of making teaching more enhancing and 'hands-on' for students. They describe how they attempt to bring potential work life situations into the classroom, and thereby prepare the students for the future by developing a generic tool case. In this chapter the authors describe how they measure students' motivation and emotions by using a desktop version of the video and an immersive (VR) version of the video. Further challenges of implementation and up scaling this experiment is also addressed. As this and the other chapters in this report point to, students are important when it comes to exploring new teaching methods and technology, and emphasise the importance of students as co-creators in course and content development.

In the fourth chapter, Jacob Bonnevie Cyvin from VR-learn at the department of geography describes their experience of going from the testing phase of the project and now starting on the implementation phase. In this chapter, Cyvin elaborates on how affiliated and cross-disciplinary networks as EMERGE plays an important role when going from one phase of a project to another and emphasises that implementation is also a significant part of their explorative activity. The chapter describes short empirical stories from other disciplines involved in this phase of the VR-learn project. The illustrated examples point to the important use of student employees to carry out explorative teaching activities and taking use of emerging technologies. They also point to the benefit of using VR-technology and other forms for immersive technology to make landscapes and social environments more accessible to students, and in such provide an opportunity to bring the world outside of academia into the classroom. This chapter also emphasises the importance of being able to share technological equipment between affiliated partners in EMERGE, and the possibility of co-creating paths forward in explorational teaching by sharing experiences and data with each other.

In chapter five the use of VR as a learning tool in social anthropology is discussed. In this chapter we follow the experiences and observations made by Marie Opdal Ulset, a PhD-candidate in social anthropology. The candidate follows three groups in a social anthropology course offered to intermediate level engineering students who use and explore VR-technology in cross-cultural project work. The author conducted virtual participant observation by participating in group discussion through

a VR headset. In this chapter it is highlighted that students felt digital exhaustion and symptoms of fatigue when using VR googles over a longer period of time. Because of several obstacles of using VR technology on campus, students were sent home during seminar times to explore and collaborate with their international group members from Romania. This chapter addresses the potential negative effects that could emerge by not facilitating NTNU with a digital infrastructure that support explorative activities like VR in a teaching context.

In chapter six the use of student employees across different departments at NTNU are discussed by Tonje Mørtzell and Håkon Fyhn. Based on EMERGE's discoveries on the various use of student employees in the first annual cycle, an interview-based study was conducted to explore this further. This chapter brings forwards student employee's own reflection of what it means to be a student employee at NTNU. The authors describe how student employees conduct various tasks and are often employed in several contracts simultaneously. Furthermore, they describe how low wages and hourly limitations on these contracts could have a negative impact, on several levels. The topics and categories presented in this chapter points towards a need for developing a bigger qualitative study regarding student employees and their role at the university. The authors describe how student employees seem to be betwixt and between being an employee and a student, and between formal and informal structures at NTNU. This chapter concludes with pointing towards the key findings from the study, and seeks to probe NTNU as an organisation to look further into developing a study regarding this topic on a bigger scale.

In chapter seven, Mathias Tømmervold and Line Lilleås Vandalsvik focus on two courses in social anthropology. They based their findings on material from participant observation and qualitative interviews with students taking these courses, and by being their seminar leaders. It is described how students in these courses experience their freedom and responsibility for their own learning as challenging and "overwhelming". Furthermore, the authors emphasis the need to investigate the term 'classroom' and how it stretches beyond the four walls that we usually associate with it. The classroom is described as a dynamic place that moves between the digital, the physical, and the relational. In this chapter the authors look at how student-active-learning could increase motivation and enhance self-regulated learning. Further they explore how student-active-learning could enhance creativity, how hybrid classrooms could promote dialogue and possible challenges that students may encounter. In this chapter they emphasise that students engaged in explorative teaching need to feel safe, to have a safe place, to ask questions in order to feel secure on their progress – something to which student employees play a central role.

In chapter eight, Ekaterina Prasolova-Førland and Mikhail Fominykh from the IMTEL project at the department of education and lifelong learning describe their project. In this chapter they describe how the exploration of emerging technologies in higher education is depended upon collaborative partners on an international scale. This chapter describe how technological development like software for extended reality (XR) and augmented reality (AR) for educational purposes are developed through international and national EU-funded projects. Further, the authors described how their development of pedagogical software result in methodological tool-kits that can be used to train teachers to learn how to implement technology into their teaching in higher education.

In chapter nine Karen Engen Økland and Magnus Bergland-Landheim from BLINK Learning Hub at the faculty of education and social sciences discuss their support function for research consortiums and projects like EMERGE. The authors describe that their experience with working in close collaboration with EMERGE have given valuable insights to develop the learning hub. Based on these experiences the learning hub is now going through organisational changes. Through working with projects like EMERGE, the authors elaborate on how they gain new knowledge of what needs teachers have in project support. They emphasise the importance of establishing a dialogical shared space between scientific employees and administrative employees to identify new areas and approaches to provide project support at NTNU.

In the last chapter, we point out areas for further study for EMERGE's third annual cycle – autumn 2023 and spring 2024.

Chapter 2: Archaeology



Teaching field documentation skills in Archaeology with low cost VR

Heidrun Stebergløkken, Martin Callanan, Department of Historical and Classical Studies, NTNU

Introduction

The archaeology program at NTNU is a cooperation between the Department of Historical and Classical studies and the Department of Archaeology and Cultural History at the NTNU University Museum. This cooperation gives our students an unique opportunity to study and at the same time be a part of an active and practical archaeological organisation.

During the BA degree program, students receive training in how to carry out archaeological field investigations, and how the results of field investigations are transformed into scientific data that later can be used in research.

Our students also learn about the different types of Norwegian cultural heritage and how they can be examined, documented and analysed answer the questions that we have. They also get an overview of the most common analysis methods, tools and aids that we use in the field of archaeology. During the BA in archaeology at NTNU, the emphasis is on tracking cultural developments in our local region through time, at the same time as these developments and learning about the discipline's broader theory and practice are placed in an international perspective. The BA degree aims to equip students with a broad knowledge that prepares the students for a variety of roles in their future workplace, both at museums, county councils, on excavation projects, and for outreach and communication activities.

Through the MA program, students gain experience with planning and the management of archaeological excavation projects, report work, and how to organise findings and observations for inclusion in the museum's collections and archives. MA students also complete internships at national and international institutions such as museums, archaeology departments, and government offices. As such, our students attain valuable work experience from relevant cultural history and archaeological management, as well as research institutions.

The MA degree is also a professional education that prepares students for a career as an archaeologist. In addition to developing and carrying out an independent research project, MA students at NTNU learn a lot about the role of archaeology in society and how the protection of cultural monuments are assessed. They also learn about how new knowledge can be disseminated to a wide audience in museums and

other settings, by way of traditional and modern methods, including digital media such as VR technology.

From this it is clear that our students need to have experience of a variety of different digital tools. However, the field is in constant development, so it is impossible to stay updated with the newest tools and practices at anytime. Therefore, our focus is rather on helping students develop the necessary skills and perspectives to be able to identify and design specific archaeological applications of relevant hardware and software. The focus is not that the student should become experts at a specific software or hardware. Instead, we want the students to become competent adaptors that are able to see potentials and applications that lie in the tools they are given, and how they can be used to document, present, and interpret archaeological knowledge. An example from our teaching, can be found in our drone modules that BA and MA students complete as part of their field training. During the modules, our main focus is on students learning how to design and produce quality field documentation, rather than on teaching students to master a specific type of drone or specific software.

EMERGE has been a valuable network in this work, providing us with a platform to connect with like-minded colleagues at NTNU who share our vision of promoting engaging learning through technology. It has provided us with opportunities to discuss our experiences and exchange ideas on how to effectively integrate technology into our teaching practices. Through this network, we have gained insights into some recent trends and innovations in educational technology, this helps us stay up-to-date with the rapidly evolving landscape of modern education.

One of the most significant benefits of using educational technology in our teaching is the ability to create authentic and relevant learning experiences for our students. Moreover, we have noticed that the use of technology in our teaching has led to increased engagement and participation from our students. Overall, we believe that our involvement with EMERGE and our use of technology in the classroom has had a positive impact on our teaching and on the learning outcomes of our students (Mørtzell et. al. 2022, p. 18).

At present, our main focus of attention is on the introduction of VR and 360° technology into our teaching at the archaeology program. Below is a short overview over teaching activities and experiments carried out using VR or 360° technology during 2022.

Episode	When?	What?	Who?	How?
1	21th-23th March	Work with the Qoocam 360° camera and create instructions for how to extract 360° footages, how to render (combine the footage), and create links for sharing footage.	1 master student – “Work Experience” (ARK 3002) Together with the Teaching Assistant at VR-Learn	Qoocam (hardware) Thinglink (software)
2	Week 17/18	Field course. As part of the presentation, a 360° video and two 360° photos were recorded from the work at the rock site Mølnargården.	The master students were responsible for this documentation (ARK 3002), and it was included in their reports.	Qoocam (hardware) Thinglink (software)
3	11th May	Documentation of various sites at Foss, Melhus. Students created 360° recordings, combining these with other documentation tools such as drones and photography.	BA ARK 2002	Qoocam (hardware) Thinglink (software) Drone, Camera
4		Excursion documentation. Oslo and Østfold (March 2022 with MA students (ARK3002) and excursion to Snåsa (22th September) with the first-year students (ARK1001).	Educational staff made some 360° recordings from a couple of the sites from the excursion.	Qoocam (hardware)

			The data has not been processed.	
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Fig. II – Teaching activities and experiments.

Our goal is that VR technology becomes a natural supplement to the educational offer at our archaeology program. In order to effectively integrate technology into our teaching and promote engaged learning experiences, it is essential that both students and teachers take ownership of the process. This means that teachers must be willing to embrace new teaching methods and technologies, and students must be actively engaged and motivated to participate in the learning process. For this to happen the students/teachers need to see this technology as a natural part of their process of documentation and dissemination of archaeological knowledge. They need experience with the technology and must also be able to explore possibilities –also in situation where the technology is not necessarily a natural element. These teaching episodes do not necessarily go according to plan, but are important for fostering positive attitudes to adopting technology and to problem solving both as students, but also later in professional settings.

In the following we reflect on how the first phase of implementing VR technology into our teaching practice has gone. We examine some of the positives and challenges we have experienced until now. We started up our VR activity in autumn of 2021 and our initial focus was on learning the possible uses and potentials of the technology itself and on exploring how it could be applied to various teaching situations and environments.

For example, use of VR as a teaching tool allows us to bring sites and landscapes into our lectures that are either inaccessible or too far away from the university.

From the exploratory start during the fall of 2021, our perspectives have developed in other directions. In the beginning we saw students as consumers of pre-produced archaeological materials in a scenario where the teachers were both designers of the pedagogical framework as well as both producers of the 360° resources. Since the start, we have shifted our focus somewhat to where we now view VR tools and procedures not just as pedagogical or documentation tools, but also as technological aids that allow us to activate and develop our students in other ways.

By learning to use VR tools and working together to produce 360° documentation, our students develop and practice various generic skills, such as problem solving and teamwork, that are essential for their futures in the workplace.

In this mode, the role of the teacher changes from being producers of educational VR content to instead being a facilitator and advisor. This new role also includes designing realistic learning scenarios where students can engage in hands-on exploration of these tools in a safe and supported professional setting. Our aim here is to create practical and social learning activities where students practice and experiment by trial and error.

A challenge related to the adaptation of 360° technology as a pedagogical tool is the question of how to best move from an initial situation where new digital tools and teaching methods are adapted by the individual, to a place where the approach has been taken up by the staff as a whole. This question needs to be addressed at different levels as it is relevant at the program level as well as at the Departmental and Faculty levels too.

Teaching assistants have a key role in our approach to this challenge; they provide technical support to teachers as they learn to incorporate new technologies with their own unique professional point of view.

This is something we aim to address more fully in a new project TeTL-TI financed by Fremtidens Campus, NTNU– how to implement this into our daily practice?

Empirical examples

Episode 1 – Manual for how to extract 360° footage (ARK3002)

During the spring term, the MA students participate in a “Work experience week” (ARK 3002¹), where they assist employees from NTNU University Museum with different tasks. The tasks that they take part in varies from year to year depending on the help that is needed by staff at the museum. During spring 2022, we recruited a MA student as part of Work experience week to help us as an assistant on VR-learn. The aim was to discuss and solve simple user-problems that often occur when using VR as a tool in teaching and learning with the master student. The main task was to compile simple instructions for how to extract 360° footage from the camera, render the recordings but also make basic instruction for the whole process from turning on the camera to finished rendered recordings. The next task was to test different uses of Thinglink.²

The 360° equipment will be used by both teachers and students, and both user-groups are important for implementing these tools into the educational program. One of the aims for the instructions therefore

¹ [ARK3002](#) – Methods of Field Archaeology, Curating and Interpretation.

² Thinglink is software used for creating interactive and dynamic educational content using a variety of digital formats. For example, teachers can take 360 recordings and annotate them with additional information using Thinglink.

was to make a very basic, easily understandable manual that could be understood by everyone. The next step was to test the manual and see how this could be used at different courses.

Episode 2 – field course documentation (ARK3002)

The next episode took place during the annual field course in week 17 and 18 i 2022. The master student that created the instructional manual during the “work experience-week” was given the 360° camera to make recordings during the field course. Documentation is an important element of archaeological fieldwork, both as a way of securing data and documenting the progress, but also for disseminating archaeological knowledge to fellow colleagues, researchers, and the general public. We wanted 360° footage for these purposes but also to have recordings of different sites that could be used at lectures & learning activities for other courses at MA and BA levels.

The results from the field course provided new material for documentation and dissemination. The MA student assistant cooperated with the other MA field leaders and as a result they were able to create their own 360° documentation alone. This allowed the field leaders to document and disseminate their site and fieldwork in a new innovative way.

The 360° recordings were incorporated into student field reports following the field course:

Mølnargården (ID 101978):

<https://www.thinglink.com/video/1581688841545187331>

<https://www.thinglink.com/video/1581688841373220867>

<https://www.thinglink.com/video/1585249889929920515>

(Sommervold, M. & Stavø, T. 2022: 13-14.)

Runeberget/Oksvoll (ID 73032):

<https://www.thinglink.com/video/1586314950282838019>

<https://www.thinglink.com/video/1586314124768313347>

<https://www.thinglink.com/video/1586316357937397763>

(Flatland, I. A. 2022:30.)

Episode 3 – documentation of various sites at Foss, Melhus (ARK2002³)

Up until now, there was a clear link between the producer of the instruction manual and the bulk of the documentation work that was carried out during the field course. The next step for us was to see if BA students could create similar 360° footage within a pedagogical framework. This was carried out with final year BA students on a half-day excursion to Melhus. The students were divided into groups and given digital cameras, 360° cameras, and drones as tools to document different cultural monuments. We wanted them to produce and annotate a 360° recording, using different information and formats within a framework of disseminating the site to others. The sites at Foss provided a safe environment, where the students could test different tools and techniques.

Teachers and students evaluated the different examples together not with the emphasis on what was the best example, but rather on how we could develop it further. We discussed if there were other formats that could have been incorporated, different camera positions – were they optimal according to what they wanted to disseminate – and problems they encountered.

Example from the student work, at the stone quarry at Foss, Melhus:

Method: To document the location, we used various photographic techniques. We used a 360° camera to create a complete picture of the area and the way into it. This was a choice we made both to make these images informative and interactive for the user, and also to better showcase the location as it was a bit 'hidden' behind fallen trees and forest. For the walls themselves, we used an ordinary camera to document how they looked. The walls have very straight edges and angles, this makes it clear how the stone has been extracted from the site, and we reasoned that close-ups of these would illustrate this best. We also used drone images to give an overview of the location itself. The location is over a fairly large area, as previously mentioned it can be considered a bit 'hidden', so a drone image would give a good overview of the size and the surrounding landscape.

Stone Quarry

Thinglink: <https://www.thinglink.com/video/1581671808996737027>

Some of the groups also experienced some technical challenges while uploading data to Thinglink. This is also something we need to be aware of; that different teacher- and student-users have varying

³ [ARK2002](#) – Field Methodology and Interpretation

thresholds for giving up when the technological challenges and problem solving gets too difficult. In this instance, whilst some of the groups completed the documentation and annotation process by finding work-arounds to the problems that arose, other groups were not able to surmount the technical difficulties and did not produce annotated documentation despite having collected the film and images necessary.

Episode 4 – excursion documentation (Oslo/ Østfold & Snåsa ARK3002 & ARK 1001⁴)

During the last year, we have also carried out 360° documentation during field excursions with students at different archaeological sites and landscapes. This entailed carrying out recordings at famous archaeological sites during the course of excursion. These were not directly pedagogical activities per se, but they are important for the VR-learn project and for the implementation of 360° technology into our education in other ways. The recordings from this excursion have for example been used as learning materials in later lectures as examples on topics like burial practices and grave monuments.

Our opportunistic approach allows us to build up an archive of site documentation that can be used during later teaching situations. Students also get to observe the field-documentation process first-hand. It is also an efficient use of resources when staff secure images and footage during excursions, as this saves us having to visit sites specifically for documentation purposes on later occasions. This underlines that creating new digital content does not need to be particularly costly or time consuming – especially when integrated into ongoing field-work, excursions, or other teaching activities.

This year, we have gathered images during two student excursions to Oslo/Østfold and Snåsa. The material produced during these excursions is stored and footage from some of the sites is already annotated and will be used on the BA and MA programs during Spring 2023.

Looking Forward

Based on the experience we have gained during 2022, we see that the students have an important role to play in how we use 360° recordings in education. We believe students should have an active role as co-creators and partners in the further development of courses and engaging learning materials. This is also one of the cornerstones of the EMERGE network, where the goal is not only to explore student active learning forms, but beyond that to elevate the role of the students to that of enabled co-researchers and co-creators of learning experiences and content (Mørtzell et. al. 2022, p. 6).

⁴ [ARK1001](#) – Introduction to Archaeology

VR Learn enables us to have the support of learning assistants. We understand the role of the learning assistant as crucial for how implementation and development take place, as the time pressure on teachers and course coordinators makes it difficult for them to invest time in these processes.

We have also received funds through the TeTLTI project to hire three scientific assistants who will work to identify the obstacles or success factors that affect digital education projects. This will help us to understand how the implementation process might go from being dependent upon an individual's expertise and interest, to a scenario where the technologies are fully integrated and incorporated as a learning tool for use by anyone independent of their educational program and/or individual competence. We want to see how this learning tool contributes to the best learning, when it is most appropriate to use, and in what way.

Summary

Our focus is on helping students develop the necessary perspectives and skills to be able to identify and design specific archaeological applications of relevant hardware and software in a life-long perspective. We want students to become competent adaptors that can see potential applications of different digital tools, and how they might be used to document, present and interpret archaeological knowledge. We want the VR technology to be a natural supplement to our educational portfolio at the archaeology program. To be able to do this, we need both the students and the teachers to become real adaptors of the technology. One challenge relating to the adaptation of 360° technology as a pedagogical tool is the question of how to move from an initial situation where the new digital tools and teaching methods are introduced by an individual, to a place where the approach has been adapted by the staff as a whole. The VR-learn project offers us support in the form of learning assistants. At the same time, we have now received funds through the TeTLTI project to hire three scientific assistants who can identify which obstacles or success factors that are present in these implementation projects. Being part of the EMERGE center and network will continue to be an important resource for us moving forward, as a resource and support community of like-minded colleagues that are engaged in similar activities. It gives us the opportunity to discuss ideas and challenges but also foster inspiration for new approaches and experiments we can try in the future.

Chapter 3: Psychology



Development and evaluation of VR-games for teaching soft skills in psychology

Ingvild Saksvik-Lehouillier, Tuva Fjærtøft Lønne & Håvard Karlsen, Department of Psychology, NTNU.

Introduction

The Department of Psychology at the Norwegian University of Science and Technology (NTNU) has since 2020 worked on a project concerning the creation of virtual reality-based scenarios to use in our teaching. This project is funded by The Norwegian Directorate for Higher Education and Skills. We are a part of EMERGE to learn from other departments at the faculty working with similar projects, to explore different parts of learning, technology and organisation, and see what new thoughts and ideas can come out of this multidisciplinary collaboration in research-based teaching.

Teaching in psychology in many cases involves the teaching of soft skills, which can be defined as social and interpersonal skills (Eckert & Mower, 2020). Soft skills are important globally across higher education programs as they affect personal development, communication, and interpersonal relationships (Pereira & Costa, 2017). Simulation based techniques, like immersive virtual reality (VR), have been increasingly used to teach students to practice real-life communication and decision making skills without potentially harming real patients or students (Kim, Park, & Shin, 2016). Immersive VR is an interface involving real-time simulations of an environment that users can explore and interact with through multiple senses (Lee & Wong, 2014). Previously, such technology has most often been used to train specific skills in situations that could be dangerous or demanding to perform in real life (Pellas, Mystakidis, & Kazanidis, 2021). This technology is increasingly used in teaching soft skills. At the Department of Psychology, NTNU we have developed two interactive immersive VR games for potential use in our teaching. The first game is described in the EMERGE report from 2022. As we have somewhat limited knowledge on the effect of immersive VR on soft skills, it is important for us to evaluate these interactive games before we can implement them into the course design.

The effect of immersive VR on soft skills is difficult to measure (Botke, Jansen, Khapova, & Tims, 2018; Laker & Powell, 2011). It is challenging to objectify soft skills like for example communication and decision making.

Immersive VR may affect learning indirectly through increasing sense of presence (Grassini, Laumann, & Rasmussen Skogstad, 2020), or create an increase of the affective processes of intrinsic motivation and engagement (Allcoat & von Mühlenen, 2018; Makransky & Lilleholt, 2018).

We have evaluated the effect of immersive VR compared to desktop VR on affect and sense of presence in a master's thesis (Fjærtøft Lønne, 2022) and a scientific article resubmitted to the international journal *Heliyon* in April 2023 (Fjærtøft Lønne, Karlsen & Saksvik-Lehouillier, submitted). The data from the project is available for the public in Sikt – the Norwegian Agency for Shared Services in Education and Research (<https://doi.org/10.18712/NSD-NSD3101-V1>). A description of the first interactive game, the design of the study and the results from the master's thesis is presented in the [EMERGE report for 2022](#). In the following we will provide a short summary of the latter, before we will describe the new results from the article, the second VR game, and future plans.

Immersive VR game 1 and design of the study

The games were made for the course [PSYPRO4502](#) – work and organizational psychology, but we aim to implement them in other courses as well. The games are based on characters and scenarios from the book *Praktisk Organisasjonpsykologi* (Practical Organizational psychology) written by Ingvild Saksvik-Lehouillier and Jonas Vaag, published in 2020. This book is used actively by our students in this course. Game 1 consist of a conflict situation where the player in first-person perspective experiences a conflict with a fictional manager named Berit. See figure III for a picture from the Game. At specific intervals the game is stopped, and the player can choose from three response options. We have made this game available in flat desktop version (desktop VR), and immersive VR version via a head-mounted display. We have tested changes in positive and negative affect before and after watching the game, and sense of presence in the two conditions among 134 university students in a randomised controlled trial. These students were randomised into either the control group (desktop VR) or intervention group (immersive VR).



Fig. III - Screenshot, picture of Berit in video 1.

Results and implications

The results reported in the article showed that students in the immersive VR condition reported higher levels of sense of presence and positive affect both before and after the scenario compared to the students in the desktop VR condition. As the students watched a potentially uncomfortable conflict situation, positive affect was reduced after interacting with the scenario in both the immersive and desktop versions. However, positive affect was overall higher in the immersive condition, compared to the desktop condition. Thus, immersive VR may be better for learning than desktop.

Immersive VR game 2

During the spring and summer 2022 we developed an interactive VR experience about management. This interactive VR video is separate from Game 1 but uses the same characters (characters from the book). We also made use of experiences from making Game 1 in this project. The script was written by Håvard Karlsen. This video was filmed in 3D, where the viewer/player is one of the characters in the game. The player is the manager Berit, the same manager we meet in Game 1, and the book *Practical Organizational Psychology*. As a manager, the player must interact with employees, prepare for a meeting by memorizing facts and respond to incoming emails. The interactive game has three scenes which are divided into several parts. Depending on the choices the players make, different pre-recorded elements will be shown.

The scenes are 1: At the players (Manager Berit) office having to answer emails, preparing an important presentation and deal with the demands of subordinates. Scene 2: Performing the presentation in front of important shareholders. Scene 3: Back at the office handling consequences made by decisions in previous scenes.

Practical implementation of the games in the teaching

We now have two interactive immersive VR games that can be used in our education to increase positive affect, engagement, and sense of presence in the learning situation and thereby improve the learning of soft skills as communication, decision making, conflict management, stress management, and presenting in front of an audience. Both games are set up to reflect real work life scenarios, and thus, can give the students some experience with this. The practical implementation of the games in the course design still needs improvement. We tried incorporating Game 1 into the teaching of PSYPRO4502 during the fall of 2021 but had trouble getting students to participate in it. The way we did this was by asking students to sign up for a VR lecture to discuss the interactive game and generally the use of VR for teaching in psychology. The students had to go through the interactive game before the VR lecture, so they knew what it was about. At the lecture itself, only three students registered for the course showed up. It thus became difficult to assess what benefit the students had from this. It would probably have been better to show the interactive VR game simultaneously to all the students during a lecture, but this is difficult to do practically as we do not have VR equipment for all the students (there are currently about 70-120 students in this course). This also poses a challenge when we want to incorporate the games in larger lectures that hold up to 400 students. Consequently, we have discussed other forms of VR experiences that are easier to develop and to use in teaching.

In this project, we scaled down the VR experience from video to VR images with sound that create immersion. This means that the game can be created faster, which enables the students to be involved in the process of making the game (in line with the EMERGE goals of active student participation, see chapter 1, report 1), while at the same time getting an immersive experience of a situation in VR. In the same way as Games 1 and 2, the project is made up of interactive choices that can be further developed by the students. A potential goal is that the students can participate in making such immersive experiences, working on writing potential follow-up stories emerging from the choices made in the scenario. It may also be incorporated into the course assignments or exam.

Conclusion

During the last two years, we have made two exciting interactive games that we need to evaluate further; we must investigate how these can be used more actively by the students and incorporated into our teaching in a way that benefit the students. We have also learned a lot through the process of making the interactive games in terms of working with professional actors, project flow, and implementations. For this project we collaborated with professionals from the Section for Teaching and Learning Support at NTNU, who provided our team with expertise in video recording, directing, post-production, and programming. In terms of lessons we have learnt, we should have budgeted for more spending on the post-production of the games so that we could have streamlined production and opened the opportunity to involve students in the production.

In this project, and with our participation in EMERGE, we have reflected on how technology should be used in teaching. What might the possibilities be, and what might we lose? We have learned a lot about prioritising time and resources and challenges and opportunities when we explore emerging technology. We have been able to compare our experiences with the other participants in EMERGE and have learned a lot from each other.

Chapter 4: Geography



VR-learn: From testing to implementation

Jakob Bonnevie Cyvin, PhD-candidate Department of Geography, NTNU.

Introduction

VR-Learn is an educational project that originally had a timeframe of three years, yet now is expanded to four. The project is supported by Norwegian Directorate for Higher Education and Skills (HkDir). The main mission of the project is to explore and further implement use of low-cost virtual reality (VR) as a supplement to field course activities in higher education. The project is extensively described in the first EMERGE report (Mørtzell et. al. 2022).

I will in this chapter describe experiences from the use of low-cost virtual reality in education within the disciplines of Archaeology, Teacher Education, Geology, Physical Geography and Occupational Therapy. I will look at the obstacles and possibilities that exist within a pedagogical framework, where the aspiration for increased use of active learning and increased use of field related learning is central.

The VR-Learn project includes multiple fields of science, at different departments and faculties at NTNU, as well as participants from teacher education in Iceland and in Utrecht in the Netherlands. The project is now passing into its expected final year, and we are entering a period of implementation rather than testing – the latter having been the focus until now. This phase of implementation is also exploratory; how to implement the use of VR as a pedagogical tool in way that creates long term changes and keeps the knowledge gained within the project saved for future projects is central.

One of the visions for EMERGE is to support explorative use of emerging technologies for teaching and learning. The support and collaboration with EMERGE, in terms of discussions, common meetings and technical support is therefore important, especially within the first year of educational projects. Nevertheless, the VR-Learn phase is now entering its final stages of implementation and the role of EMERGE as a cooperating partner is increasingly important. This statement is based on the need to transfer the knowledge from the ongoing project partners and employees to the future. As I see it, we cannot defend our use of economic resources in projects like VR-Learn unless it is taken further after the project period is over.

The cost-benefit equation – in terms of a positive outcome for the students attending all the satellites of such educational projects – is questionable if all experiences and initiatives within the project are to end

concurrently as the use of project money stops. EMERGE is hereby an important partner to draw attention towards the use of alternative learning methods, and retain knowledge from projects like VR-Learn for further development, internal projects, inspiration, or development of future project applications creating post-projects.

Technicalities

The project is built upon an idea of using 360° photos and film to create immersive virtual reality stories that enable an experience of telepresence for students. An example from Geography is the creation of a digital twin of our fieldcourse in Physical Geography (GEOG1014⁵), where we bring students to Trollstigen and Hjerkind, looking at the development of the Norwegian landscape. As preparation for this fieldwork, we now invite our students to join the same trip prior to using VR.

It has also been a mission to let students themselves create photo-stories as part of assignments or lectures, or to use their photo-stories as course content in the subsequent running of the course. We have moved from the use of Virtual Reality Cardboards (VR goggles made out of paper) to the use of web-browser versions and Meta Quest 2 goggles with higher resolution. This is due to the reduced cost of high-quality equipment, and due to moderate good feedback from students towards the use of the low-cost cardboards within Geography. An enabling factor for this development has been the possibility to share equipment between EMERGE and VR-Learn. We are now using the VR goggles purchased by EMERGE, as well as some VR-Learn equipment.

Software

The web-browser versions of the VR experiences are also actualised due to motion sickness among some students and teachers. Less technical issues, time used charging goggles, and setting up user accounts, are also important factors to account for.

The use of software is currently not an issue due to the work the last year, buying Thinglink⁶ as an educational VR software. The software is meant for the creation of 360 photo- or video-stories with annotations and points of interests appointed to each picture. This software is now paid from an internal project budget and necessary to keep up the work with this visualisation method. It poses a substantial question what we as lecturers should do if we lose the use of this software in the future. We are now making quite an effort in creating content within this software, which will disappear if we are unable to

⁵ GEOG1014 – Earth's Natural Environment

⁶ <https://www.thinglink.com/>

financially sustain it. A parallel track to this issue is the in-house development of our own software (<https://vrlearn.it.ntnu.no/>). The IMTEL⁷ group at the Department of Education and LifeLong Learning is currently working with this software. The issue here is also the question of maintenance and resources. What do we do when the project is over and Google Chrome comes with an update? The software would then need maintenance, but without the resources for it. Ironically, we are looking at the possibilities for commercialising the software with help from NTNU Technology Transfer AS⁸.

Question to be answered

The research questions asked in this chapter is as following:

1. What are the major challenges and possibilities across disciplines when looking at the use of low-cost virtual reality for learning in the VR-Learn project?
2. How can we keep and build further upon timewise delimited educational tech-projects without losing track of experiences and valuable knowledge after the project is finalised?

Discipline-based cases

The following cases are chosen as valuable examples for further discussion. All the project partners are not represented in this report chapter, but specific disciplines are chosen to give the reader an overview of the issues and possibilities so far found to be important for future development of these teaching practices.

Archaeology

At the department of Historical and Classical studies at NTNU, cardboard and web-browser versions of 360° photo-stories with annotations and points of interest are currently being tested. At department of Archaeology, the use of VR is used for tele present exploration (Favier & Cyvin, 2022) of archaeological sites during the winter, where it would not otherwise be possible to go. The field season is thus expanded, and the feedback from the students are so far very promising. Even with some technical issues, as well as the use of low-cost methods with limited resolution within the VR goggles, all students answered in a survey that they want teachers to continue developing these learning methods, despite the relatively high total cost. The use of VR now seems integrated into different courses, but the usage is also resource intensive and led by some few enthusiastic staff members. Archaeology is, out

⁷ <https://www.ntnu.edu/imtel>

⁸ <https://www.ntnutto.no/>

of their own initiative, this spring (2023) arranging an in-house seminar to share their newfound knowledge with their colleagues⁵.

Geography

At Department of Geography, fieldwork is an essential part of the curriculum both at a bachelor and a master's level. The history of geographical exploration goes far back in time, and fieldwork seems like a part of the DNA of geographers and their discipline identity (Holt-Jenssen, 1990). The implementation of various forms of technology for learning, as part of field related activities at the Department of Geography at NTNU, or within projects with involvement from employees at the department, are well documented (Cyvin et. al. 2022; Midtuane et. al. 2018; Panek, et. al. 2022; Favier et. al. 2021; Cyvin et. al. 2022), where storytelling and the use of mobile units for GIS-based surveys have been in focus, as well as the use of Virtual Reality in recent years (Cyvin et al. 2022).

During the last year, the use of VR at department of Geography could have been more widely taken into use. It is utilised in the courses Introduction to Physical Geography (GEOG1014), Digigeo (GEOG2500⁹), and within the course EduChange (EDU2001¹⁰) which is a cooperation between teacher education and Geography. Within GEOG1014¹¹, the students were prepared for their field course in Physical geography, by visiting the same places prior to fieldwork. Within the two other courses the VR technology was used in workshops, asking the students themselves to create VR content and share their VR-stories with each other. This work was exploratory and discussion-based, focusing towards the future possibilities and obstacles in terms of taking the technology in to use to learn content knowledge. Within the course GEOG2500, we streamed a 360 degrees live field course for the second time for students located other places in Europe. We walked around the city of Trondheim talking about stone buildings as a point of departure for learning geology in higher education.

The use of this technology within courses mentioned can be seen as a movement towards learning within what is described as the Technology Pedagogical Content Knowledge (TPCK) model (Mishra & Koehler et al., 2007; Favier et al., 2021). During the past year, the course GEOG1010 has implemented a Virtual Reality seminar as a part of the curriculum for the course, which the VR-Learn project now support, an later on EMERGE will support the course leader in using this technology for field course preperance¹²

⁹ [GEOG2500](#) - DigiGeo

¹⁰ [EDU2001](#) – EduChange – Active citizenship through innovative methods to tackle wicked environmental problems

¹¹ [GEOG1010](#) – Geographical Perspectives and Fieldwork

¹² The courses [ARK1001](#) – Introduction to Archaeology, [ARK2002](#) – Field Methodology and Interpretation, [ARK3002](#) – Methods of Field Archaeology, Curating and Interpretation

Occupational Therapy

The Occupational Therapy program led by Malin Eerola, at the Department of Neuromedicine and Movement Science is also a part of VR-Learn (Eerola et al. 2022). Their use of fieldwork is different than at for example Geography, but there are common elements in terms of place-based education and the need to bring students out of the classroom. At occupational therapy, in the course Context, Accessibility and Technology ([ETT1104](#)¹³) VR is taken in to use to create an immersive explorative and tele present teaching situation. 70 students are brought into a fictional house where an old man could have lived, asking the students to analyse how the build environment could have been prepared and changed towards the old man's movement disabilities. The digital fieldwork went well, and the students were over-all satisfied with the session. The use of student assistants as technical and practical support seems vital to continue after VR-Learn is finished and EMERGE here seems like an excellent organisational unit to continue this support. The ongoing work and role of student employees highlighted and researched upon in EMERGE – as well as commented thoroughly upon in this chapter – is also of great importance for the continuous use of these emerging technologies at occupational therapy.

Teacher education

At the Teacher Education (ILU) at NTNU, VR is taken into use at the Natural Science Section (at NTNU, they are a “level 4”, a section, not organised as a separate Department) as part of the EDU2001 Course, and elements within various EVU courses (Cyvn et al. 2022). A new cooperation with the pedagogic section is also under development, focusing on the use of digital twins for student practices in refugee camps in Italy. We are trying to bring the experiences from those students doing their practice as teachers in refugee camps back to students at campus. At the Natural Science Section, the use is quite akin to what we do in Physical Geography, while the usage within Pedagogy, so far is like the VR content created in Occupational therapy. The students at the Teacher Education seems more critical to the use of VR, than within the discipline courses. They do see the possibilities, and there has been great discussions with the students, but in terms of using VR for learning they seems more demanding regarding the user interface, quality of the VR experience, as well as concerns about the feasibility and cost towards using it in school situations. It is an ongoing obstacle that the course plan for teacher education is stricter than e.g., for Geography, but at the same time they do have more time with the students and more obligatory on-campus activities, which gives possibilities for the use of technology associated with risk of failing. The cooperation with ILU is promising but is characterised by limited numbers of engaged teachers, in need of practical support from the main project.

¹³ [ETT1104](#) – Context, Accessibility and Technology

Initial Questions

The first question to be answered within this chapter was: *“What are the major challenges and possibilities across disciplines looking at the use of low-cost virtual reality for learning in the VR-Learn project?”*

Looking at the cases from different disciplines, the main possibilities within field related teaching seems to be the possibility for distant learning – taking the students virtually out of the classroom pre- or post-fieldwork, as well as bringing them to places that are impossible or too expensive to visit, increasing the visualising and concretising element within the learning process. The learning outcome is to be researched upon further, but the feedback from the students is all over the same: they want us to keep working with these technologies of learning despite its cost. The cost and time consumption in preparing VR learning situation is also found to be the greatest obstacle together with the need for student assistants/support in developing learning materials.

The second question to be answered within this chapter was: *“How can we keep and build further upon timewise delimited educational tech.-projects without losing track of experiences and valuable knowledge after the project is finalised?”*

To this there are multiple answers, where a combination of those might be the right one, but economical resources to handle assistants, organise user accounts, software, keep track of GDPR regulations and hardware as well as helping out with student assistant seems to be important elements. EMERGE is an initiative that could be one such unit taking care of, and organising, as well as getting new grants for these supporting systems.

[BLINK Learning Hub](#) might be a similar element on campus. However, one issue to be raised regarding BLINK is that they so far seem to be solely an administrative unit, while the support within pedagogical use of technology should also be able to do scientific work together with scientific staff, as research and research dissemination. I hereby propose the development of employment descriptions with a role in-between the scientific and administrative domain. I would call it a shared scientific-administrative position. The project coordinator of EMERGE is currently holds such a shared position, but to be able

to bring the project outcomes from educational projects further, these positions might be an idea also for BLINK, Section for Teaching and Learning Support (SLS), IT, or directly at faculty level at NTNU. Taking the knowledge further might also involve faculty granted PhDs tailored towards didactics, for example as a certain percentage of the RSO-grants. Projects like VR-Learn and EMERGE is generating huge amount of data that would be an excellent gate towards PhD positions within Technology-didactics within geography, social anthropology, archaeology or at the teacher education, as some out of multiple examples.

Concluding remarks

During the last year, we continued to use virtual reality for learning in various disciplines, led from the department of Geography. The project is successful, and the use of student employees is necessary and needed within all levels of the VR-Learn project; from leadership to technical, practical, and didactical support and exploration. Cost of software is indeed a limiting factor, and lack of educational software within NTNU '*programfarm*', the bureaucratic obstacle of buying new software and also following the NTNU regulations as well as GDPR. We would conclude that it is easier to apply for projects, gather project partners, and pilot new learning tools, than implementing it into long-term teaching. The reason seems multifaceted, but lack of resources to course development, physical as well as software and technological barriers, organisational barriers (e.g. assessment regulations), and the "easy" solution of "turning the pile" from last year seems as some of the most pressing issues, as well as the time lag of changing course content and obligatory activities.

As a finalizing commentary is it worth mentioning that we during the last weeks, after finalising most of this chapter, we finally managed to successfully run a live 360 degrees virtual reality fieldwork from the city centre of Trondheim, streaming it to students in central Europe. Coming back to the risk of emerging technologies – the whole fieldwork will stop if we are to lose 4G network downtown.

Chapter 5: Social Anthropology



Student experiences using virtual meeting places in a hybrid classroom

Marie Opdal Ulset, Department of Social Anthropology, NTNU.

The use of virtual reality (VR) equipment for teaching is becoming increasingly popular in Higher Education, and the EMERGE research group at NTNU has invested in 30 pairs of VR goggles for student-led exploration of teaching technologies. However, the use of VR in teaching presents several challenges, including technical issues and the need for proper guidance from teachers. In this study, I conducted participant observation fieldwork to examine the use of VR in an anthropology course at NTNU. I have followed one VR-group and found that while the use of VR allowed for collaboration that mimicked real life, there were technical issues, physical/mental exhaustion, and a lack of feedback from teachers that hindered the overall experience.

Introduction

The COVID-19 pandemic has motivated educational institutions in Higher Education to adopt and experiment with new teaching technologies, including virtual reality (VR) equipment, for teaching purposes. The EMERGE research group at NTNU has invested in VR goggles to equip whole classes if needed, yet the use of this technology heavily relies on the motivation of students as well as teaching staff. The equipment needs to be administered in such a way as to not disturb, but instead enhance, learning and teaching.

This chapter is based on data collected from participant observation fieldwork during the fall semester of 2022 examining the use of VR in an anthropology course at NTNU. The use of VR in teaching presents several challenges, including technical issues, exhaustion, and a lack of guidance that hinder the overall experience.

In collaboration with the EMERGE research group I have, as a part of my PhD project, gained access to one such course taking on the use of VR technologies for teaching. I have followed the course throughout one semester looking at the use of teaching and learning technologies through virtual participant observation¹⁴.

¹⁴ By joining the students virtually, I had to create an avatar, just like they did, download all the same apps as they and connect from the comfort of my cramped apartment. I became immersed in the virtual meeting space, with nothing but digital tools to support me. I connected my computer to write fieldnotes, I connected my phone to the headset so that I could livestream everything I saw directly to my phone which enabled me to take screenshots and recordings (with consent) of the virtual meeting. The virtual fieldwork gave me quick access to photo documentation, however certain aspects of the human behaviour were less obvious in the virtual context – I could for example not interpret facial expressions in the avatar.

The VR goggles were handed out individually to students to test out experimental virtual groupwork, and students were encouraged to take the goggles home to test out platforms that piqued their interest. The headset came with two controllers and a charger; however, hand tracking technology made the controllers optional on certain platforms¹⁶. The EMERGE VR equipment (Meta Quest 2) comes with no mandatory requirements or instructions for use making it up to each student or teacher to decide on the aims for using VR. In the course I followed, the teaching staff recruited three student-groups to use VR but left it up to the students to decide how to make use of it. Using students to lead the exploration of technology is a tradition within the EMERGE research group (see Berge et. al. 2020; Mørtzell et. al. 2022) based on the desire to give students more power in the introduction of teaching technologies.

Methods

The students I conducted fieldwork with participated in an interdisciplinary anthropology class with the topic of cross-cultural collaboration and project development (see chapter 4 in EMERGE report, 2022 for more details about the course). The class had 48 registered students, one head lecturer and two seminar leaders to guide the groupwork. The course was taught once a week in a four-hour slot; a two-hour lecture immediately followed by a two-hour seminar for group work and feedback (15:15-19:00). I entered the field site as a seminar leader taking on the role of co-seminar leader engaging with the whole class. To get a closer social connection with the specific VR-groups, this fieldwork-method was quickly ruled out in favour of doing more focused work with only one of the VR-groups at a time. The lecturer and course-leader hired a new seminar leader to take on my previous role in the seminars. I virtually attended the collaborative meetings with the VR group I followed as a group member/researcher contributing to project-related discussions but also social interactions and chatter.

All groups comprised of NTNU students working together digitally with students from the West University of Timisoara (WUT) in Romania. The WUT students follow the course remotely from Romania and the NTNU students physically attend the lecture at Gløshaugen in Trondheim and then digitally connect with their team during seminar hours. Out of the whole class, three groups (group 1, group 2, group 3) were recruited to use VR equipment for the collaborative work. The NTNU students used only Meta Quest 2, while WUT students used both second- and first-generation Quest. This caused issues for two of the VR groups (group 1 and 3) because the different equipment resulted in unequal access to virtual platforms. Because the different groups had parallel sessions in VR, I was only able to focus on one group at a time, I initially followed group 1 but resolved to change to group 2 and then supplemented the fieldwork data with a short semi-structured interview with one of the students in group 3. The following section details some of the key findings and observations, structured in a

¹⁶ Workrooms was one of the platforms used most by the VR-groups, it does not require the use of controllers.

chronological order, starting with my short collaboration with group 1, moving to the main portion of fieldwork data together with group 2, and closing with the additional feedback from group 3.

Findings

Initial fieldwork - Group 1

In the first meeting with VR group 1, we spent two hours testing out different platforms that all had their own unique technical and accessibility issues¹⁷. During these two hours, group 1 made no progress on the assignment and the students requested more information from the teachers and wanted help to move along.

During the meeting, the group made comments along the lines of “This isn’t the first time this class has been taught, is it? So how did you do it last time?”¹⁸. The group requested similar equipment for the whole group or access and guides to other platforms all group members could access. Several of the NTNU students in group 1 felt uncomfortable having “better” equipment compared to their WUT counterparts which made it difficult to have an inclusive group dynamic. This group decided to withdraw from using VR following their initial attempt with no feedback or initiative from teachers to resolve the issues reported¹⁹.

I spent the remaining weeks leading up to the final exam following a second VR-group (group 2).

Main fieldwork - Group 2

The weeks leading up to the exam went by in a blur with myself jumping between different groups and virtual meetings. I experienced technical difficulties failing to connect my keyboard to my virtual computer screen in Workrooms – which made the process of jotting down fieldnotes an excruciatingly awkward and slow experience hunched over my physical keyboard trying to see the different keys through the passthrough function while simultaneously staying engaged in the conversation. I mention this because it explains why I have struggled to sort through what has later become a chaotic and

¹⁷ Meta Workrooms did not allow first generation Quest users, after struggling for some time to gain access to a meeting room in Workrooms (which requires email calendar-invitations) some of the students had to resort to connecting through their computer instead of VR. For the app Immersive, some of the group members had issues with downloading the software and connecting the headset to their computer. In the app MeetinVR we all got access, but the audio cut out frequently so that only about half of the group was able to hear each other. The room layout in MeetinVR was adjustable, however due to some technical issue the room continuously cycled through the different background filters every five seconds, after some time in this app the whole group experienced motion-sickness due to this issue.

¹⁸ Group 1 interacted with me in accordance to my previous role as teaching staff in the seminars and not a group member. I did not have any experience with the previous years of teaching in this course and was not able to provide fulfilling answers to their questions.

¹⁹ They had been assured access to the invite-only platform BreachLabs, however they received no information on how to access this platform from the teachers.

unstructured repertoire of fieldnotes – some titles indicating the date of the meeting while others only referred to as “meeting 3” or “group 2 meeting”. Give or take a meeting, my best guess is that I participated in five weeks of four-hour meetings with group 2. I also participated as an observer during their exams. Group 2 communicated by texting in WhatsApp (mostly to schedule meetings) and met virtually in Workrooms.

In their first virtual meeting group 2 used a drawing function to play hangman as a social icebreaker. While I had missed the first meeting, the drawing was still visible on the virtual chalkboard during our second meeting. The group showed excitement when telling me about their hangman-experience, however, this would become their only attempt at playing games to socialise in the weeks to follow. During our second and third meeting the students had some issues with paying attention and staying focused. Some group members stayed muted for most of the meeting, unless directly addressed. The students struggled with self-reported digital-exhaustion – an experience of fatigue related to continuous work in a digital/virtual space.

I noticed the symptoms of fatigue myself, becoming easily distracted and losing focus on the discussion. At one point during the third meeting the group discussed the fact that they were not taking enough breaks, something they wanted to improve on in the weeks ahead to reduce the experience of fatigue. Group 2 were able to take more frequent breaks following this discussion. Our breaks would be about 10-20 minutes long with everyone temporarily leaving VR – the breaks would not lead to any further socialising compared to a physical meeting space where breaks were often enjoyed together.

Group 2 decided to study remotely (not being physically present on campus) because the VR headset was not compatible with campus use. The VR headset required students to log in using meta-accounts (or Facebook/Instagram), if the students want to use VR and connect with a Meta account, they are free to do so but to avoid GDPR related issues we discourage students to connect the meta gear to Wi-Fi using the eduroam network which requires a student-ID username and password. The eduroam-guest network, which does not require a student-ID log-in, is not suitable for VR use; we experienced a massive lag. In addition to the network issues the campus area is not suitable for hybrid-group work in VR. The WUT students connected from their homes in Romania, and if the NTNU students wanted to connect from campus they would have to be spaced out in individual rooms to avoid an audio loop. Should the NTNU students be in the same physical room they would have had to mute their

microphones, to avoid an audio loop – but this would make it impossible for the WUT students who are not in the same physical room (but in the same virtual room) to hear the NTNU students.

Group 2 managed to stick to the four-hour teaching timeslot by remotely watching live streams of the lecture on their desktop and then switching to virtual rooms for the groupwork during seminar hours. Because the group never showed up physically while they were engaged in virtual groupwork, the group ended up missing key moments of socialisation; students who attend physically usually socialise in the lecture breaks, on their way to class or when travelling to class. Whether the lack of shared breaks had any impact on the learning outcome is unclear, however it likely contributed to the social dynamic in the group.

The NTNU students who did not use VR for their groupwork remained physically present on campus – they also received course-related feedback and guidance from teachers during the lecture and seminar hours, which was much harder to coordinate for the VR-groups. This put the students who agreed to participate in the exploration of technology at a disadvantage compared to their peers. The lack of interaction between the course-teachers and students could have an impact on final grade and learning outcomes for these students.

Being totally immersed in the VR technology the group on occasion missed messages from the teachers who, using different digital platforms, tried to organise a meeting for feedback. Group 2 went without feedback from the teachers for most of the weeks they were in VR. After having alerted the teachers about the issues of receiving feedback in class the teachers announced strategies to improve upon what was conceived as confusing for the group. The lecturer told the VR groups to book group rooms at campus to receive feedback. Poor Wi-Fi connection and audio-looping made hybrid-groupwork in VR non-compatible with the campus location suggested. Group 2 was also informed that meeting the group in Workrooms would be too time consuming for the teachers and that it was the students' responsibility to make sure they show up at campus to receive feedback. The student-group was feeling very frustrated at this point – the course hours ran late in the evening from 15:15-19:00 with the WUT students having an added time difference of one hour making it 16:15-20:00. The suggestion that NTNU students in VR groups should travel back and forth to campus just to receive feedback from the teachers was poorly received within the group. The students in group 1 and 2 complained about the overall lack of structure and information during the course, both groups expressed confusion about having been encouraged by the teachers to take on the VR equipment and later left to their own devices to suffer the consequences and complications that followed. The students expressed a desire for more guidance on technical issues and assistance regarding receiving the course related feedback they needed. The uneven access to

course-related guidance created by using VR-equipment, should raise concern with the EMERGE research group to prioritise and protect students' learning outcomes in the continued exploration of teaching technologies. Based on these research findings, EMERGE will be able to identify and address ethical issues linked to the project methods.

In the final session before the exam, the group was hard at work organising their presentation. During this meeting, group 2 discussed briefly how the use of VR had impacted their group work and decided on creating a section in their presentation on their experience as a part of the exam. The group made a brief pro-con list to use in their presentation. The following sections present the experiences brought forward by the students during the presentation with slight revisions in the wording.

The key positive experiences in VR brought forward by group 2 were:

- Collaboration mimicked real life *more* (compared to videoconference) once the proper tools were in place.
- It was easy to share screens and have a common whiteboard.
- It allowed for “layered communication²⁰” (students’ own wording) through body language, shared surrounding, and avatar-positioning.
- It removes the risk and intensity of face-to-face²¹ interactions.
- It creates a common challenge that unites the team (the technical issues became the common enemy).

²⁰ The point about “layered communication” was worded this way by the students to reflect points made in the course literature using Clifford Geertz’ concept “thick descriptions”. By “layered communication” the students were addressing to the many layers of symbolic meaning in communication that became visible to them through a shared virtual room compared to the experience of videoconference meetings. In VR the avatar exists in relation to the other participants’ avatars. Their avatar bodies interact with each other – they high-five, gesticulate towards shared surroundings, they turn their body and head to address another avatar, they have proximity-chat (the loudness of another avatars voice is parallel to their virtual distance from your avatar i.e., the closer our avatars get the louder we hear each other)

²¹ The Meta Quest 1 and 2 does not provide the avatar with detailed facial expressions. Newer versions of VR equipment from Meta and other companies are expected to increase facial tracking technologies on their goggles which could result in more detailed and realistic facial expressions. Therefore, the students in the 2022 fall semester experienced how VR also *removes* layers of communication (in contrast to the footnote above) conveyed through facial expressions.

Some of the key issues brought forward by group 2 during their presentation were:

- Battery life quickly depleted.
- Significant time was spent learning how to use VR and find platforms suitable for collaboration.
- Not everyone was able to configure all the settings / this may have resulted in a power imbalance at times with some participant struggling to connecting though VR/
- When group members do not use the VR headsets (due to low battery or other problems), the computer-users feel like they're on the outside looking in – which could also result in a power imbalance.
- Getting help from instructors was an isolating experience ([the teachers])had problems connecting, we ended up meeting in Google Meets).
- The amount of time it takes to learn how to use VR reduces time spent on work which may be off-putting.
- Long sessions might cause digital exhaustion, headaches, and nausea.

The lists presented by group 2 highlighted some of their best experiences using VR in collaborative work, which included mimicking real life *better* than videoconferences and enabling the participants in the meeting to have meaningful communication using body language and shared surroundings. However, the group also made remarks about the drawbacks of time consumption using VR, technical difficulties, and an overall lack of guidance during the collaborative work.

Additional interview – Group 3

I did not spend any time working together with group 3; however, I was able to discuss the experiences with one of the members in this group. In contrast to group 2 who rearranged to work off-campus, group 3 participated from the physical classroom. Like the non-VR groups, group 3 showed up for the lectures and used videoconference to do groupwork within seminar hours. They only used VR outside of the scheduled teaching hours and therefore never missed any project-related feedback. This approach worked well for the group, yet it resulted in more hours spent on the groupwork outside of class compared to group 2 who collaborated primarily during the allocated seminar hours. Like the other VR-groups, group 3 got no guidance from the teachers on how to use VR during the work process however they seemed motivated to manoeuvre these virtual spaces on their own. The group had some technical issues during the exam, which was also virtual, however these were quickly resolved.

Group 3 scheduled and organised their virtual meetings through text messages on WhatsApp. In VR they primarily used Workrooms, nevertheless not all the participants were able to join this platform virtually (some of the group members had the first-generation Oculus Quest). They played some games together and had overall good chemistry. The student remarked that their virtual meetings helped the group warm up to each other. I asked if the use of games specifically helped the group get more comfortable with one another, but the student replied that it was instead the shift from video conferences²⁴ to VR meetings that altered the group dynamic and made them more comfortable. During videoconference collaboration the dynamic had been a little “stiff” however this changed when they were in the same virtual room where they could turn their heads to look at one another, give high-fives, and gesticulate. The student from group 3 remarked that some of the group members were barely in contact, failing to contribute to the groupwork both in, and outside of, VR. During our short talk the student told me those in the group who were motivated to try VR were active participants and helped to make a positive work environment.

The student from group 3 enjoyed the fact that they could share their screens and review the PowerPoint in unison from the same virtual room. Typing from within VR was no issue for this student because he was well accomplished in touch-writing so if the keyboard failed to connect it did not affect his ability to write. In a future scenario this student would prefer a hybrid work scenario – a mix of virtual and physical attendance which he said to have enjoyed very much.

Finally, as an unintended consequence of VR, the student I talked to shared that some students prefer to do their final exam in VR because they could read from a manuscript during their presentations without anyone noticing. The students would accomplish this by tilting their VR-goggles up to their forehead so that the avatar would appear to be looking straight ahead while the person was looking down at their manuscript. This was an unexpected finding that I intend to explore further in my research by looking at the topic of using technology to create shortcuts in the learning process.

²⁴ When the students were first assigned a group, most groups used video conference to make the initial contact with their group members, even the students who were planning to use VR would have a video conference with their group before planning for VR meetings (which, as I have described, was a time consuming task). In this statement the student from group 3 referred to the beginning stages of the groupwork prior to moving the group work over to VR.

Discussion

The use of VR in teaching presents several challenges, including technical issues, mental/physical exhaustion, and a lack of feedback that hindered the overall experience. My observations of a VR-groups taking an anthropology course at NTNU revealed that while the use of VR allowed for collaboration that mimicked real life, technical issues such as battery depletion, time spent learning how to use VR, and connectivity issues posed significant challenges.

Digital exhaustion was also an issue, with several participants being co-present and quiet during group discussions. Additionally, the lack of feedback from teachers was a major frustration for some of the students. VR fostered social interaction and enhanced group dynamics compared to videoconferences for some of the participants, however. this experience seemed to depend on the personal motivations of the student to spend extra time exploring the virtual landscape. The use of virtual meeting spaces in this course did not organically facilitate social interaction in the same way a shared coffee-break or a communal walk to the bus stop might, but it did supplement and enhance the experience for some. For some students, social interactions in virtual workspaces needs to be organised to a greater deal compared to physical course-attendance. These findings suggest that the use of VR in teaching requires proper guidance and support from teachers to ensure a successful and positive experience for students. The shared virtual space in VR created a unique group dynamic and allowed for new kinds of virtual interactions that are not possible in two-dimensional videoconference meetings. For one of the student groups the dynamic became noticeably more relaxed once the communication shifted from videoconference to VR. Drawing from the experiences of these three groups, a more in-depth investigation into the influence of students' motivations towards their educational choices and learning techniques would be valuable for future research and for identifying potential correlations.

Chapter 6: Social Anthropology



The roles of student employees at NTNU

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Through EMERGEs' first annual cycle with explorational activities in teaching approaches, we discovered that the use of learning and student assistants varies significantly at NTNU. We have also seen a substantial potential for improvement in the practice of using student employees, which might lead to improved learning outcomes. In this chapter we will explore this by looking at material based on interviews with student employees across faculties of social and educational sciences, as well as the humanities.

Introduction

The shared experiences from the EMERGE research group in the project's first annual cycle (Mørtzell et. al. 2022) make up the background for conducting an interview-based study concerning student employees and their role at NTNU. In the previous report we noted the following: “we discovered that the use of teaching and student assistants varies significantly²⁵.” (Mørtzell et. al. 2022). From these experiences we explored what student employees *actually* do at NTNU.

We chose to use the term Student Employee, rather than for example learning assistant or student assistant, as we have seen students being employed in *various* positions, often switching between position codes without any change in tasks. The interviewed student employees could be employed, for example, as a learning assistant and scientific assistants simultaneously and still carry out the same tasks. Our point is that based on the material from interviews the position code does not really say much about what kind of work the student employee does. Therefore, we emphasize the use of the term Student Employee (SE) to cover the various types of employment students occupy at NTNU.

The interviews that this chapter is based on are founded on anthropological perspectives, and emphasis interpersonal relations and organisational structures. In the research design we also draw on our own experiences as former student employees, as well as on recruiting and employing student employees.

²⁵ In this chapter we use the term Student Employee as a superior term that covers student employments as “learning assistant”, “student assistant”, “scientific assistant”, “research assistant”, “candidate”, “researcher” and “department engineer”.

Working as a student employee is demanding for students as they have to balance their “betwixt and between” (Turner, 1969) role as a student and as an employee, while simultaneously having to learn the ins and outs of the university from a scientific and administrative perspective, balancing being colleagues with their own professors, how to treat their classmates as students, learn how to handle administrative tasks, how emerging technologies work and to help lecturers understand how these work. Being a student employee then, as our material points to, is being adaptable to unfamiliar tasks that rapidly change from context to context.

Method

The study is based on ten individual semi-structured interviews (Bernard, 2006), that lasted around one hour. The student employee participants got the opportunity to answer open-ended questions regarding topics such as work tasks, contracts, and their own sense of belonging as a student employee at NTNU. Participants were invited through email by one of the authors, and the selection was made among disciplines already collaborating with EMERGE. After narrowing down the selection to specific disciplines and departments that participate in EMERGE, the next criterium was that the participant had to be recently (no more than a couple years ago) or currently employed as a student employee. The respondents had a background from a variety of disciplines across the faculty social and educational sciences, and the faculty of humanities (social anthropology, geography, psychology, teacher education, education and lifelong learning, geology, and philosophy). However, the student employees participating in this study were solely those employed at departments connected to EMERGE.

The interviews were initially planned to last no more than 20-40 minutes, but the majority ended up lasting around one hour. It was clear during the interviews that each student employee had a lot to share regarding their role as an SE. The interviewer made room for the student employees to take their time, and make sure that they got to tell their own story. The interviews were conducted during the autumn semester 2022, and the material was analysed all together after the last interview.

Scale of the study

Due to limited recourses in EMERGE, it was necessary to keep this study relatively small. It is not possible to estimate precisely from ten interviews to which extent the tendencies found here reflect the totality of student employees at NTNU. However, what we can say with certainty is that the tendencies are part of the spectrum of student employee practices at NTNU and deserve closer attention. As such, this study should be the first stage in unveiling relevant research questions for a larger study.

A benefit with keeping the scale small is that the interviewer had more freedom to be flexible. Flexibility is important in a study where the priority is to discover relevant themes and topics for research questions for further studies, rather than answering already defined questions. The scale also allowed flexibility regarding the lengths of interviews. It was beneficial for the interviewer to be able to go back to some of the student employees, if something from the interviews was unclear or if additional information were needed. Moreover, keeping the study small, selecting student employees within disciplines and departments that already collaborate with EMERGE, enabled the interviewer to undertake these interviews already familiar with the disciplines involved. This familiarity, we argue, enables the interviewer to pick up on cues that were made, insight gathered from anthropology, creating rapport with informants.

Nevertheless, keeping the study small scale we have managed to identify several themes and topics of interest regarding student employees. Based on our findings, our point of departure is that it should be of interest for NTNU to initiate a similar qualitative study on a bigger scale. Our findings indicate that we are only scratching the surface of the question of what student employees do at NTNU, and that there is much more to explore and discover regarding these valuable employees.

Motivational factors of being a student employee

One of the themes that was commonly shared by the participants during the interviews was topics related to “formal and motivational measures, such as wages (Mørtzell et. al. 2021, p. 130).” When student employees discussed their salaries with the interviewer, they emphasised that, even though they do not feel that they get rewarded by reasonable salaries, they feel rewarded through the experience of taking part in intellectual work, as well as being able to have ‘first-hand’ experience with ‘the other side of the table’ at the university. They also emphasise that this type of employment will look good on their CV. For example, one of the respondents, a former student employee who graduated with her masters, stated that for her the experience of being employed as a SE was in many ways more rewarding than her degree itself. When she got her first job after ended studies, it was the experience and the knowledge

that she had gotten by being employed as a SE that her current manager emphasised the most when employing her. The experience they attain as student employees should thus not be underestimated.

Wages: Surprisingly, low wages, as we guessed (in the last report) would be very important for most SE's, was not the most significant topic, even though the wages were described as too low. Most of them mentioned briefly that their wages were low, and that they usually had another job outside of academia that paid for utilities and bills. They could easily get a side-job at a local supermarket, clothing store, coffee shop, or similarly with better salaries and better benefits than what the university offers them as SEs. Nevertheless, they emphasised that it would be more beneficial for them if the salary was higher at the university. In that way they would have been able to focus more on their own studies, than on two jobs and their studies simultaneously. Moreover, even though the respondents did not seem to worry too much about their salary, the majority of them shared the feeling that the salary was more symbolic than reflecting the work they carried out.

Hourly limitation: Instead of emphasising an increase in salaries many of the respondents shared a frustration regarding the hourly limitation of 120 hours each semester. One of the respondents stated that the hourly limitation was perhaps, initially, established to protect student employees, yet the opposite seems to happen as the same respondent stated:

... the hourly limitation, the argument that I've heard is that students should study instead of working. However, this, the hourly limitation means that they have to have another job on top of that. Which make them study even less, and have to move more around in the city ... I had quite a few hours on several projects, it was, it would have been better if I could have had an extra hundred or so hours per semester instead. So, I think this is simply devastating.

This example is not one of a kind; the majority of the interviewed SEs emphasised the same.

Informal solutions to formal limitations: Nonetheless, several of the student employees experienced that this exact issue was resolved on a local (often informal) level with additional contracts, and often with other job-codes and titles. However, their work tasks stayed relatively unchanged.

Recruitment: During the interview the participants were asked if they had applied for a student employee job and most of them had never applied, but had been asked directly by a professor or other permanent employees if they were interested in this or that job. From first time employment later positions came along, as one respondent stated:

... I've been asked to participate in several projects, such as XXXXXX, and I got to write a master's and have soon published an article. So really, it's snowballing at a high level in academia.

Invisible formal channels: Being asked directly to take this or that job seems to be dependent upon various factors. First, our own experience is that it is difficult to recruit student employees through formal channels as for example '[innsida](#)' (the university's intranet page), because students, nor employees, visit this site on a regular basis.

Personal relationships: Second, as an employer, especially if you practice explorative teaching approaches, the affective aspects between student employees, lecturers, and researchers are of high importance and cannot be overlooked. The importance of affective aspects is supported by Maria Hesjedal's (2022) research on placemaking at a Norwegian multi-located research centre. Hesjedal emphasises that getting to know people and to form "personal professional relationships" (Hesjedal 2022, p.11) is important when working on a project together with other people. Further in her analysis she explains this as important aspects "in most forms of research collaboration ... because of the need for trust and appreciation when sharing knowledge and data" (Hesjedal 2022, p. 22). These aspects are mutually supported by the interview material as well as from our own experiences with recruiting SEs. Moreover, being asked personally to take a job creates a sense of being lucky or special. And creates a sense of being fortunate to hold a position at the university. The feeling of being special was explained as a positive benefit from working as a student employee²⁶, but as we shall see in the next section, there are also potential dangers.

The general conclusion regarding motivational factors is that there is a need to explore this area further. In addition to monetary compensation, other motivational factors play an important role. As such, additional credentials must be considered. Already in 2002 when the formal learning assistant training program was in the planning phase this point was highlighted. In the original project design document *Læringsassistenter ved NTNU* (Jacobsen, 2002) the project leader suggested "in the long term, one must consider making the training Skill-enhancing in the form of credits that can be included as part of a degree" (Jacobsen, 2002, p. 4).

²⁶ Student employees explained that they felt that they were given a lot of trust and freedom in their positions by the recruiting lecturer or professor. Many of them explained that they felt they had been invited into a share social community with a small group of lecturers, researchers, and professors.

Considering this latter point being emphasised in the early 2000's, Hakel shedding light on SE invisibility in 2017, and us raising similar questions in 2023, points towards that SEs are still invisible today. We emphasise, as we did in the EMERGEs' first annual cycle and report, "when teaching is explorative there is a need to share and gather experience" (Mørtzell et. al. 2022, p. 131), and this we will continue to explore in the next cycle.

Vulnerability

Many of the respondents stated that they often felt that they worked outside their contract(s) because their hourly limitation was reached. However, a few of them stressed that this was countered with either additional contracts, or that they were given extra hours. They explained this as 'voluntarily', but at the same time, it was a connotation towards that they felt they needed to give something back because of the opportunity they have gotten being employed at the university. This, of course, raises several questions. And especially the question about SEs being vulnerable for exploitation.

Among the SEs that noted that they worked outside of their contracts, most had started working in their positions several weeks before they got a contract from NTNU. Some of them also worked more hours than their contract offered, and some worked after their contract had ended. There seem to be several reasons for this to happen: One is that the SEs feel obligated towards the professor who hired them, a second is the SEs feeling of obligation towards the students they are responsible for, a third is the simple fact teaching cannot be postponed just because the contract for the student employee is not ready. Here there seems to be a challenge in the encounter between the slow working bureaucracy of NTNU and the problem of engaging student employees early enough before teaching starts. These reasons are hypotheses; to say with anything with certainty we will need further studies.

However, one thing we can say for sure is that by comparing the discoveries leading to these hypothesis' about the invisibility of student employees in organisational management documents and their lack of labour protection, that student employees are vulnerable to labour exploitation.

We find it important to explore these findings further in the next annual cycle in EMERGE. As mentioned above, for NTNU as a HE-institution, our findings could serve as a point of departure for a bigger qualitative study, focusing on SEs and their dual role as employees *and* students.

Betwixt and Between

To answer our initial question *What student employees actually do* in their jobs at the university we need to explore empirically their tasks from an emic perspective, as well as looking towards the unused potential of student employees. Hakel (2017) explored learning assistants' role in quality assurance work within Norwegian HE-institutions, and in her article, she emphasised that:

As unskilled employees in positions with a limited number of hours and duration, learning assistants will not form part of the formal, structural structure at a HE institution. As I perceive it, a consequence of not including them as formal actors in the quality system may be that they continue to be invisible and that a great potential in quality work remains untapped” (Hakel 2017, p. 29-30).

This perspective of invisibility is further explained by the SEs. They explain themselves as neither a full employee nor a full student (Mørtzell and Fyhn, Forthcoming). By not being visible, or constantly being made invisible, at the organisational and formal level, it is no surprise that they describe a feeling which could be said to be “betwixt and between” or “liminal”. We understand SEs role as being trapped between formal social and organisational definitions. Turner in his book *The Ritual Process: Structure and Anti-Structure* (2008 [1969]) describe liminality through distinctive and often opposite categories. He describes the “[a]ttributes of liminal entities” (Turner, 1969, p. 102) as “... all attributes that distinguish categories and groups in the structured social order...” and “... the neophytes are merely entities in transition, as yet without a place or position.” (Turner, 1969, p. 103). And it is through Turner’s perspective on liminality and the state of being betwixt and between that we understand the SE’s role at NTNU.

Interestingly, student employees, as our material points to, are trapped and kept motionless in their roles. Meaning; since they are continually made invisible at the organisational level, they are kept in a state of remission rather than in a state of transition. To improve motivational measures for SEs and to improve the recruitment process there is in the first stance a need to explore empirically their use and value for the specific study programmes and the university as a whole.

The student employee role should be lifted to the foreground, and they should be given a voice at the executive organisational level. If not, they will, as Hakel (2017) states, continue to be made invisible, and thereby continue to feel invisible – feeling that several of the student employees explicitly and some implicitly emphasised during the interviews.

EMERGEs approach to student employees

To contribute in improving recruitment and creating motivation in becoming a SE, we argue that “there is a need to strengthen contact points between student organisations, students” (Mørtzell et. al. 2022, p. 131), departments and employees. In EMERGE we have begun this process with taking student employees seriously as active participators in teaching and development, by exploring what they do and

how they themselves make sense of their role as a SEs. And by sharing experiences with BLINK (chapter 9) who take a similar approach and a more formalised practice with the use of SEs through their onboarding program. By having a space for sharing experiences and reflecting around the SE role with Uniped, we aim to give them a voice at the organisational level, and prompt awareness amongst other lecturers, researchers, departments, faculties, and NTNU as an organisation.

We want to promote the valuable role that SEs, regardless of job-title or contract, have for fellow students, university staff and the overall teaching environment and culture at NTNU.

Based on the material from the interviews, on sharing experiences in EMERGE on the use of SEs, the employees in the research group themselves being former SEs, and on our close collaboration with the Educational Development Unit (Uniped) and Blink Learning Hub, we are looking into how one as a HE-institution can develop a practical training program for SEs that carry out various tasks for departments and in research projects.

An example of a possible approach to SEs is being developed at the department of social anthropology:

We have four courses, SANT1019, SANT2020, SANT2025 and SANT3600 where we have informally implemented our own training program for new student employees. In this innovative and still informal program, we emphasis a practical training scenario where former student employees work together with new student employees in the same courses during the same semester. This form of practical training creates an apprentice-experienced training situation.

The role of the student employees in the mentioned courses are partly as process facilitators (as in (Experts in Team, EiT) and partly as “reading help”. However, the “apprentice model” at Department of social anthropology is different from the EiT model where student employees (called Village Assistants) are trained in a dedicated course the term before the courses run. We find the apprentice model to be suitable for smaller scale courses as the total number of student employees don’t justify a dedicated course. Also, the apprentice model is economically less costly, as the training is done simultaneously with the job.

A further advantage of the apprentice model is that it seems to build strong relations between students, employees, and the department in early and later stages of their degrees. The newly employed students, together with the experienced, are enrolled in the courses at several levels. They take an active part in meetings with lecturers before the teaching begins. The student employees are thereby invited into the development and planning phase of the course and are also given a voice to contribute to shape the subject outline for the up-coming semester. A respondent from one of the anthropology courses explained how she was invited into the development phase,

Yes, it was probably in the XXXXXXXX subject. And it was actually a very cool thing to have as a first student job. Yes, it was a completely new subject for the year, so that we got to help shape it quite a bit by being involved. So, both what it should consist of and how. Both the syllabus and sort of procedure and how we wanted to present it in seminars and everything like that. So, you got a bit of ownership to subject, or the subject as a project rather than a subject. And it was, yes, generally quite a nice experience.

EMERGE also plays a role in this approach, as some student employees in these courses also participate through EMERGE as observers and write down fieldnotes from lectures and seminars. Their fieldnotes and observations are continuously shared with lecturers and the research group. They further participate with other students in analysing and writing out their reflections for example in EMERGEs' reports (see chapter 7). In this way, student employees are invited in as serious practitioners in research and as important actors of research, teaching, and course development.

Summary and further studies

In this chapter we have begun to explore what it means to be a student employee at various departments at NTNU. We have focussed on giving SEs a voice and to let them share how *they* understand their role as a student and an employee.

Here are some key findings:

Recruitment, Compensation and student economy:

- Recruitment seems to be a challenge and should be studied further
 - The formal channel “Innsida” is not very visible
 - Personal recruitment from professors is important
- The wages seem too low but is not particularly stressed by students.
- The hourly limitation of 120 hours may work against its purpose as students need other jobs in addition
- Other forms of benefit are equally important as monetary ones:
 - Experience with academic work
 - Participation in academic social communities
 - CV
- The possibility of giving formal credits for SE work should be explored

The position as student employee:

- SEs are vulnerable
- SEs are not visible in NTNUs strategy documents
- The position of SE should be explored further

This study does not cover all SEs at NTNU but indicate identify essential themes that should serve as a starting point for a more substantial qualitative and quantitative study of the role of SEs.

Chapter 7: Social Anthropology



Filling the space between idea and presentation – Enabling creativity in a hybrid student-active-environment

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Introduction

This chapter deals with perspectives of classroom experiments in two separate courses in social anthropology. The empirical material that will be presented throughout the chapter is conducted from learning- and research assistant's meetings with students throughout the autumn term of 2022. We have conducted observations and interviews throughout the semester. Learning, together with the students, how higher education can be improved for the better, is not an easy task, but an important one. The classroom experience can be viewed as a laboratory (See chapter 1 in EMERGE report 1). And as anthropologists our 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 (for detailed description see Mørtzell et. al. 2022, p. 31-32). Conducting participant observations in the classroom means that one needs to take part in both a physical and digital sphere, something that has proven to be quite troublesome. However, by gazing at the screen together with the students we got some insight into their digital presence.

As we have seen throughout our study that the student-active-learning process can be a great challenge for the students. We will focus especially on how students relate to the amount of freedom given in the two courses. The students frequently expressed the experience of freedom given by the lectures and assistants as “overwhelming” – an expression used to describe not knowing where to start, or how to structure their work. The process of sorting out, overcoming frustration, and finding a direction together with co-students is described as “exertion” (Fyhn, 2009). In our report we want to investigate the possibilities and restrictions that students experience through exertion. This is a difficult task, as students' experiences of possibilities and restrictions can be both a bodily and structural matter.

As the digital is expanding in the university's, we need to expand the term “classroom”. A classroom is not only the physical room where students meet with teachers and assistants in order to learn. The classroom can expand beyond four walls, all the way to the far corners of the world. The classroom, in the post-corona world, is situated in various networks and trajectories that work together in number of ways, and that move across time-space in both traditional and untraditional ways. The researcher's task,

together with the students, is to connect various networks and trajectories to understand what makes up a classroom in the post-corona world. The continuous work of “opening the container” of the educational space (Leander et.al. 2010). In this article we try to open the container by investigating some of the technologies that students use.

In addition to looking at the relationship between students and technology, we want to discuss creativity from an emic perspective. The students expressed high motivation to learn and to be creative as part of the freedom and open-endedness of the assignments. On the other hand, we seek to investigate how the larger context of learning creates some challenges and barriers to student-active-learning.

This study is conducted in two courses, *Human, technology and dialogue* ([SANT1019](#)) and *Cultural understanding and international working relations* ([SANT3600](#)), which are both offered by the Department of Social Anthropology at NTNU.

SANT1019 is a course that challenges students to investigate complexity in different connections between the social human being and an emerging technological reality. The course offers students an opportunity to explore different topics concerning the technology that affects their daily life. The course requirements are a semester assignment presented in front of the class, which is mandatory to pass to be able to take the final exam, and an individual written final exam graded from A to F (F being failed) which ends up on their diploma (see report 1, chapter 4). In the semester assignment the students were given full responsibility, which meant finding a topic and reflecting about this in a presentation form free of choice. We observed that the students chose topics that were related to their daily life and the technologies that impact their lives on different levels. They were especially interested in the latest inventions in social media such as the app *Bereal* and *Snapchat ghosttrails*. Although the students were given full freedom to choose their own method of presentation, the majority made video or podcast to present their material.

SANT3600 offers a theoretical and practical introduction to cultural knowledge as an analytical tool to handle challenges related to internationalisation of work. The students are introduced to a holistic way of grasping cultural differences and are also trained in reflecting on their own cultural background, in cross-cultural meetings. Like the previous semester (See EMERGE rapport 1 chapter 4 for more detailed description of the course) the students in this semester had to complete two oral exams. The first exam project was a group assignment where the students were challenged to make an innovation that could improve the living conditions of locals in Cambodia, based on an issue that was already problematised by local NGOs. In the second assignment the established groups collaborated with students from University of Timisoara to come up with an innovation to improve the life of vulnerable

groups in Romania. The students were given the same freedom as in the first assignment, responsible for keeping in touch with the students from WUT, facilitating a bigger group by using digital tools of communication.

The explorational activities is based on student-active-learning. SANT1019 is a course that consist of traditional lectures led by a group of teachers. The lectures are supplemented by seminars led by teaching- and research assistants. The students are encouraged to be explorers in compliance with the EMERGE philosophy (see report 1, chapter 1). Therefore, the assistants were not supposed to lead the students throughout seminars, but instead offer them guidance throughout their learning process. The course SANT3600 was held in four-hours long seminars once a week. The seminars were divided into lectures and group work, and in these seminars, students were given freedom to structure the group work. The students' response to the freedom given in the two courses, and how they unfolded creatively in a hybrid learning environment, will be the central topics throughout this section.

In this chapter we want to contextualise experiences from assistants', and students' perspectives to understand how presence and creativity can be promoted and/or repressed facing exploration in an educational setting.

These are our research questions:

- How does student-active-learning affect the students' motivation and creativity?
- How is a hybrid learning environment effecting dialogue between students, and between student and assistants?
- What are the possibilities and barriers to student creativity? And how can teachers and assistants facilitate the student's creativity?

Student-active-learning

In the two courses SANT3600 and SANT1019, students are challenged to resolve the assignment without intensive guidance from teachers and learning assistants. The teachers and assistants have created a learning environment where students are given space to experience the frustration and joy of dialogue, without the interruption or immediate guidance from teachers and assistants (see report 1, chapter 1). This is called student-active-learning.

The student-active-learning facilitated in the two subjects was met with a broad range of feelings. Having the freedom to self-regulate their university work without a strict how-to-recipe inflicted “a state of frustration”, as described in Chapter 4 in report 1 (Mørtzell et. al. 2022, p. 56). In SANT 1019 we witnessed that facing student-active-learning was perceived as a large, confusing challenge, as this way of teaching is experimental, and therefore not a usual practice for the students.

The vast majority were at first overwhelmed, and somewhat provoked by not getting guidelines such as requirements on content or presentation form. It took a lot of convincing over a period of time, that the assignment is interesting, and they have a unique opportunity to dive deeper into their own interests.

As a learning assistant who has been through a similar procedure in SANT2020 the prior term (see course description in report 1, chapter 4), considering the students interests and trying to boost their confidence became a priority from early on. From my personal experience, being exposed to student-active-learning was at first challenging and perceived as difficult, as this was different from traditional assignments given in university. Eventually the challenge resulted in personal growth in the sense of gained independence in academic writing and understanding, and above all a trust in my academic skills. A valuable experience I wanted to share with the students in SANT1019.

After a while, some of the students showed great motivation to the student-active-learning in SANT1019. One of the students commented during a seminar, “I have never felt having such responsibility in a semester assignment”. He explained to us that he liked having responsibility and it gave him more motivation to put effort into it. One of the student groups continuously gave verbally feedback throughout the term on how this was a new, fun way of learning. They described a feeling of independence as they were in control of their assignment, without being “locked” to strict demands on content or form. And a different student group showed large engagement and motivation. In conversations they talked about how they worked a lot with the project in their spare time in ways that were not directly linked to the assignment. For example, one of these students showed us a great range of memes based on the subject’s theoretical framework and their experiences within the subject, made solely for fun; these memes were never to be shown in their final presentation, nor was this their plan, they just had a lot of fun with the subjects' activities and structure.

This view was shared by a group of students in SANT3600. In a group interview with four students who participated in the course we talked about their view on student-active-learning. The students all had backgrounds from various technical student programs at NTNU. By relating to their technical

backgrounds, the students in SANT3600 told that they were not used to the freedom and openness fostered by the assignments. They compared the anthropological subject to the technical subjects, which from their view, often followed a strict recipe.

However, not all groups had this experience with the explorational activities. Considering the students as “active contributors to the subject” is central to the EMERGE philosophy (Mørtzell et. al. 2022, p. 38). Therefore, students in the SANT1019 subject were encouraged to use elements from their own life as empiricism and connect it to the theoretical frameworks found in the syllabus. This principle was not well received in one of the student groups, where one of the students exclaimed “this is a bullsh*t course and a bullsh*t assignment” once he realised that his own life experiences could be used as empiricism. In several conversations with this student, it seemed that the subject faced a loss of credibility in his eyes, because the students being considered as co-researchers.

Also, we observed limitations to the explorational and creative initiatives from the students. In the beginning, most of the students struggled with the task of creating a presentation form and requested examples. Therefore, we spent some time on talking about previous students' assignments, which gave several student groups inspiration towards non-traditional presentation forms. For example, when we showed a previous video-presentation, some of the groups decided to make videos; and when we listened to a previous podcast-project, other groups decided to make a podcast. The presentations on the subject varied between podcasts, videos in different formats, and PowerPoint presentations.

The students appeared to be holding on to the classroom in traditional ways and did not see the classroom as a space of endless possibilities; space to unfold creativity. Teaching as exploration and students as explorers are principles central to the EMERGE philosophy (report 1, chapter 1) that were new to the students, and they needed guidance in what ways they could seize the opportunity to explore the emerging world.

In the NTNU manual it is stated that guidance from teaching assistants is intended to “help students become aware of their own learning process”, while contributing to “teaching and supervision” work (Mørtzell et. al. 2022, p. 106). This, combined with the student-active-learning-process, contributes to a practice in SANT1019 where the guidance is not supposed to lead, but give them tools to solve the group work, and an awareness of learning outcomes. In the process, we observed a pattern of difference in the students' use of guidance. There were student groups that were more active in the seminars, asking a lot of questions around the assignment. One of these groups requested a lot of guidance and continuously asked for approval as they experimented with different ways of solving the assignment.

From constantly asking for the assistants' approval, the group found confidence in expanding their working methods in experimental ways. They ended up with having one of the more experimental presentation forms seen this term, in presenting about the phenomena 'private stories on snapchat'. The presentation in front of the class was a screen recording of their private snapchat story that both explained and exemplified the phenomena.

On the other hand, there were the student groups that relied less on seminars and the help from assistants; these had a tendency of solving the assignment in different ways. The times they attended to the seminars, they asked few questions and showed low interest in receiving guidance. Among these groups, one of them often left the classroom to work on their assignment in privacy. These student groups tended to solve the assignment in terms of traditional PowerPoint presentations. From this, it appears that when guided and reassured, students may find confidence to be explorational and creative.

Dialogue and group dynamics in a hybrid environment

In the previous sections we have discussed some important aspects of student-active-learning in SANT1019 and SANT3600. In this section we will look further into the dynamics of the different groups, and how they worked together given the freedom and open-endedness of the assignments they were handed.

The classrooms and the locations of the two subjects can be described as hybrid learning environments, which means that the students were physically present, while using digital tools to communicate and work on their assignment. In SANT1019 the students used shared documents such as google docs to work on the group assignment. In SANT3600 group work was conducted on digital communication tools such as google meet, -docs and WhatsApp.

At first, observing group work and dialogue between students in SANT1019 appeared to be a difficult task as we could see groups that was barely talking, gazing into their screens. However, after spending some time with the students, we learned that the computers were not necessarily a barrier to group dynamics and discussions but could also be used as a necessary tool for group work. Working in digital tools such as google docs was an important part of working together, creating ideas and material for the assignments. As one of the students explained, "we just started producing ideas, and in the end, we had to work on how to compromise it." Writing together in google docs, the students always had an idea on what the rest of the group was working on, enabling them to supplement each other. The students appeared to be in what Håkon Fyhn (2011) describes as a "flow". Fyhn describes flow as a collective

action where human activity are moving forward without a visible effort or force. It is a state of presence, which is visible as soon as something or someone interrupts the flow (Fyhn, 2011, p. 28).

Seeing how the students used their hybrid environment to create a shared digital presence where the “flow” unfolded in a digital room, shows how the students were present in a creative process that exists across the digital and the physical environment.

The group work in SANT3600 was a different case as the students from NTNU was not physical present with the students from WUT. The students from NTNU talked about the cross-cultural group work on the digital arenas as an exciting, but challenging experience. In an interview conducted with one of the groups in the subject there was a discussion about the first meeting with the students from WUT in a Google Meet videocall. The students from NTNU participated as a group in front of the camera, while the students from WUT were neither acquaintances with each other beforehand nor physically present at WUT, participated from individual computers. The students from NTNU described the group dynamic in the first meeting as *strange* and *inconvenient* because the students from WUT were quiet and not taking any initiative to start conversations. Being online, the students from NTNU uttered that they had no idea how to “*break the ice, dealing with the discomfort of quietness.*” They described this as a new and unknown situation. They decided to take the next meeting apart from each other to meet on the same terms as the students from WUT- staying at a place outside the university context in front of a screen. The students from NTNU claimed that the action had positive implications on group dynamic and dialogue between the students from NTNU and WUT. The students learned how to deal with distractions and disturbances to improve the flow of their conversation, as this was a new way of collaborating on an assignment, instances of trial and error were crucial. They also made discoveries about the technology in use and made some critical remarks regarding the communication tools and how this affected dialogue, in terms of lacking body language.

In this section we will look closer to how the students used the syllabus, when presented with no requirements of reading. The reading was supposed to be a supplement to the creative process, in which the students themselves decided on which theories to focus on. Given this freedom to apply the literature, we observed that the main concern was the final exam, which appeared to be the primary motivation amongst the students. We often met questions as “which readings is obligatory?” and “what is the best tactic to pass the exam?”. At the beginning of the very first seminar in SANTI019 a student asked “How will the exam look? Can I see examples of earlier exams?” on the grounds that the student in question had signed herself up to a great number of courses, to be able to pick and choose from the most interesting and *manageable* course.

Observing how passing the exam was a dominating focus in the group, we adapted this focus as a tool when trying to engage and motivate the students the first weeks. Saying things like “This is a fun way of *preparing for the exam*, by getting to know the syllabus on your own terms, and working on it however you like”. These phrases were received with affirmative nods from the students. Still, it appeared that a great deal of the students did not read the syllabus throughout the entire course – especially after learning that there were no requirements on what to read.

Several scholars have investigated the challenges of making students use the syllabus (Lei et al. 2010; Rød & Nubdal, 2021) and show that students not reading is an overall problem in academia. One of the factors connected to the problem is the lack of reading comprehension among students (Ryan, 2006). Other scholars connect the phenomena to the result-oriented society that stems from neo-liberal thinking (Lynch, 2006). The result-oriented society might be an explanation on the students' approach to the subject. During the term several open-ended qualitative questionnaires were posted on SANTI019's digital platform to get honest feedback from the students regarding the experimental teaching approaches. The questionnaires were volunteer to fill out and not many responded to them. Therefore, the answers gathered cannot say anything about the experience of the course on a general note. However, we found the focus on the final exam to be a distinct pattern among the feedback. The first questionnaire was posted at the beginning of the term, questioning their expectations for the course: the answers were in terms of “I expect to be taught well enough so that I will be prepared for the exam” or “I expect the lectures to be related to the exam”, and so on. A later posted questionnaire asked how they felt about the alternative learning-method used in this subject and one student answered, “This is a great way to be prepared for the exam!”. On the other hand, when they were questioned on *how* this course stood out in comparison to other courses, one of the answers were “In this course it is hard to know

what is required to pass the exam...”. From this it seems that despite the experimental teaching approaches, the freedom to explore with digital tools, and being self-regulating learners, the students’ focus is to a large extent the final written exam.

Findings and results

During our time in the two subjects, we have investigated how exploring with student-active-learning was received among the students. In both subjects the students were met with open-ended assignments, where they were considered as co-researchers, along the lines of the EMERGE philosophy.

Through our observation we have learned that students need a safe space to ask questions and seek approval from teachers and assistants in a student-active-process. Students had some challenges to unfold in terms of the EMERGE philosophy that “Placing students at the centre of their own learning could increase motivation for, creativity in, and reflection around, the curriculum of the course” (Mørtzell et. al. 2022, p. 43).

The majority of the students were highly motivated by open-ended assignments and the free choice of presentation media. But in the starting process, it is evident that the students were not used to be met with assignments that open for creativity. They requested examples to get the process started, and reassurance as they experimented with different solutions.

In this process, the seminars with the learning- and research-assistants seemed to have played an important role for the creative exploration. Having someone there to guide them and answer their questions seemed to enable the creative processes. Eventually, this resulted in high motivation, ownership of the project, and a feeling of accomplishment.

In this we observed how digital tools enabled creative processes through shared presence in the groups’ online documents. These platforms seemed to create a shared space for exploring ideas and inspiration in the exertion phase. On the other hand, we witnessed how the digital tools prevented creativity in different ways. For students, its negative implications were in terms of lacking body language in the Google Meet videoconference. For the learning- and research assistants, the hybrid learning environment restricted the dialogue between student groups and assistants, in that we found ourselves on the outside of their hybrid “bubble” of gazing at the screen together, not seeing the exertion work process, and therefore not knowing what has been done, what ideas they have, or how to guide them forward.

A further research topic for EMERGE might be to look deeper into how students are using the digital documents and how creativity unfolds in these to better grasp how teachers and assistants can guide the students in the creative process that takes form in the digital shared space.

As we mentioned in previous section, some of the student felt overwhelmed by the freedom and open-ended assignment. Despite this we have observed that the student made solid presentations and handled the exertion well. But we need to reflect further upon how we made the students aware of the process of student-active-learning. As teachers and assistants, have we spent enough time to reflect together with the student upon the learning process?

We have found that the hybrid learning environment enabled dialog between students through different digital tools. Sharing in the digital documents was an important part of the co-work and presence among students.

However, there is still a question about how to increase the motivation for reading the syllabus. From our observations we have seen that a larger number of the students viewed the syllabus in the courses as a tool for passing their final exam. Instead of using the literature as a tool to enable creative processes. Seeing how several scholars have investigated students' habits with the syllabus, and how this was a struggle in our subjects as well, we could argue that this is a topic that could be of value to investigate further through EMERGE in coming terms.

Summary of point

In SANT1019 and SANT3600, students were introduced to a student-active-learning process with a large amount of creative freedom. We have investigated the possibilities and restrictions that students experienced using this method. We have looked at the reactions of student-active-learning (a feeling of responsibility, sense of accomplishment, amusement, or loss of credibility), the group dynamic and presence in a hybrid environment, and a distinctive exam-oriented approach to the syllabus.

Chapter 8: IMTEL (Education and Lifelong Learning)



Immersive learning in European perspective: EU-funded projects at IMTEL

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The exploration of emerging technologies and innovative pedagogies at NTNU, which is the focus of EMERGE, is impossible without the tight collaboration of the international community.

Acquiring external funding, particularly EU funding, is becoming more and more important for Norwegian universities. It will be vital in the coming years to facilitate innovative initiatives and the adoption of emerging educational technologies. IMTEL research group has traditionally had a strong record of international collaboration and externally funded projects in the fields of immersive learning and technology-enhanced learning. In the following chapter, we present a selection of recent EU projects at IMTEL, with the focus on XR and immersive learning:

Erasmus + eROBSON: Educational Robotics at Schools Online with Augmented Reality

<https://e-robson.eu/>

In this project, we explore how to enhance educational robotics with Augmented Reality (AR). The consortium completed two literature reviews, one with an educational focus and another with a technology focus. We also completed an expert study to complement our desk research.

We are working on a conceptual approach, a platform-independent framework. We are also developing two prototypes, on the basis of two Augmented Reality platforms AR Tutor and MirageXR. For both, we are developing software modules that would support educational robotics content and methods. For the reference implementation on both platforms, we selected educational robotics kit LittleBits. We developed some educational resources for demonstration and are working on more.

We are planning three training events for teachers. One is scheduled for the 31st of May 2023 to be organised in the Netherlands by our partners Open University of the Netherlands and Discovery Museum <https://e-robson.eu/erobson-inspiration-and-design-workshop-for-stem-teachers/>.

The second, more comprehensive training event (<https://esia.ea.gr/erobson-summer-school-2023/>), is scheduled for a full week from 9th to the 14th of July 2023 to be organised in Marathon, Greece, as part

of the framework of the ESIA summer school, hosted by our consortium partner EA. The event is open to any teachers interested in educational robotics, STEM, and Technology Enhanced Learning.

The third teacher training event should be organised by NTNU in the autumn. We are in contact with the European schoolnet to possibly host this event in Brussels, hosted by the Future Classroom Lab <https://fcl.eun.org/about>. We are also planning to organise a webinar in collaboration with the European schoolnet, as part of the webinar series by the Future Classroom Lab.

Erasmus + VR4VET: Virtual Reality for Vocational Education and Training

In this project, we develop solutions to support career guidance and vocational education with Virtual Reality. This project is based on a previous nationally funded project Virtual Internship in collaboration with the National Labour and Welfare Administration (NAV), that resulted in several VR applications for job interview training and career guidance: <https://www.ntnu.edu/imtel/virtual-internship>

Since the beginning of the project in 2022, we went through the ideation and infrastructure planning phases. We collected data and specified problems of the subject matter area. We started generating ideas and quickly had more than we could translate into the prototyping process, so we are getting back to the ideation process from time to time after this phase is over.

The concept of basic vocational training and career guidance with VR is being developed and written by the project together with an associated design methodology, based on our previous work in the Virtual Internship project (<https://www.ntnu.edu/imtel/virtual-internship>), ideation results, and additional theoretical perspectives.

In the technical tasks of the project, we started the open-source software development process, selecting the MIT license, and setting up the development infrastructure, code repository, and agile software development processes. Our open code repository is set up at <https://github.com/vr4vet/>. The open license (MIT) is selected and approved by partners. The main repository with the core assets is started in this period. Developer teams defined at NTNU and two other universities in the consortium TH Cologne, and TU Delft. The core technical team of the project is working on a collection of reusable assets that will serve as a basis for workplace and profession applications. The scenarios and content for these applications are being designed in the project as well. In Norway, NTNU collaborates with NAV and the career center of Trøndelag (project partners) and some external companies representing the maritime sector. In Germany TH Cologne works together with BZB on a construction scenario. In the Netherlands, TU Delft works together with the Technical College Rotterdam on a cloud server installation scenario.

In this project, NTNU hosted a f2f project meeting in Trondheim. All partner organisations were represented and the local partners NTNU, NAV, and Trøndelag county participated with large teams, invited experts and target group representatives. The meeting was organised as a Design Thinking workshop.

Erasmus + iPEAR: Inclusive Peer Learning with Augmented Reality Apps

<https://i-pear.eu/>

The main idea behind the iPEAR project is that use of AR in peer-based teaching and learning presents unique possibilities for engaging and meaningful educational experiences. The project's objective is to promote peer-to-peer pedagogy as an active and empowering approach to learning, especially in the aftermath of the pandemic. With AR technology, students can produce their own content together with their peers and visualise the results of their collective efforts. By integrating collaborative methods with visual aids and immersive technologies, teachers and learners can develop an innovative and promising instructional model (iPEAR model), fostering new perspectives on emerging educational technologies and pedagogies.

[The outputs of the iPEAR project include:](#)

- **The iPEAR Toolkit**, providing guidance for teachers on adopting AR tools for peer learning and education in general: <https://i-pear.eu/resources/>
- **Theoretical framework** of iPEAR pedagogy: <https://scholarworks.merrimack.edu/phs/vol9/iss1/2/>
- **MOOC**: the iPEAR MOOC showcases the outcomes of the project, such as the AR toolkit, iPEAR case studies, and strategy. The course provides an overview of the potential of utilising AR technology in peer-based learning environments in higher education. It emphasises the use of affordable, readily available low-end technology (such as cell phones) that requires no coding expertise. Participants in the MOOC will have the chance to design their own simple AR experiences. The MOOC will also cover topics such as peer-to-peer pedagogy and the pedagogical approach to teaching and learning with AR (iPEAR approach). <https://imoox.at/course/ipear?lang=en>
- **Publications**, including Compendium of best practices (soon to be released)
- **iPEAR Conference**: The outcomes of the iPEAR project are presented and summarised at a dedicated conference in Athens, Greece on the 30th of May until the 1st of June 2023. This conference aims to bring together teachers, instructional designers, educational technology specialists, and pedagogy students to exchange research results, practical experience, and pedagogical concepts. The goal is to establish a European community of practice that is interested

in combining peer and collaborative learning methodologies with AR technology: <https://i-pear.eu/conference-2/>

One of the major contributions of IMTEL to the project is the development of Nevrolens application in collaboration with Kavli Institute for Systems Neuroscience. The Nevrolens provides an AR learning experience supporting collaborative exploration of rat brain anatomy. The application uses a high-resolution 3D model of the rat brain, which is part of the Waxholm Space atlas of the Sprague Dawley rat. The brain model is color-coded, annotated, and enriched with several educational tools, such as quizzes and dissection tool.

Medical and neuroscience students, as well as those interested in neuroanatomy, can use the Nevrolens app to learn about brain anatomy as part of their formal education or on an informal basis. Users can place the rat brain model in their physical environment, move it around in AR to gain different perspectives, manipulate the different parts of the model and perform dissections. Users can do so individually or collaboratively, being co-located or remote, using Hololens 2 headsets or their cell phones (Figure IV). The mobile version of the app available on AppStore and Google Play <https://www.ntnu.edu/imtel/nevrolens>.

In addition to Nevrolens application, a sister application Pelvislens was developed focusing on the pelvis region (Figure V). Both applications have been successfully tested among neuroscience and medical students and teachers at NTNU and other universities, with very positive feedbacks. In one of the testing scenarios, 4 anatomy students in Trondheim, Bergen and Ghent were using the Nevrolens and Pelvislens apps simultaneously, collaboratively exploring the anatomical models and tutoring each other. Towards the end of the project, we plan to add several additional anatomical models and improve the collaborative features of the app.

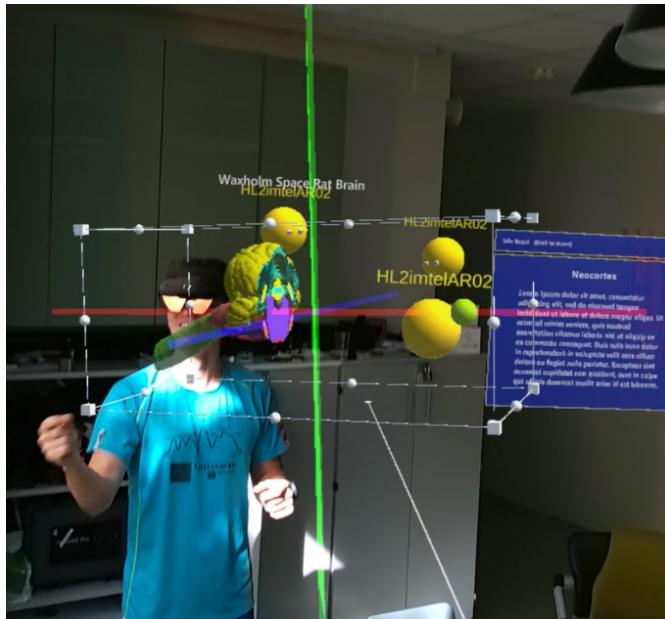


Fig. IV - Collaborative exploration of rat brain anatomy with Nevrolens application, including local and remote users, with Hololens 2 and mobile devices.



Fig. V - Medical students exploring pelvis anatomy with Pelvislens application.

HORIZON CSA XR4HUMAN: The Equitable, Inclusive, and Human-Centered XR Project

<https://xr4human.eu/>

HORIZON XR4Human project is a three-year EU funded CSA (Coordination and Support Action) initiative. The main goal of the project is to collaboratively create a roadmap for ethical, inclusive, and safe XR (Extended Reality) in Europe. The resulting roadmap and guidance will focus on ethical aspects, as well as policy, regulatory, governance, and interoperability concerns associated with XR technologies. In addition, the project seeks to establish trust and acceptance among the general public, while cultivating a robust and competitive European XR ecosystem.

To support XR developers, XR4Human will provide an online repository of test cases that demonstrate compliance to industry best practices. In addition, through an XR rating system and a toolbox of educational and informational resources, the project will facilitate informed decision-making among policymakers and the end-user XR community when it comes to acquiring, regulating and utilising XR technology.

The main outputs of the project will be:

- European Code of Conduct for ethical, inclusive, and responsible XR technologies
- Test Cases for demonstration and validation
- Interoperability Guidance Document
- Rating system and Educational Toolbox

The consortium agreement was signed by all partners in June 2022, and work on the project started in November 2022. Consortium members met in Kongsberg for the project kick-off meeting November 15-16, 2022. IMTEL has led the submission of one of the 1st deliverables in the project, Stakeholder Engagement methodology in January 2023. IMTEL VR lab will through the duration of the project be utilized as one of the physical nodes for demonstration and validation of selected XR applications and test cases for policy makers, teachers, and general public, with a special focus on inclusion of vulnerable and under-represented user groups.

Chapter 9: BLINK Learning Hub



Teaching and Learning Support in 2022: BLINK Learning Hub as a Service Provider

Karen Engen Økland, Magnus Bergland-Landheim, Faculty of Social and Educational Sciences, NTNU.

Introduction

BLINK Learning Hub provides broad, cross disciplinary teaching and learning support to teachers at the Faculty of Social and Educational Sciences (SU) and the Faculty of Humanities (HF) at NTNU. The learning hub is organised as a partnership between the two faculties, along with the NTNU IT Division (IT), the University Library (UB) and the Section for University Pedagogy (UniPed). BLINK also cooperates closely with the university's central Section for Teaching and Learning Support (SLS). The uniting factor for the learning hub partners is teaching and learning support in a broad sense.

The illustration below outlines how the Learning Hub is organised. The learning hub “frontstage” is a teaching and learning support service, where teachers can ask questions and get support from full-time staff and student employees. In addition to the physical learning hub area at Dragvoll campus, the learning hub can be reached digitally through several different platforms. At the “backstage” level, a community of colleagues from the learning hub partners meets weekly to discuss teaching and learning support related issues. The community's cross disciplinarity enables the learning hub's ability to discuss and solve complex issues related to teaching and learning support across organisational units, varying from data management and GDPR, to teaching design and project management. From the outside, the learning hub “frontstage” and “backstage” might seem like two separate entities, but in practice the two depend on each other to function. The basic teaching and learning support in the physical learning hub allows the learning hub staff to make, and maintain, contact with the academic staff, as well as a form of promotion of the learning hub's services. The knowledge and experience of the community of colleagues also strengthens the support service in the physical learning hub. The cases brought into the community of colleagues often first enter through the learning hub “frontstage”, and BLINK provides a low-threshold meeting place for teachers and staff.

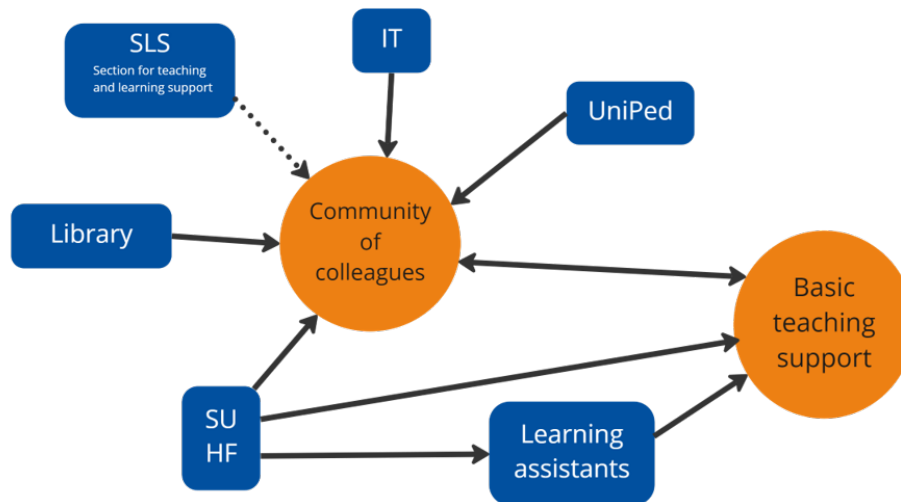


Fig. VI - Organisation of the learning hub

BLINK as a teaching and learning support service

Reaching individual teachers and researchers with information is a well-known issue at the faculty level. The learning hub is no exception – while some teachers use BLINK a lot, others hardly know that the learning hub exists. Through 2022, BLINK has focused on service design and communication to broaden the learning hub’s user base at the department level.

Collaboration with educational projects such as EMERGE is essential to BLINK and provides the learning hub with valuable insights into the practical needs of teachers at the two faculties. Extensive project support and partnership provides valuable in-depth information and experience for the learning hub staff, which in turn improves future project support. This reciprocal approach to learning and service development fits well with EMERGE’s hermeneutical circle approach to learning design (Mørtzell et al. 2022).

In addition to strengthening the learning hub’s project support expertise, contact with teachers and educational project leaders is a key channel of communication for the learning hub. Affective experiences and personal relationships are an important and often under communicated aspect of cross disciplinary collaboration (Hesjedal, 2022). Personal relationships between the learning hub staff and educational project leaders act as an informal network for the learning hub, facilitating communication between BLINK and teachers at the department level.

Through 2022, BLINK has adopted a “frontstage versus backstage” mentality of service design, in part due to informal contact with the university’s newly operational service design team. Previously, the learning hub has communicated its services mainly by explaining how the different BLINK partners collaborate to provide a cross disciplinary community of teaching and learning support. As a rule, the learning hub tailors the support based on the user’s needs. This approach has been a large part of the learning hub’s key message. The approach of providing undefined support has proven ineffective, as an teacher without prior knowledge of the learning hub would typically struggle to understand what sort of support they could expect, and as such would not ask the learning hub for support even when the issue was well within the bounds of teaching and learning support.

Experience from BLINK dictates that administrative staff often expect teachers to understand the relevant organisational structures and how to use them. However, teachers and other academic staff do not always know what type of support they need or what is available, and the questions that reach administrative support services do not always reflect the actual needs of the teacher. Together with EMERGE and several of its sub-projects, BLINK has explored different approaches to identify the projects’ different needs within and outside teaching and learning support.

Partly based on this, the learning hub has recently switched to a more service-focused “frontstage” communication, in which some of the specific services offered by the learning hub are in focus. These services include podcast production, project support, resources and equipment, and teaching support, as seen in the illustration below. This shift has demanded a great deal of defining and specifying the learning hub’s services, both within the learning hub and in relation to related units.



Fig. VII - Services offered by BLINK (frontstage). [From ntnu.no/BLINK](http://From.ntnu.no/BLINK)

In addition to specifying the services offered by BLINK, work has also been done to define the limits of the learning hub's support. Specifically, this has consisted of defining the relation between the learning hub and the faculty administrations at HF and SU. When educational projects reach a certain magnitude and complexity, project support on a more long-term and strategic basis than the learning hub can offer is required. EMERGE has been a catalyst for this work, prompting the SU faculty administration to create new structures for educational project support. An example of this was the acquisition of VR headsets for use in teaching situations in various courses related to EMERGE. The learning hub has neither the staff nor the authority to allocate funding for large acquisitions, so this had to happen within formal faculty structures. At the same time, BLINK acted as a bridge between EMERGE and the faculty, making equipment recommendations to the faculty and addressing concerns related to operation and storage with EMERGE.

Exploring the student employee role

In recent years, the use of student employees has developed from using students as learning assistants in single courses from a specific study program to a broad use of student employees in cross disciplinary research groups such as EMERGE. There is also a rise of students working closer with administration tackling everything from psychosocial measures to technical support. Examples of these include the learning assistants in BLINK Learning Hub, who work with teaching and learning support, and the "Campusvert" team at Dragvoll, who are responsible for social activities for students regardless of study program.

One of the main discussions through 2022 has been how much time and effort should be put into the onboarding process since the students are only here for a brief period (usually between 2-4 semesters). With a limited number of hours spent at work for the students, it is important that they have the basic knowledge of the organisational structures at NTNU, the technical use of the podcast studio, and how to provide teaching and learning support in the learning hub. The rest of the knowledge is gathered throughout the semesters as "learning by doing", and by smaller meetings or workshops for sharing knowledge about specific topics. Too little time for onboarding will result in student employees unable to fulfil the more complex task they are given, and on the other hand, having too much time dedicated to the onboarding process will take time away from other types of work. One of the biggest rewards with having student employees for a limited amount of time is that it gives the learning hub fresh and critical eyes, and that the students provide valuable insight into the student democracy, the student unions, and other parts of student culture at the university.

The formal training programme for student employees at the university is the LAOS course, operated by the Section for university pedagogy (UniPed). Cooperating with EMERGE, UniPed and others, the learning hub is attempting to make an alternative module for the LAOS-course focusing on student employees who have less traditional teaching tasks, as described in chapter 6 of this report.

The learning hub is also looking into sending its student employees to other parts of BLINK for a short-term “internship” to the hub partners and projects such as EMERGE, to broaden their perspectives as well as their knowledge of NTNU as an organisation.

BLINK in 2023

Through 2022, BLINK has been allocated an abundance of both people and time. This has enabled the investments in both in service development and student employee training described in this chapter. The learning hub’s resource situation is changing – this does not mean that BLINK is any less of a priority for the faculties, but rather that tasks and responsibilities are being moved from the learning hub into other areas. Still, it is important that the learning hub’s organisation is robust enough to withstand a scarcer resource situation in the future which will likely shape the direction of BLINK through 2023.

Chapter 10



Further development and the next annual cycle

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Throughout this report we have elaborated on various approaches of using emerging technology in higher education. We have pointed towards some common challenges that occur when practicing explorational activities in teaching. Based on the chapters in this report as well as other events and developments during the last annual cycle, we have identified some topics that are of interest for further exploration in the next annual cycle – autumn 2023 through spring 2024. We present our suggestions in categories below.

Organising EMERGE

We will take action to systematise the research group's meeting points. The aim is to have research meetings where we share experiences, opportunities, and difficulties that we encounter through the term. To do this we will need to ensure regular meetings with the core research team every second month during the annual cycle. In addition, we will continue to develop our research practice, organisation, and network as described in Section VI in EMERGE's first report (Cf. Mørtzell et. al. 2022, p. 129-130).

We also aim to keep up the informal meeting points and contact the group, as well as remaining open for more partners to join us.

To put us in a position to form a centre for excellent education, we aim at gathering an advisory board during the next cycle.

Thematic areas for exploration:

ChatGPT in higher education

- How do we approach this seemingly eruptive technology?
 - In the bigger perspective?
 - What are the possibilities and potential pitfalls?
 - What can we learn about the university facing it?
- How do students relate to and use ChatGPT in their student life now?
- How should we think about exams (summative – formative)?
- Ownership of data

Syllabus

- How do we get students motivated to read for learning purposes and not for passing exams?
- Immersive reading?

Social-academic presence at campus (Fagsosial tilstedeværelse)

- Continuing the research initiated by the project Fagsosial tilstedeværelse, we aim to contribute with practices and suggestions for how to connect the academic, the social, and the hybrid spaces around teaching.

Technology for cross-disciplinary learning – from test to implementation (TeTL – TI)

- Continue research initiated by the TeTL – TI project which focus on exploring how technology intensive teaching and research can go from testing-phase to implementation-phase in everyday teaching at the university.
- Explore and compare success factors and obstacles in the usage of technology in teaching and learning.

The role of student employees

- We will build on the study conducted in the first cycle to carry out or contribute to carrying out a more substantial study at NTNU. (The scale of this study depends on funding).

Emerging organisation

- We will continue our focus on organisational obstacles for innovative and experimental teaching. During next cycle we aim at pinpointing and analysing concrete challenges and possibilities.

VR-technology

- We will continue to test VR-technology as a tool for learning.
- Reveal obstacles that may occur.
- Does VR as a learning tool enhance student learning and motivation?
- What possibilities do we see or experience with using emerging technologies in teaching?

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