Høgskulen på Vestlandet

NAB3030 - Bacheloroppgave

NAB3030

Predefinert informasjon

Startdato:	01-04-2022 12:00	**Termin:**	2022 VÅR
Sluttdato:	04-05-2022 14:00	**Vurderingsform:**	Norsk 6-trinns skala (A-F + Bestått)
Eksamensform:	Bacheloroppgave		
Flowkode:	203 NAB3030 1 PRO-1 2022 VÅR		
Intern sensor:	(Anonymisert)		

Deltaker

Navn:	Sander Rossland
Kandidatnr.:	428
HVL-id:	586428@hvl.no

Informasjon fra deltaker

Antall ord *:	21372

Sett hake dersom besvarelsen kan brukes som eksempel i undervisning?:	Ja	**Egenerklæring *:**	Ja
		Jeg bekrefter at jeg har registrert oppgavetittelen på norsk og engelsk i StudentWeb og vet at denne vil stå på vitnemålet mitt *:	Ja

Gruppe

Gruppenavn:	Bacheloroppgave-586395-586428-586400
Gruppenummer:	5
Andre medlemmer i gruppen:	Andreas Amundsen Tøsse, Andreas Flo Tonning

Jeg godkjenner avtalen om publisering av bacheloroppgaven min *

Ja

Er bacheloroppgaven skrevet som del av et større forskningsprosjekt ved HVL? *

Ja, COAST

Er bacheloroppgaven skrevet ved bedrift/virksomhet i næringsliv eller offentlig sektor? *

Nei

Høgskulen på Vestlandet

BACHELOR THESIS

COAST

"Assessment of the benefits of extended maritime simulator exercises conducted by students"

Andreas Amundsen Tøsse
Sander Rossland
Andreas Flo Tonning
Nautical science
Western Norway University of Applied Sciences – HVL
Maritime
04.05.2022

I confirm that the work has been independently prepared and that references/citations to all sources used in the work are stated, *cf. Section 12-1 of the Regulations relating to study and examination at Western Norway University of Applied Sciences.*

This page is intentionally blank

Summary

This bachelor thesis is inspired by The Centre of Excellence in Maritime Simulator Training and Assessment (COAST) which is a collaboration between the four educational institutions in Norway that offer nautical science education at the bachelor's degree level. An important part of this education is training in navigating and maneuvering ships on a simulator. COAST aims to be a leading provider of simulator training and assessment methods for maritime education (COAST, 2021). In connection with the COAST project, we have determined our research topic regarding increasing nautical students skills. In this context, the main research question in this thesis is: "What effect does increased hours of training have on students' practical navigation skills?"

First, we started the project which is called "NightSim", offering nautical science students to do more practice in simulators at Western Norway University of Applied Sciences in Haugesund. During the autumn of 2021, we conducted 10 different exercises where the students could freely enroll in their free time. This turned out to be a long-awaited offer for the students, as all the exercises mainly were fully booked. Second, we have used both qualitative and quantitative methods in this study. By the qualitative method, we have interviewed 24 students and 3 navigation teachers, to hear their thoughts on this topic. Furthermore, we compared exam results in 2021 and prior years by using the quantitative method to investigate whether the grades improved after NightSim.

Finally, the results show that the students had gained better practical skills on ship simulators after attending the NightSim exercises. In depth- interviews, it was evident that the students feel safer and have more confidence in the simulator. They feel more prepared for the navigation course simulator exercises. The students also stated that it is easier to get to know fellow students by attending NightSim, as it is a more informal setting than the regular teaching. The exam results also show an increase in the grade average in the subject *Navigation 3,* which is the last practical simulator exam the students complete.

The NightSim Project has been successful, and it is planned to continue also next schoolyear.

Sammendrag

Denne bacheloroppgaven er inspirert av Senteret for fremragende utdanning (COAST), som er et samarbeid mellom de fire utdanningsinstitusjonene i Norge som tilbyr nautikkutdanning på bachelornivå. En viktig del av denne utdanningen er opplæring i å navigere og manøvrere skip på simulator. COAST har som mål at man i Norge skal være en verdensledende leverandør av simulatoropplæring og vurderingsmetoder for maritim utdanning. I forbindelse med COAST-prosjektet bestemte vi at oppgavens forskningstema skulle være å prøve å øke nautikkstudenters ferdigheter når det kommer til å navigere skip på simulator og i virkeligheten. I denne sammenhengen er hovedproblemstillingen i oppgaven: "Hvilken effekt har økt mengdetrening på simulator på studentenes praktiske navigasjonsferdigheter?"

Med bakgrunn i dette startet vi prosjektet som fikk navnet "NightSim". Dette er et tilbud hvor nautikkstudenter ved Høyskolen på Vestlandet – Campus Haugesund har fått muligheten til å trene på simulator i sin fritid utenom den ordinære undervisningen. Vi lanserte dette høsten 2021, hvor det ble gjennomført 10 ulike øvelser der studentene fritt kunne melde seg på. Dette viste seg å være et etterlengtet tilbud for studentene, da alle øvelsene hovedsakelig var fullbooket.

Vi har i denne oppgaven benyttet oss av både kvalitativ og kvantitativ metode. Ved den kvalitative metoden ble det intervjuet 24 studenter og 3 navigasjonslærere, dette for å høre deres tanker om emnet. Videre sammenlignet vi eksamensresultater for 2021 og tidligere år ved å bruke den kvantitative metoden for å undersøke om karakterene ble bedre etter at NightSim ble lansert.

Resultatene viste at studentene hadde fått bedre praktiske ferdigheter på skipssimulatorer etter å ha deltatt på NightSim-øvelsene. I dybdeintervjuer var det tydelig at studentene følte seg tryggere og har større selvtillit på simulator og at de følte seg mer forberedt på de ordinære simulatorøvelsene som er i læreplanen. Studentene uttalte også at det er lettere å bli kjent med medstudenter ved å deltatt på NightSim, da det er en mer uformell setting enn den vanlige undervisningen. Eksamensresultatene viste også en økning i karaktergjennomsnittet i emnet *Navigasjon 3,* som er den siste praktiske obligatorisk

simulatoreksamen studentene fullfører.

NightSim-prosjektet kan derfor sies å være vellyket, da instituttledelsen har signalisert at man vil fortsette med dette tilbudet også neste skoleår.

This page is intentionally blank

Preface

This bachelor's thesis is written by three graduates of The Western Norway University of Applied Sciences in Haugesund (hereafter HVL), department of maritime studies. This bachelor's thesis is a final assignment by a three-year bachelor's degree in nautical science.

The group has a common interest in simulator training and therefore wanted to do a deep dive into how much effect an increase in simulator exercises plays into the practical navigation skills of nautical science students.

We, therefore, chose to accept when asked to represent the school in the Centre of Excellence in Maritime Simulator Training and Assessment (COAST). This center is a collaboration between the four educational institutions in Norway that offer nautical science education at university level. The center aims to be a world-leading provider of simulator training and assessment methods for maritime education. This has been an exciting project to take part in, and we look forward to seeing the late impact of the project in the years to come. We, therefore, feel incredibly lucky to have been given the opportunity to contribute to this work and influence the nautical science education at HVL.

The work on this task has been a demanding, long, and time-consuming process, but in return, we have approached a tremendous amount of knowledge about the topic. The choice of subject was not easy either, but after the first meeting in the previously mentioned COAST, everyone in the group agreed that we wanted to explore the effect of simulator training in maritime education. Choosing this theme also made it possible for us to write about a project in which we have taken part.

First and foremost, the group would like to thank Professor Charlott Sellberg of the University of Gothenburg for her good contributions to relevant literature. We would also like to take this opportunity to thank all the students, teachers, and members of COAST for their very good cooperation and good access to the necessary material for the foundation of the assignment.

Finally, the group wishes to send a big thank you to our supervisors Margareta Holtensdotter Lützhöft and Meric Karahalil, for good and regular guidance as well as feedback during meetings related to the bachelor's thesis.

Haugesund, 04. May 2022

Andreas Amundsen Tøsse Sander Rossland Andreas Flo Tonning

This page is intentionally blank

Table of contents

1. Introduction

1.1 Background of the task

Since COAST was established in 2020, the center has held several events and workshops. At these meetings, we who represent HVL have been given the opportunity to share thoughts and experiences with representatives from the three other schools members of COAST. One of the things we discussed and uncovered was the difference between students access to the simulators at the different schools. In this regard we observed a major variation, there turned out to be significant dissimilarity where some schools had free access while others had more limited access. This made us think about how much advantage this gives students who have unlimited access compared to those students who do not have this. After all, students at all four schools are competing for the same workplaces and, therefore should all students have an equal amount of access to the same resources.

At HVL Haugesund, students have limited access to the simulator center, mainly in the compulsory hours in the curriculum. In addition, the students have not had the opportunity to run a simulator outside the ordinary classes. The main reason for the significant differences between the different schools is that some of the schools have their simulator buildings at their disposal, while HVL has its simulators in an external building, where other companies also operate. This has meant that HVL has not been able to offer full access to the students at the simulator center.

For a long time, there has been a desire from the students at HVL to get more training on the simulators, to become even better at navigating and maneuvering ships. As student representatives, both the employees and us wanted to do something about this. We established a working group with both teachers and students in January 2021, who collaborated to offer increased access to simulators. Through this work, the project was named NightSim. The start-up was in August 2021 and took place throughout the autumn semester of the same year. A total of ten exercises were held. Students could voluntarily enroll once a week and run the simulators outside the schools regular curriculum. The working group created different scenarios in advance that were somewhat different from the ordinary exercises.

The offer proved to be very popular, and all exercises were fully booked by the students. The working group also wanted teachers not to be involved in implementing these exercises, to create a more "informal atmosphere" for the students. During these exercises, we, as student representatives, have therefore been responsible for the implementation of these exercises.

Based on this work, we who have participated in the project wanted to use this to investigate whether the extended offer has had any effect on the students practical competence in ship simulators and whether it has made everyday life more exciting, considering whether the students feel more engaged than before.

To see if this affected the students, we chose to investigate this in several ways. In-depth interviews were held with students and teachers, also the exam results were collected to see if the results have changed compared to previous years. The subjects where exam results were examined in this assignment are Navigation 1 and Navigation 3.

NAB 1026 - Navigation 1

This is the first subject that nautical science students at HVL have in navigation in the curriculum, the students here take their first practical simulator exam. This course focuses on maritime traffic rules, planning of voyages and general knowledge of the different instruments available on the simulator. There is less focus on the actual maneuvering, but it is also a part of the exam to show that they understand the traffic rules and how the different instruments can be used in navigation.

NAB 2014 - *Navigation 3*

This is the last navigational subject in the nautical science education at HVL, and practical simulator exam are also held in this subject. Here the main focus is on the students maneuvering skills, where they will dock once or several times before they will sail out of the quay again.

The course *Navigation 2* that the students have between the two subjects mentioned above has not been investigated. The reason for this is that NightSim was started in the autumn of 2021, while Navigation 2 is only in the curriculum in the spring semester. It has therefore not been possible to examine this subject.

Another important thing to mention, is that there are two different types of nautical science students at HVL. These are both the ordinary students and the practical students. When you go the ordinary field of study, the students have completed the higher education entrance qualification, but if you go in the practical direction, you already have experience from the sea such as able seaman. Therefore, at HVL, the terms "O-students" and "P- students" are used. The education is quite similar for both types, but there is a few different subjects in the two different education types.

1.2 Research Question

The main research question:
"What effect does increased hours of training on simulator have on students' practical navigation skills."

Under the main research question, we have also made two sub-questions:

1. Whether the student performs better on practical exams
2. Whether the students feel that the project makes them engaged during their studies.

1.3 Delimitation

Since the project NightSim has only been held at HVL Haugesund, this assignment is limited to nautical science students studying at HVL.

2. Theory

2.1 Words and phrases

Dead Reckoning- Is a basic method of calculating the current position of the ship using a previously determined position and keeping track of speed and direction sailed. This method is performed by using paper maps, compasses, rulers, map subtractors and pens.

Piloting- Is the practice of navigating using visual landmarks and navigational aids, such as lighthouses, buoys, or depth soundings.

Celestial navigation- Is an ancient method of navigating by determining position using the sun, moon, stars, and planets. It can be performed using a sextant to measure the distance between two objects or as described in Hutchins's study on Micronesian navigation, by visually following the linear constellations of star orbits.

Radar- Stands for Radio Detection and Ranging, and the term reflects the property of radar as an aid for calculating direction and distance, as well as being able to detect targets that one may not be able to see with the naked eye.

Gyrocompass- Is a navigational instrument that shows the right geographical celestial directions without any kind of magnetic deviation as the magnetic compass does.

Sonar- Is an electronic instrument for measuring water depth and searching for fish under the vessel.

Satellite navigation- Is positional determination using radio signals from satellites orbiting Earth.

Electronic maps- (ENC) is a type of map that shows continuous position, speed and course based on GNSS and gyrocompass.

STCW- International minimum standard for the education of officers. STCW stands for "International Convention on Standards of Training, Certification and Watchkeeping for Seafarers".

GNSS - Global Navigation Satellite system is a common term for a satellite-based system for navigation and positioning with global coverage.

DNV GL- Is the world´s leading ship classification company and is a group with activities in ship classification, certification, consulting, inspection, and research (Paulsen, 2022).

The following sources have been used to describe "words and phrases" (Hutchins, 1983 Hutchins, 1995; Lützhöft, 2004; Kjerstad, 2015, Kjerstad, 2019).

2.2 History

Navigation is part of a long-lasting tradition of social and technological working practices that dates back well over two thousand years. A modern navigator can use technology that varies in age from a few years to many hundred years ago. The timescale for the development of navigation practice can be measured for centuries (Hutchins, 1993). In Old Norse times and earlier, the training of navigation was mostly based on training through experience at sea (Kjerstad, 2021).

By examining the technological changes of the last century, Lützhöft shows how working practices and navigation technology have evolved from the last century to now (Lützhöft, 2004).

The shipwreck of the Titanic in 1912 has become the epitome of the fact that shipping has not necessarily improved maritime safety, however, the shipwreck of the Titanic initiated an international process to improve maritime safety (Kjerstad, 2008).
In the late 1920s, bridge teams depended on traditional and sometimes outdated navigation methods and older technologies, such as piloting, dead reckoning, and celestial navigation (Hutchins, 1995). By the end of the 1950s, radar systems had become available, this advance was followed by gyrocompass and sonar in the 1960s and satellite navigation in the 1970s and 1980s (Lützhöft, 2004).

In modern time, a technologically equipped bridge includes models for electronic navigation, such as electronic devices, for instance radar and electronic maps for positioning (Orekhov & Aizinov, 2010). During the time new technology has entered modern navigational work practices, some have anticipated that navigators will have less work to carry out (Lützhöft & Nyce, 2014). But instead of having less to perform, navigators have simply moved their work practices from manual work to integration work. This type of work is not new in the maritime field.

Lützhöft & Nyce describe it as the kind of work employees have always performed to establish jobs that "work for them" on the bridge of a ship. Their research on board different types of vessels, found that the work done in bridge teams relied heavily on both electronic devices and the use of paper and pen to determine positions. This means that navigation, therefore still relies on established methods, such as dead reckoning to plot courses on paper maps. By merging these older practices with electronic navigation tools such as electronic maps and radar, makes it possible to form an integrated view of the unfurl situation (Lützhöft & Nyce, 2014).

Such a combination of traditional and electronic navigation is important because navigation decisions require a lot of certainties. In today's shipping, ships are massive objects that are slow to respond to changes in propeller speed and rudder position, hence, making mistakes is very costly in terms of time and resources (Bailey, Housley, & Belcher, 2006). Furthermore, when sailing in narrow waters with limited visibility or congested areas, changes in direction and speed must be anticipated and planned (Hutchins, 1990).

The bridge team must be prepared for "clear, concise and early action" (Hutchins, 1990, s. 193) the members of a bridge team must cooperate and make use of a variety of technologies to constantly plan and keep an eye on the surroundings, in such manner that they can make the right decisions (Bailey, Housley, & Belcher, 2006). One of the reasons why navigation decisions and the fact that members of a bridge team must cooperate properly is because this is an organization that has its foundation in complicated environments and situations, where failures can lead to fatal consequences. What is special about such an organization is that they must work at all times and in all conditions, they simply have no option.

These types of organizations are called High Trust Organizations, and the organizations are resilient and manage to cope with encounters with the unknown (Rosness, et al., 2010).

Furthermore, Lützhöft & Ljung indicate that the work done by maritime industries is one of the most conservative in the world. The structure is "firmly rooted in a hierarchical order with defined roles for the performance of work" (Lützhöft & Ljung, 2014, s. 232).

If you ever visit a vessel, this hierarchy is still observable on the bridge, where the commanding order comes from the captain in charge of the ship to the watch officer navigating the vessel, to the wheelman in control of the steering, to the lookout that keeps an eye on the marine environment (Bailey, Housley, & Belcher, 2006). “This hierarchical and spatial organization forms the basis of teamwork, which involves an intricate matrix of social and material interactions” (Sellberg, 2017, s. 26).

To put it briefly, the bridge team has an unfolding time frame for navigation work, i.e., there is a temporal framework where the interaction between the bridge crew consists and is realized within a matrix of navigation equipment, control of the rudder and speed of the propeller as well as oceanographic/geographical features and other waterborne objects (Bailey, Housley, & Belcher, 2006).

To cut a long story short, studying to navigate call for being embedded in an environment with a long history of technological and social development and changes in the division of labor (Sellberg, 2017). In today's maritime education context, simulators are used to narrow the periods during which students practice on board vessels to learn theoretical skills and practical skills of navigation (Barsan, 2009). All navigation of vessels larger than 500 gross tonnage is regulated by the STCW Convention, which requires an international standard of competence among sailors (Hontvedt, 2014). Situations that arise in the maritime industry are often high-risk domains. The situations are complex and dynamic, it is considered essential that the simulators the student uses can reflect the working condition and that the simulation is similar to the conditions in the working world. Therefore, learning about navigating today involves a combination of learning through formal education and experience/participation in simulator training (Drews & Bakdash, 2013). Simulators illustrate how new technology can help transform our learning concepts on what students should learn thoroughly and how skills should be cultivated (Säljö, 2010).

2.3 Simulators at Western Norway University of Applied Sciences

Today at Western Norway University of Applied Sciences, the doctrine of navigation is practiced through theory at school and practical learning using the simulators. At the school in Haugesund, we use K-Sim simulators supplied by Kongsberg (see Figure 1). The K-Sim navigation provides both students and instructors with the latest advanced and integrated ship bridge simulation, which gives the students much more realistic scenarios for training. The K-Sim is certified by DNV GL and exceeds the existing STCW requirements, also, the K-Sim is specifically designed for maritime education and for the maritime training industry (Kongsberg, 2021).

Figure 1: Bridge simulator at HVL[1]

K-Sim provides the students at Western Norway of Applied Sciences with highly realistic training using vessels, objects and equipment that behave and interact as in real life. Thanks to an advanced physical engine and state-of-the-art hydrodynamic modeling. “The sophisticated new visual system brings vessels and objects, including geographical training areas and all possible weather conditions, to life” (Kongsberg, 2021). K-Sim simulators come in second with other equipment such as radar and electric map machines, the simulators offer realistic ships, which have similar vessel behavior. K-Sim simulators are also realistic in terms of object interaction, grounding, and the surroundings, such as sea marks, day, and night (Kongsberg, 2021).

[1] https://maritimt.com/nb/maritimt-magasin/nautikkutdanningen-i-haugesund-far-fem-millioner

Figure 2: Bridge simulator[2]

The idea behind the simulator is that it can recreate everyday task that resembles the working setting in a marine environment. In a way where simulation resembles common tasks, thus skills are more likely to be shifted from one context to the other (Barsan, 2009). Figure 3 shows the simulators at Western Norway University of Applied Sciences. Students usually use the K-sim Navigation, Offshore, and Dynamic positioning for training, teachers and student assistants control the simulation from the K-sim engine.

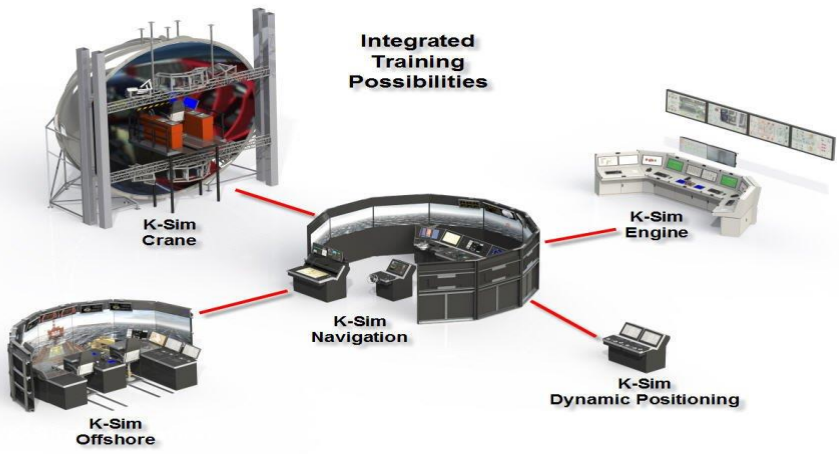


Figure 3: Simulators at HVL

In many ways, the K-Sim navigational system is the new generation of navigation bridge simulators. The K-Sim is designed for premium user experience and with advanced and integrated simulation training by the STCW Reg I/12 standard.

[2] https://norway-coast.no/

“The significant feature of the system is a quick routing of ship traffic, which is regarded as a highly important tool for STCW related training. The system has allowed inserting the vessel, making a route, and assigning the specific task within 10 seconds, which is relatively short compared to other simulation systems” (Maung C. , 2019, s. 43).

As you can see, we have gone a long way, from the Viking Age, where they drilled on navigation through experience, to where we are today. Where we combine theory and practice through the STCW Convention that requires an international standard of navigation. Training to navigate in today's society involves learning how to navigate through being integrated into an environment with a long history of social and technological development and changes in the division of labor (Sellberg, 2017).

2.4 Learning

What is learning? There are several definitions of learning, some are universal, while others are limited to humans. The vast majority deal with the experience element for individuals. We have chosen to use Lars Løvlie's definition of the term:

"Learning is shown as a more or less lasting change in behavior as a result of experience or exercise" (Enerstvedt, 1986, s. 39).

Explanation of definition: This is a universal definition that can be used for both humans and animals, it deals with both the element of experience and the element of practice in the concept of "learning.” Løvlie also believes that not all behavioral changes are due to "learning,” but that some behavioral changes are due to natural growth processes. Examples of such behavior can be reflexes or instincts, and this is the result of maturation (Enerstvedt, 1986).

2.4.1 Pedagogical learning perspectives

Epistemological science holds two central principles, empiricism and rationalism. In addition, there is a social constructivism perspective of learning. Each of these principles possess different educational learning perspectives that will be reviewed in the following sections

(Johannessen, Tufte, & Christoffersen, 2016). Pedagogy deals with the techniques that are related to the transfer of defined learning objectives to a specific target group (Tjeldvoll, 2018).

2.4.2 Behaviorist learning perspective

Behaviorism is a psychological direction that stems from empiricism in the United States, and this learning perspective can then be seen in a strong context with the empirical science, which deals with experiential learning (Duenger Bøhn, 2019). The empirical and behavioral perspective on learning is based on the fact that experiences are our only source of knowledge, and that innate knowledge does not exist. The empirical perspective on learning believes that all true science can be measured, counted, and observed (Haug, 2000).

An example that Ray Svanberg and Hans Petter Wille use in their book is when a child learns to ride a bike; at first, the child will soon lose his/her balance, but as the child exercises more (acquiring experience), there will be a longer time between each time the child loses his/her balance and eventually the child will have acquired a new skill, cycling. The progression in this example is easy to measure with tangible values, such as time or distance, through practice, the child has acquired experience and changed behavior, because it has learned a skill. In other words, by making concrete measurements through a process like this, one can study behavior and its change due to the practice and acquisition of experience (Svanberg & Wille, 2009).

The classical behavior model believes that human emotions and thoughts can not be measured and thus cannot be used in a scientific context. Thus, humans are objectified and seen as a mechanical or organic organism. Stimuli and the response of the individual are what form the basis of learning, the idea is that an individual is exposed to an external influence and that the reaction should "stick", which leads to increased experience and then learning. To briefly summarize the behavioral learning perspective, this deals with measurable stimuli (exercise) and response (experience), where the reaction should propagate in the individual and form the basis for learning. Using this theory in a teaching context, it will be the teacher who conveys and exposes the students to stimuli, the pupils will be recipients as a teacher, as a result of their response to the given stimuli (Svanberg & Wille, 2009).

2.4.3 Cognitive learning perspective

The cognitive learning perspective can be seen in the context of rationalism, which believes that reason and mindset are the most central sources of learning and knowledge (Holmen, 2021). This perspective on learning came as a leap from the behaviorist learning theory of the first half of the 20th century, the idea came from European gestalt psychologists who believed that what characterizes people is that they perceive wholes. One of the slogans that they had was that the whole is more than the sum of its parts (Svanberg & Wille, 2009). A central thought in this perspective is that human thought is the starting point for understanding learning (Østbøll, 2009). Gestalt psychologists believe that the internal mental processes are the central thing and that we humans learn by seeing things in context, understanding and interpreting, people constructing their own version of the outside world based on their experiences (Wittek & Brandmo, 2016).

This concerns that people receive and process information, and then implement this in their own mindset (Digital didaktikk, 2013). To summarize the cognitive learning perspective, this theory has a great focus on the individual's own thoughts and feelings, it is the mental processes and interpretation of information and stimuli that form the basis of learning, "knowledge must be organized and built in the individual. It cannot be conveyed as ready-made packages from the outside into the students" (Svanberg & Wille, 2009, s. 75). The teacher's role will then be to facilitate that knowledge can be "built" in the students to the greatest extent, this means helping them to see connections and gain understanding. Under such an educational approach, the pupils will to a greater extent be active participants, this means that inner motivation is also a key element.

2.4.4 Sociocultural learning perspective

The sociocultural learning perspective can be seen in the context of social constructivism, a basic idea in this learning theory is that all learning takes place in a social context and that people are primarily guided by the environment and not by internal driving forces (Digital didaktikk, 2013) (Kjetil Sander, 2020). Knowledge is developed through interaction between people, and learning must be seen in the context of learning, the idea behind the sociocultural learning perspective is that different knowledge is distributed between people,

and that the different individuals can contribute their knowledge and experiences to create a common understanding and learning (Svanberg & Wille, 2009).

A central theorist in connection with the sociocultural learning perspective is Lev Vygotsky, he also believed that people depended on the social environment to be able to learn, he believed that an action occurs in social interaction in order to then be internalized. Internalization means that external processes are turned into internal processes, in this way, the development goes from the social to the individual (Tetzchner, 2021). Vygotsky used an example that dealt with teacher/student interaction in a teaching context, in which he presented with a picture of a teacher making sure that a child learns. The teacher reviews key concepts together with the student, as well as he asks, explains, and "forces" the student to self-explain and answer questions himself. In this way, students are, to a greater extent, included in the learning and become a kind of "sparring partner" for the teacher instead of a direct recipient, questions are thus answered in a community. On a later occasion, the child will be left alone to solve an assignment or answer a question, then it will independently reflect and make use of the knowledge gained in previous collaborative situations. What happens is that the collaborative situation with the teacher is still ongoing, even though the teacher is not physically present, the collaboration is ongoing because the independent solutions for the child are based on experiences from previous collaborative situations with the teacher (Svanberg & Wille, 2009).

The knowledge structure depends on interaction with the surroundings (Wittek & Brandmo, 2016), this also involves the use of artifacts, which are man-made objects (Wikipedia, 2022). The interaction between humans and artifacts leads to increased knowledge and skills (Säljö, 2006), an example may be the use of a simulator in a teaching context. Vygotsky presented a basic model, see Figure 4, that addresses the importance of the interaction between stimuli, response, and tools (Säljö, 2006).

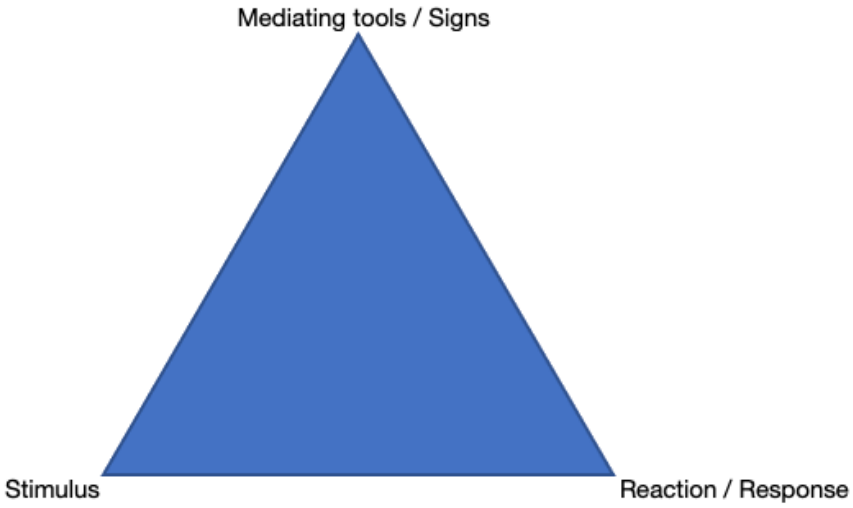


Figure 4: Vygotsky's Model of Mediation. Adapted from (Vygotsky, 1978)

Vygotsky´s model is based on the idea that humans react to the stimuli to which they are exposed. If we envision a teaching situation, then the teacher will use language to guide and help the students, the students will then adopt the words and respond accordingly to this to a greater or lesser extent. In this example, language will be a tool, and the legal leadership will be stimuli, the stimulus will further affect the students, which in turn will lead the students to exercising a response (Lillebø , 2018).

In short, the sociocultural learning perspective concerns that learning occurs through experiences of social interaction between people, both with and without the use of artifacts as an aid.

2.4.5 Experiential Learning

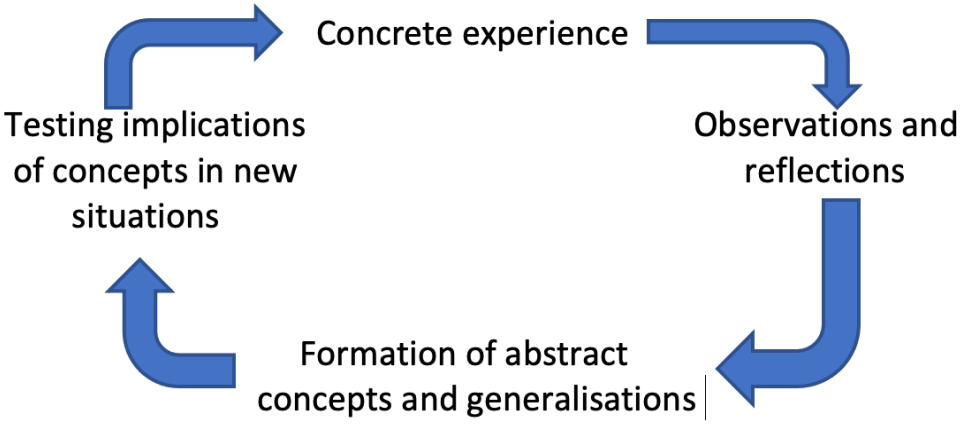


Figure 5: The Lewinian Experiential Learning Model. Adapted from (Kolb, 1984)

Kolb's model of experience-based learning (Figure 5), sees learning as a continuous process where experience is transformed into knowledge, he believes that all learning is experience-based and that the model is an open circle without a defined start or end (Holte Haug, 2016).

The model deals with the interaction of four elements; the specific experience, reflective observation, abstract conceptuality, and experimentation (Stuedahl Mohn, 2013). If the model is used in a simulator context, one can imagine that "concrete experience" is the actual exercise that is carried out. In order for students to acquire more experience, it is important that they are engaged and that they are willing to immerse themselves in the scenario (Tøsse, 2011). After the exercise, the students will take on a role where they will reflect on the specific experience, in the next element that deals with "abstract concepts" the students will try to interpret and understand the reflections related to the experience they have acquired (Tøsse, 2011). After the students have acknowledged and understood the reflections, they find themselves in the last element of the learning circle, i.e. the element of testing and experimentation, at this point of the circle, the students have acquired new experience, which will affect their behavior and performance on the simulator. The experience they have now acquired will influence their assessment of a new situation, which may lead to a new pattern of action (Tøsse, 2011).

The model forms the basis for new experiences and thus contributes to increased knowledge among those involved. Once the students have reviewed all four elements, they will be ready to start a new round in the learning circle in order to acquire even more knowledge (Stuedahl Mohn, 2013).

In the next chapter *2.5 Simulator learning*, we find it relevant to especially link the Sociocultural learning perspective and Cognitive learning perspective theory to this chapter. This will be justified in the discussion part.

2.5 Simulator learning

This theory section deals with the assessment of simulation training in maritime education and training, with a focus on the effect simulator training has on the Nautical science students at Western Norway University of Applied Sciences. The maritime industry is developing dramatically, especially with the use of new technology in all aspects. Simulators can be considered an effective tool through a maritime education and by training. Simulators can ensure improvement of skills, knowledge, and emergency preparedness within different levels of responsibility, from normal ship operations to complicated duties, presentations, and tasks. Training with simulators can transfer the competence that students have acquired in theoretical learning into real-world situations (Cross, 2019) (Maung C. T., 2019).

In other words, simulator training can help students put theories and lectures that they have learned in the typical traditional classroom into action. The utilization of advanced simulation training can also lead to promoting the necessary practical skills and abilities that seafarers need to perform functions required by the STCW Convention (Maung C. T., 2019). "At the same time, the assessment done by the simulator can give a more exact result whether the candidate has passed or failed compared to a traditional assessment" (Maung C. T., 2019, s. iv).

In an article that addresses key findings in the use of simulator training and technology research, the researchers have established that simulator training provides a deeper understanding of content and has a positive effect on both student presentations and teaching, as well as that simulation can be used to improve performance, ranking accuracy, and assessment effect. The article thus states that simulator training can improve learning (Dietel, Bewley, Chung, Vendlinski, & Lee, 2012).

"Effective simulator-based training can also lead to the development of non-technical skills such as situational awareness and decision making for the trainee" (Maung C. T., 2019, s. 11) (Saus, Johnsen, & Eid, 2010).

Situational awareness and decision making are skills that are important to master for all sailors, and especially for those who are going to make the right immediate decisions related to the safety of the ship and persons, and not least the protection of the marine

environment (Maung C. , 2019). As before, simulator-based training can promote situational awareness and correct decision-making in actual situations for seafarers (Saus, Johnsen, & Eid, 2010). The skills needed or the skills necessary for maritime professionals may not be built up in a classroom with only theories and lectures. But simulators allow students to, for example, connect new experiences from different emergency preparedness trainings and scenarios in the simulation, which they may never have experienced before in their previous experience. The experience and awareness students build up through simulator training will be able to support them if they have to take a stand in the same scenario in an actual situation and decide the right action and performance (Maung C. T., 2019).

Several maritime professionals have mostly positive perceptions of simulator-based training and conclude that simulators have an evident potential for training non-technical and technical skills (Emad & Roth, 2008) (Sampson, Gekara, & Bloor , 2011).

It has also been shown that a good simulation environment will help improve the training of non-technical skills such as communication and management by requiring the students to give more accurate and relevant reporting of the current situation in order to create the right situational awareness (Baldauf, Schröder-Hinrichs, Kataria, Benedict, & Tuschling, 2016).

Studies have reported a correlation between experience and situational awareness, particularly, the ability to achieve and maintain situational awareness. This ability seems to evolve, resulting in increased experience (Carolyn & Salas, 1997) (Carretta & Ree, 1995). A simulator “allows students to harness the complexity behind complex problems”, they also provide the opportunity for students to immediately see the results of the operation they perform (de Água, da Silva , Carrasqueira, & Daniel, 2020, s. 350).

Since the skills of the students studying at Western Norway University of Applied Sciences vary from never having been to sea to having a certificate, is it relevant to shed light on which training contributes to the transfer value for different skill groups. In research on assessing the effectiveness of simulator use in the Armed Forces, Temby & Stephans discovered that several students passed the shooting test they conducted in the shooting simulator as they changed the simulator target's color.

They assumed that this increased student self-esteem before conducting the test as a sharpshooting (Temby & Stephens, 2014). In the book "Sharpening the Warrior´s Edge," we can read that if simulator training is done correctly, it can "reduce the student's anxiety and working heart rate levels by giving him an experience relating to a skill's field application. This develops the student's confidence in a skill, which lowers working heart rates" (Siddle, 1995, s. 58). If one feels confident in a skill, it may be possible that the skill is easier to apply when a situation becomes more demanding. It is also conceivable that the confidence around the skill one needs can be created in a simulator and further transferred to the bridge of the boat (Siddle, 1995).

To explain and investigate how well a skill can be learned in a simulator, we must first address how a skill is learned. A skill can be described as an organized sequence of actions carried out correctly (Helle & Bø, 2008). A practical skill such as golf is often taught by the experienced one who stands by and says: "You stand like this, then you hold the club like this, and then you just do it like this... Boom, the ball is on the green" (Høiback & Ydstebø, 2012). "One cannot know if the student has the skills until we see it performed" (Dreyfus & Dreyfus, 1986, s. 16). It is difficult to put into words how practical skills are done but to teach skills we can look to learning principles (Kaiser, 2000).

Intensity, progression, positive feedback, and self-monitoring are principles that, based on research, can be beneficial for skills learning (Sigmundsson, 2010). Intensity involves practicing a lot, and often, progression starts at the right level, positive feedback is getting praise when one succeeds, and self-monitoring is that the tasks are laid out so that the person himself sees when the skill is mastered. The overriding goal of all training is to transfer what one has learned to real situations (Hancock, Vincenzi, Wise, & Mouloua, 2009).

Surgeon Fredrik Herman Halvorsen at Oslo University Hospital has investigated the effect of training with simulators for surgeons who will learn peephole surgery. These simulators provide the opportunity for surgeons to practice surgery before performing the actual operation on live animals or patients under supervision. Halvorsen wanted to find out if such type of training is as good as traditional training. The conclusion he later found was that simulator training has as good an effect as traditional training. Halvorsen also emphasizes

that "simulator training should be combined with other types of training to provide optimal effect" (Halvorsen, 2014).

Generally, the simulator training process has three important steps that provide different material and reasonable conditions for instruction (Sellberg & Rystedt, 2015). First, an orientation shall be carried out as an introduction before the assignment is carried out by the student. This is a necessary part of the training since it is during this phase that the student is notified of how the assignment should be performed and the learning objectives (Wickers, 2010). The second step is that the student performs the task itself, the task will take place within the scenarios created to fulfill the training purposes. The last step will be to debrief, debriefing will be carried out to review the performance and point out the mistakes that have been made during the training scenario to achieve better results in the future (Maung C. T., 2019).

Providing either positive or constructive feedback to the students performing the simulator exercises allows for students to change their mental models and develop a kind of critical thinking that minimizes unintended consequences that improve decision making and due actions once in the field (de Água, da Silva , Carrasqueira, & Daniel, 2020).

Those who facilitate simulator training often put a lot of effort into debriefing, meta-reflection and standing in the form of instructors, peers or via technological support. Debriefing is often advocated as a deciding aspect of simulator training (Fanning & Gaba, 2007) (Hancock, Vincenzi, Wise, & Mouloua, 2009). Baker & Jensen points out that debriefing sessions can be used to transform experience into learning and combine theoretical knowledge with practical experience (Baker & Jensen, 1997).

It has been widely accepted that debriefing is the "heart and soul" of the simulator experience (Fanning & Gaba, 2007). In a survey in which they asked 14 simulator centers in Europe what the most important part of simulator training is, all of the respondents responded that debriefing was the most important part of realistic simulator training, it was actually "crucial to the learning process", and if the debriefing was performed poorly, it could harm the learner's learning potential. Furthermore, they found that the elements of good debriefing included the use of positive reinforcement, open-ended questions, the use of cognitive aids and good use of audiovisual abilities.

Although several learning experiences need feedback, debriefing is a one-of-a-kind type of feedback process. If, for example, the main goal is to teach the student a technical skill such as docking the vessel or intubation for that kind of sake, it requires thorough adaptation, feedback, and reflection on the skill to master it (Rall, Manser, & Howard, 2000).

Research has been conducted and proven that adults learn best when they are actively engaged in the learning process. When they participate, they play a role and experience not only a specific event in a cognitive way, but also transactional events in an emotional way (Fanning & Gaba, 2007). The trainee or the learner must understand the event experienced, combined with active experience, with this combination the event experienced can lead to long-term learning. This type of learning is called experiential learning: Which is learning by doing something, thinking about and assimilating lessons learned in daily behavior (Kolb, 1984).

Usually, simulators are used for training skills that involve time, cost, and risk of practicing in natural environments. Simulator training provides risk-free training for critical situations such as accidents. The simulation also provides the opportunity to repeat and organize activities in a way that is not possible in actual working conditions, such as the ability to "freeze" scenarios for discussion or introduction (Fanning & Gaba, 2007) (Hancock, Vincenzi, Wise, & Mouloua, 2009).

Simulators have long been used for training objectives both in the maritime and aviation fields. A great deal of the literature shows how simulators can reflect the actual situation. Through several years of research, there is ample evidence that the simulator is considered an effective tool for improving practical skills in many maritime areas such as navigation, load handling, radio communication and machine operations. The simulator can help translate principles and theory concepts into effective practical action (Muirhead, 2004).

2.6 Engagement

Engagement is a key concept in this task, and we have chosen to make use of the following definition of the term:
"Positive, fulfilling, work-related state of mind characterized by a more persistent and pervasive affective-cognitive state that is not focused on any particular object, event, individual, or behavior (Rothbard & Patil, 2011, s. 7).

In a job/study context where individuals will perform various tasks, engagement deals with the thoughts and feelings everyone has for one or more tasks. According to the Great Norwegian Encyclopedia, vitality is about enjoying life or, in other words, how to thrive (Nilstun, 2021). Enthusiasm can be seen as the motivation or enthusiasm of the individuals toward a task or operation or the extent to which they want to perform the task in the best possible way (Nilstun, 2018). Specialization in this context concerns separating people from the task at hand, more easily explained, this is about practicing satisfactory break intervals to maintain workers' commitment to the task to be performed. In short, engagement is about what emotional approaches individuals take towards work. Research on student engagement proves that the commitment of students has a critical role in performance and learning (Kahu , 2011) one can no longer question the importance of this (Trowler & Trowler, 2010).

The behaviorists see student engagement as a construction that is constantly evolving, student engagement can help to capture institutional practices and student behavior related to students well-being and performance, this entails, among other things, social and academic inclusion, teaching practice and time aspects related to assignments. In order for institutions to influence and form an overview of student engagement, it is necessary to be able to make measurements.

The National Survey of Student Engagement (NSSE) presents the five measurable engagement elements: academic challenge, active learning, interactions, educational experiences, and a supportive learning environment. Implementation of these five elements is becoming more and more important for new definitions of the concept of "student

engagement.” An example of this is that (Kezar & Kinzie, 2006) argue that it is important to review these five elements in order to understand what student engagement deals with (Kahu , 2011). There are disagreements around this, but the NSSE believes that these elements are well theoretically and psychologically rooted, as a result of which the measurement method has great reliability (Kuh, 2001).

Institutions that engage their students to a greater extent should be considered of higher quality, it is also widely believed that higher engagement results in a deeper understanding and increased knowledge that in practice, will increase the competence and skills of the students, increased engagement will also be able to help shape the students into more independent and creative problem solvers (Bayoumy & Alsayed, 2021).

Another theory created by Kahn suggests three necessary psychological conditions to engage single persons in the given task. These are: availability, meaningfulness, and safety. Safety is associated with the psychological safety of being able to express oneself without negative consequences. Availability is associated with psychological and physical resources to devote themselves to task work. Meaningfulness is related to one’s investment in effort, and the return on the one has invested (Kahn, 1990). Tews, Noe & McConnell went on to work on Kahn's theory, to describe the relevance of the terms of engagement in learning. Safety is important for students, because when students feel safe in given environments, it opens up the possibility of students to try and fail. Something important when acquiring competence, what is meant by this is that there is good learning in making mistakes and seeming incompetent. Availability can add energy, which individuals can allocate to learning, a process that requires sustained attention. Meaningfulness gives a belief that one's efforts to learn new knowledge and skills will bring benefit. Learning involves a degree of security, and individuals will seek to learn from those who will not judge them negatively (Tews & McConnell Dachner, 2010).

It has also been shown that fun can, to some extent, promote open communication and camaraderie. It's been shown that when it is fun to learn, individuals can actually become less concerned with protecting their frames, and then step out of their comfort zone to become more open to exploration and make mistakes. In other words, people relax a little more because the setting becomes more "informal,” and it makes it easier to try and fail.

Moreover, it has been shown that fun promotes positive emotions, which can improve relationships and reduce anxiety about learning. It can almost be stated that fun helps build greater relationships by putting people in greater and more frequent contact with each other, often by putting the people in a text that is non-task. Likewise, fun probably creates an atmosphere that encourages friendly connection without fear of negative consequences. That is because informal learning involves seeking competence and asking questions, in this way, individuals are more likely to seek out others with whom they have good relationships (Tews, Michel , & Noe, 2017).

Informal learning is a type of learning that is completely unstructured and takes place outside the traditional and formal learning environments, such as a classroom. Informal learning has no clear or established goals, as learning is often not planned and self-directed by the student (Training Industry, 2022). Informal learning includes a variety of behaviors to acquire learning new knowledge and skills, such as experimenting with new ways of doing work, interacting with others, self-reflection and reading job-relevant material (Noe, Tews, & Marand, 2013).

Considering that fun has the potential to increase the positive feelings of the individual, which in turn provides more energy and increases a person's optimism and resilience needed to be able to engage in endeavors such as informal learning. A more relaxed attitude given by fun can signal to people that they can direct their energy and resource away from their responsibilities toward informal learning. In other words, they can lower their shoulders and even allow themselves to try to fail and then acquire informal learning. Fun can also help individuals with informal learning because fun can increase the meaningfulness of informal learning. Individuals are not always as motivated to learn, but fun can help increase an individual's perception of the value of informal learning through positive influence and creativity (Fredrickson, 2001) (Panksepp, 1998).

Often, individuals experience joy and fun in the "play" they are involved in; these feelings of joy promote creativity by driving brain development and prompting exploration. Something that helps to create intellectual complexity and knowledge. When stimulating creativity, fun

can promote informal learning and then help people further develop their ideas which can solve, for example work-related problems (Tews, Michel , & Noe, 2017).
As individuals begin to deepen and think creatively about problem solving and work-related issues, they will also engage in informal learning. By promoting general connection, fun can promote informal learning because one can more easily engage and seek proactive behavior to improve (Fredrickson & Cohn , 2008) (Tews, Michel , & Noe, 2017).

It is not necessarily the "fun" that is the reason why individuals learn better, but the relationship between fun activities, informal learning and acquiring learning / knowledge from others. Fun activities put people in more frequent contact with others in a non-task context, giving individuals the opportunity to socialize. And that is when “higher-quality relationships are more likely to develop, which can open the door to the exchange of experience and ideas” (Tews, Michel , & Noe, 2017, s. 53).

A probable explanation for the relationship between fun activities and learning from non-interpersonal sources is that fun activities put individuals in new and exciting situations, which most likely stimulates creativity, and there they in teams get to analyze problems from different perspectives. Individuals may then be motivated to seek out new information through such pathways to further expand their knowledge and complement new ideas (Tews, Michel , & Noe, 2017).

3. Methodology

This chapter will review the methods we have used for this task. According to Jacobsen, he believes that; "The purpose of research is to generate valid and credible knowledge of reality. To explain this, the researcher must have a strategy for how he or she should proceed. This strategy is the method" (Jacobsen, 2015, s. 15).

3.1 Quantitative and qualitative method

Since we have a main research question and two sub- research questions, we found it necessary to use quantitative and qualitative methods. Therefore, we will explain in this chapter in more detail these methods and justify why we have chosen to use these.

If we are going to explain what's the difference between the two methods, Ian Dey wrote that:

“While quantitative data operate with numbers and sizes, qualitative data operate with opinions. Opinions are conveyed mainly through language and actions” (Dey, 1993, s. 10) (Jacobsen, 2015).

Both methods, therefore, do the same, but they differ from each other in terms of the way the data is collected and analyzed. One can also see strengths and weaknesses with both methods, and according to Jacobsen, he believes that "what is a disadvantage in one approach is often an advantage in the other" (Jacobsen, 2015, s. 138).

We have used the qualitative method by having in-depth interviews with random nautical science students and teachers at HVL and using the quantitative method when we have examined the grades of last year's students compared to previous years.

We will now look at the advantages and disadvantages of these methods, then present a rationale for our choice.

3.1.1 Advantages and disadvantages of using quantitative methodology

Advantages

One of the advantages of using quantitative methodology is that the data collected requires fewer resources than using qualitative methods. Furthermore, it is a strength that you can get many participants to attend such a survey, as you can send this out to many people if you wish. This type of data is also standardized and is well suited for statistical analyses. Since we checked the grades in the navigation subjects of last year's students compared to previous years, it was easy to obtain these from Western Norway University of Applied Sciences via the platform "Student web".

Disadvantages

One of the disadvantages of quantitative methodology is that you will have little knowledge of the people you are investigating, as the distance is so great. Data can only be collected on the exact factors you have decided to investigate in advance. This is, therefore, a weakness, as there may be several factors that have not been thought of that may affect the exam results, we collected. Also, there tends to be a low answer frequency in, for example surveys.

3.1.2 Advantages and disadvantages of using the qualitative method

Advantages

When examining whether students gain better practical skills on simulators through increased quantity training, we believe that you can not only look at the grades but also at how they feel about their skills when you get to train more on simulators. In addition, we could ask whether the students feel more engaged in everyday life after the project started, that is under problem #2. Therefore, in this assignment, it is the most use the qualitative method in the form of in-depth interviews to find out what students and teachers think about this, so that we could get more complete answers from these. Being able to hear what the interviewees themselves felt and thought about the project was very valuable to the

study as well as rewarding to us as a group in this process. This method is, therefore, well suited when one wants to clarify an unresolved topic in more detail and present a nuanced description of the topic (Jacobsen, 2015).

Disadvantages

One of the disadvantages of this method is that it is very resource-intensive to hold in-depth interviews, especially when interviewing quite a few people. Another disadvantage is that one can get so much information in such interviews, that parts can become difficult to interpret correctly. Qualitative data is, therefore, very complex (Jacobsen, 2015).

Furthermore, this closeness can be a problem with such interviews. This means that we, as "researchers" in this project, have some form of relationship with the candidates we have interviewed. In this context, all interviewees are fellow students and teachers at the school where we are studying.

3.2 Justification of choice of method

The main research question in this task is, as we have mentioned earlier; "What effect does increased hours of training on simulators have on students' practical navigational skills?" We agreed to use both qualitative and quantitative methods with this issue in mind. This was because we believe that there are several different types of skills students can improve on for simulator training. Therefore, we wanted to check quantitative by looking at the grades and qualitatively when interviewing. This is so that the students themselves should have the opportunity to express what they thought about their skills on the simulators.

Furthermore, we have also presented two subproblems: "Whether the students perform better on practical exams," and here, as mentioned earlier, we have used quantitative data by looking at the students exam grades.

The other issue in this paper is: "Whether the students feel that the project makes them more engaged during their studies." We have used the qualitative method with the information we received in the in-depth interviews. When we held these, we divided it into two parts, where one part focused on questions regarding practicality skills, while the other

had to queries about the social aspect in terms of engagement.

Therefore, we have chosen to use deductive research in this task. When pursuing a deductive approach, one starts with a research question, finds relevant theory and research this, before discussing the findings, and whether these support the hypothesis one has set (Jacobsen, 2015).

3.3 Sources of error using method

When using qualitative and quantitative methods, we have found some limitations. We have ensured that these do not affect our findings throughout the process, but these should nevertheless be mentioned as weaknesses in terms of the task at hand.

3.3.1 Sources of error using quantitative methodology

The only thing we think can be a source of error regarding the students grade results is that the information we have received from HVL's platform "Student Web" does not match the actual exam result.

3.3.2 Sources of error using qualitative method

Since we held in-depth interviews using this method, this is where any sources of error may have occurred. This may have come from us who held interviews or the people we interviewed. One thing we decided early was not to have too many questions, as we would rather interview a lot of students and teachers. This was because we wanted to get many people to answer our questions about the topic. The only criteria for our interviewees were that they studied Nautical science at HVL and that they had participated in the project NightSim. As mentioned earlier, we also interviewed all the navigation teachers. Another weakness is that we have had of a relationship with everyone we have interviewed since all of these have either been fellow students or teachers. Nevertheless, the interviewees were randomly selected from the three different classes at HVL.

3.4 Design of the project "NightSim"

As mentioned in the previous sections, the NightSim project was started by the Centre of Excellence in Maritime Simulator Training and Assessment (COAST), where the four educational institutions in Norway that offer nautical science education in Norway are members. These four schools are:

- Norwegian University of Science and Technology Campus Aalesund
- University of Southeast Norway Campus Vestfold
- University of Tromsø – The Arctic University of Norway
- Western Norway University of Applied Sciences Campus Haugesund

In Coast, one of the participant representative groups is a selection of students who have been named "Student Think Factory." In this group, there are three students from each school represented. The main task of this working group is to contribute a students thoughts regarding simulator education as it is today and how it can be improved. Together with researchers, teachers, and representatives from the business community, we work together to achieve the goal of "being a world-leading supplier in simulator-based training in maritime education."

In 2020, Student Think Factory had its first meeting where students from different schools could share experiences from their everyday school life. We who write this task represent HVL. We found these meetings very interesting because we got an insight into how the other schools operate their simulator education. The input we received from here motivated us to start the project NightSim. We contacted the head of the department of Maritime Studies and the COAST focus area leader in HVL Haugesund. Together we agreed to establish a working group consisting of navigation teachers and a selection of students, where together we would find out how to make the best possible offer. One of the things we wanted to do was to produce new and exciting scenarios that students have not tested in the ordinary lessons. This is to make the project attractive and engage those students who want to participate in NightSim.

The teachers involved, therefore, started producing these scenarios, and when these were eventually made, we asked students at the simulator center to test these exercises. In this

way, we were able to give feedback to the teachers about what we thought was good about the different tasks and what might be better. When we gradually started to get enough scenarios ready-made, we were ready to present the offer to the students. To get in touch with the students at HVL, we created a private Facebook group where all nautical students in Haugesund were invited. We chose this platform because we could communicate best with the students instead of using a different platform. Thanks to the help of fellow students from the other classes, we managed to get almost all the students into the group in just a few days.

In August 2021, we presented the project to the students, and it was very well received. We conducted NightSim ten times that semester, and the attendance was very good. It was almost full every time, suggesting that this has been a long-awaited offer for the students. Moreover, it also seemed that the new scenarios students had never tried before engaged positively.

Another focus we had outside of the goal of developing the students practical skills was also to create a better school environment considering the social factors. We have been through a pandemic, where the students had little contact with each other, and we, therefore, wanted to make an offer that also highlighted this. Consequently, we agreed with the teachers that during the actual implementation of the exercise, we students, would be teachers. We did this to create a more "informal setting" so that students could see NightSim as a leisure offer and not the traditional teaching, they are already familiar with. This worked very well. We also noticed that we in the "teacher role" also got an excellent benefit from sharing our knowledge with younger students.

Furthermore, we also wanted to get the students from the different classes to get to know each other better, and make sure that the younger students had the best possible learning. We, therefore, chose to mix students from 1, 2 and 3 years in on the different simulators.

3.5 In-depth interview design

After completing NightSim ten times in 2021, we wanted to investigate how the students felt about their practical skills and social involvement after attending the offer. The way we did this was by having in-depth interviews.

According to Matthews & Ross: "An interview is a particular type of conversation between two or more people. Usually, the interview is controlled by one person who asks questions of the other" (Matthews & Ross, 2010, s. 219).

We divided the questions into two different categories, one of which focused on how the students felt about their practical skills after attending NightSim. The other dealt with the social factors associated with the students engagement. We decided to have reasonably short in-depth interviews. The reason for this was because it gave us the opportunity to interview more students, to see if we saw apparent similarities in the answers we received. In total, we had 27 people in for interviews, where 24 of these were students, and 3 of these were teachers.

We also interviewed the teachers responsible for the navigation subjects who, among other things, have simulator training in their curriculum. We also divided the interview into the same two categories to see what experiences and impressions the teachers had after the project started, compared to earlier when NightSim was not offered to the students. Therefore, we started the work of creating an interview guide. Matthews and Ross say that; “An interview guide is designed to help the researcher to conduct a semi- structured interview […] the guide acts as an agenda for the interview with additional notes and features to aid the researcher” (Matthews & Ross, 2010, s. 227).

We spent a lot of time creating the interview guide to make sure that the people we interviewed easily understood what they were asked, so that we got good answers to answer our questions. Furthermore, it was decided that only one of us should be the interviewee and talk to the interviewees to avoid misunderstandings. We were very specific about this because most of the students interviewed had never participated in such an interview before. We, therefore, wanted students to feel as comfortable with the situation as possible.

Before starting the interviews, we tested the interview guide with some randomly selected students. Here we received helpful feedback on what was good and could be done better. One of the feedback we received was that those we interviewed wanted the Norwegian language to be used instead of English. This justified the test participants by saying that it was easier to express their opinions on the topic in Norwegian.

After we had the application approved by NSD (Norwegian Centre for Research Data), we started collecting respondents for interviews, in accordance with our supervisors, we agreed that we wanted a response rate of around 33% from the students who have participated in NightSim. The interviews were conducted physically at school or over the internet. All students signed on that we could make audio recordings of the interviews quote them accurately during the transcription of the interviews. In order to present the various answers, the respondents came up with, we chose to categorize the answers we received. This was done by going through all the interviews, looking at all the answers and then numbering all the similar answers. This was done to present more easily what the majority of the respondents thought about the different questions they were asked. The answers will be presented and commented on in *Chapter 4 Results.*

3.5.1 In-depth interview benefits

Since our research question is: "What effect does increased hours of training on simulator have on students' practical navigational skills," we believed there were clear advantages to holding in-depth interviews. This is because the students themselves express if they feel their skills have improved, and not least, what specific skills have been improved by increased crowd training on the simulator. Another clear advantage for us who wrote this thesis was that we had good access to the students to hold the interviews. We mean that we recruited random students who participated in an actual NightSim exercise for an interview, by taking them out from the simulator for a short period of time. In this way, we avoided spending unnecessarily much time reserving time for meetings with the different people we spoke to.

3.5.2 Disadvantages of in-depth interviewing

The main disadvantage of conducting the in-depth interviews was that it was very time-consuming. It took a long time to complete so many of these and translated the interviews from Norwegian to English. Another effect of semi structured interviews we noted was that some of the questions became "close to each other", which meant that the interviewees often answered several questions before they were asked these.

3.6 Collection of exam results

When collecting the exam results on a practical simulator, we have only looked at the classes' average exam results. We haven't looked at individuals as we did not think this was necessary, and it would be issued with the privacy and personal data protection. Later in the thesis, we will look at these results. Still, although not all students in the different classes have participated in NightSim, we believe that the percentage of participation is so high that one can see whether the project has influenced the different classes.

3.7 Sub conclusion

In this thesis, the qualitative approach has been used most often to further investigate the main problem we have chosen. Furthermore, we have also used the quantitative approach to gain an even more thorough insight into the problem and be able to answer one of the subproblems in this thesis. The next chapter will present our findings after using these two methods.

4. Results

4.1 Method of data collection

As mentioned earlier, the quantitative method was used to obtain the students grades through practical simulator exams and in-depth interviews to the qualitative method. This is explained in detail in *Chapter 3*.

4.2 Representativeness

For our investigations to be as representative as possible, we assessed both methods properly before they were initiated. The data collected represented a large enough proportion of the nautical students at HVL Haugesund. When we collected the grades from the three different classes, these exam results represent all nautical students at HVL, where we have checked the classes in terms of the average grade of the different classes. Furthermore, when we collected data using the qualitative method in the form of in-depth interviews, 33% of the students who participated in NightSim were asked. Since participation at NightSim has been high, where 73 out of 112 students have participated in one or more NightSim exercises, we, therefore, believe that looking at the average grade of the classes is representative with this in mind. This is more thoroughly explained in *Chapter 4.3, Participation on NightSim*.

4.2.1 Quantitative method: Exam results

The students exam results represent everyone who completed the practical exam in the navigation subjects that the different classes have in the curriculum. We have chosen to examine the different classes' results in the form of average grades. It is important to point out when it comes to collecting these results is that we have not looked at the 3rd- grade results, as this class does not have an exam in the simulator the final year of education. We have therefore examined the grades in these two subjects:

- *NAB 1026 - Navigation 1 (first-year students)*
- *NAB 2014 - Navigation 3 (second-year students)*

In the curriculum for the nautical science study, the subject Navigation 2 is also implemented. We have not examined this subject because it is not part of the autumn semester, and since NightSim has only been conducted in the autumn, we did not have the opportunity to collect data for this.

4.2.2 Qualitative method: In-depth interviews

For the findings in the in-depth interviews to be representative, we chose to interview as many students as possible. As mentioned earlier, 10 different NightSim exercises were conducted during the autumn of 2021, and there were 73 students who participated in at least one of these exercises. We interviewed 24 of these students, representing 33% of the students who attended NightSim once or several times.

4.3 Participation on NightSim

Before the exam results are presented, we will first look at how the students NightSim participation was in the different classes. This is to get an idea of how many students may have impacted their simulator skills by training more on the simulator after attending NightSim exercises. Each exercise that was conducted lasted 2 hours.

After reviewing the participant lists for all 10 exercises, the participation is as follows:

A total of 73 students participated in NightSim 1-2 times in the fall of 2021. These students, therefore, received 2-4 hours more simulator training than they normally have in their education. This is 65% of all nautical science students at the school, as at this time, there were 112 nautical science students at HVL.

The participation of the different classes is shown in Table 1:

Table 1: Student participation

	Student participation in each class	Total students per class year	Participation percentage
1st year	43	50	86 %
2nd year	21	26	81 %
3rd year	9	36	25 %

A total of 30 students participated in NightSim 3-4 times in the fall of 2021. These students, therefore, received 6-8 hours more simulator training than normal. This is 27% of all nautical students at HVL. Participation from the different classes in Table 2:

Table 2: Student participation per class

	Student participation in each class	Total students per class year	Participation percentage
1st year	20	50	40 %
2nd year	9	26	35 %
3rd year	1	36	3 %

In the end, there were 17 students who participated in NightSim 5 or more times, and these, therefore, received 10 hours or more of training than normal. This is 15% of all nautical science students at HVL.

Participation from the different classes in Table 3:

Table 3: Student participation per class

	Student participation in each class	Total students per class year	Participation percentage
1st year	13	50	26 %
2nd year	4	26	15 %
3rd year	0	36	0 %

The numbers show that the students from the first year have the highest participation rate when we look at the different classes. Furthermore, we see that almost 40% of the first -year and second-year students have received approximately 8 hours more simulator training after attending NightSim. Since participation among these two classes is so high, one can argue that NightSim has influenced students practical skills and exam results. It is also seen that participation for third-year students is relatively low. This may be due to the fact that these students did not have a simulator exam this semester, in addition to the fact that some students from this class have contributed as simulator assistants during the exercises. A large proportion of this class was also gone for much of the semester, as they were out in integrated practice at various shipping companies.

4.4 Exam results

We will present the exam results and compare last year's results with previous years when the NightSim project was not started, which meant that the students did not have the opportunity to do more quantity training on simulators. First, the results for the subject *Navigation 1* will be presented, and after this, we will review the results for the subject *Navigation 3.*

4.4.1 Practical exam result: Navigation 1

To compare the grades from 2021, when NightSim started, we examined exam results from previous years. The years that have been investigated were 2019 and 2020, when NightSim was not started.

Figure 6 and Figure 7 show the grade results for 2019 and 2020. To see if the grades in this subject have changed thanks to NightSim, this has been calculated, among other things, the average character for all the years. We have done this to see if one observes a positive or negative trend because of the project. this was done was by turning the letter grades into numbers so that one could more easily see this. Therefore, in the examples below, the best grade A is equal to the number 6, while the worst grade F equals the number 1.

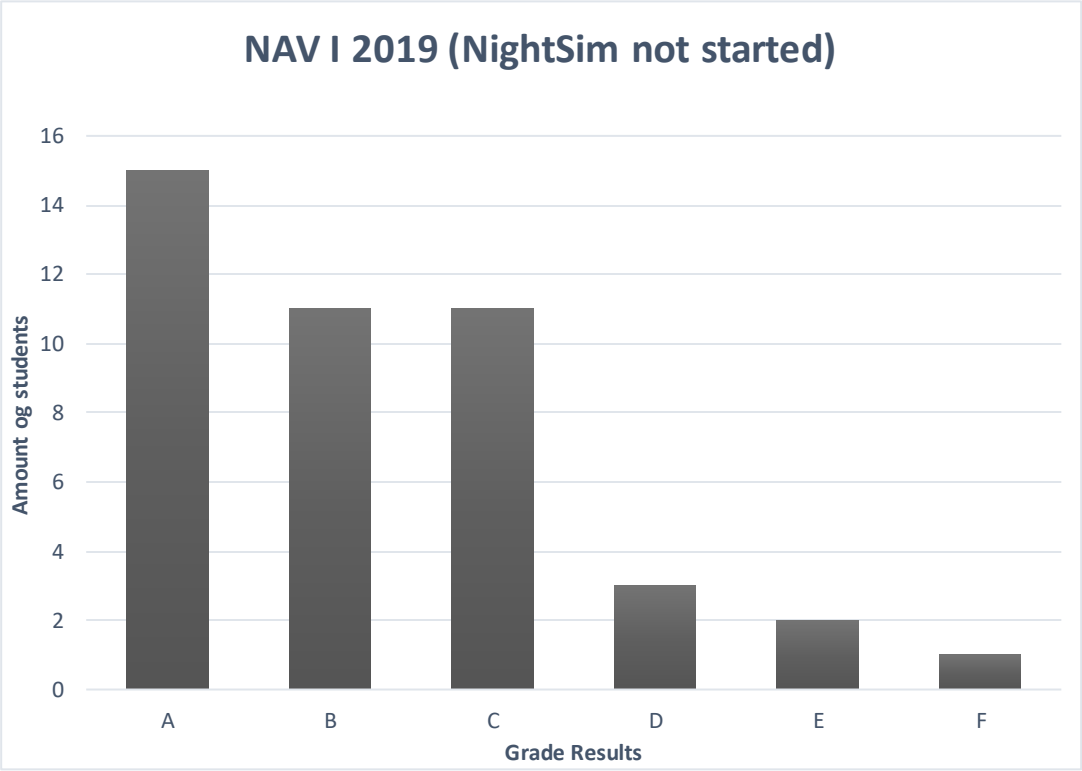


Figure 6: Nav I grades 2019

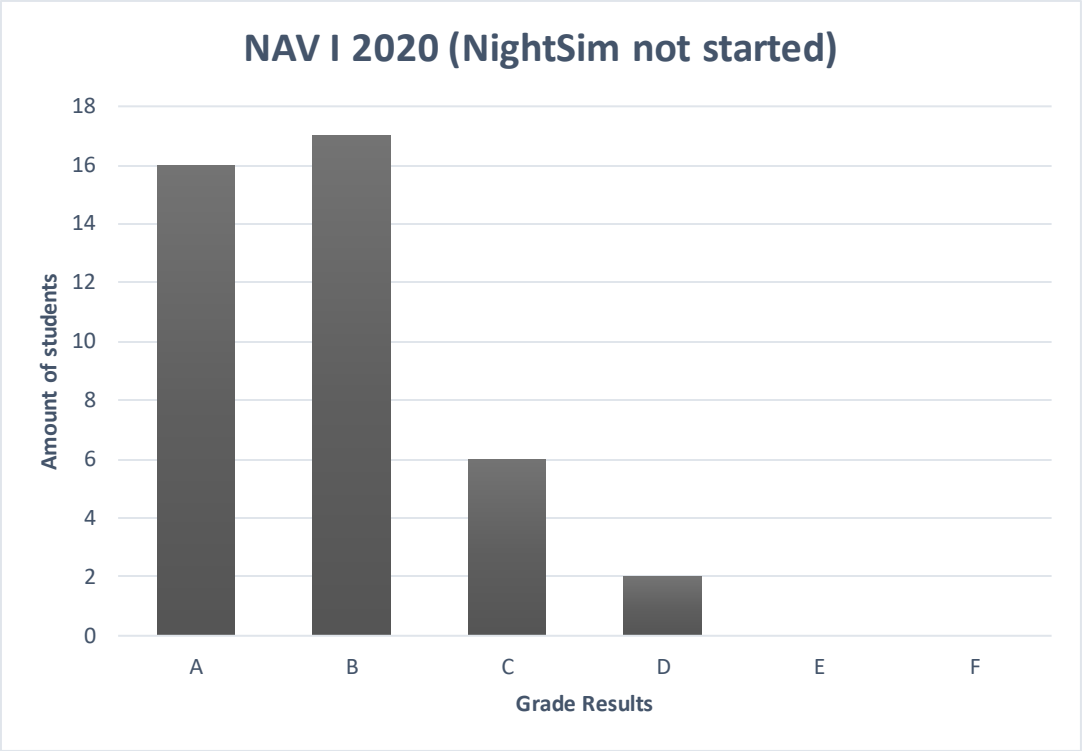


Figure 7: Nav I grades 2020

- For the students who had the practical exam in 2019, the average grade was 4.72.
- For the students who had the practical exam in 2020, the average grade was 5.15.

We see an increase in the average grade from 2019 to 2020. NightSim has not influenced this increase as the project was not started at this time. There may therefore be other factors that may have influenced this.

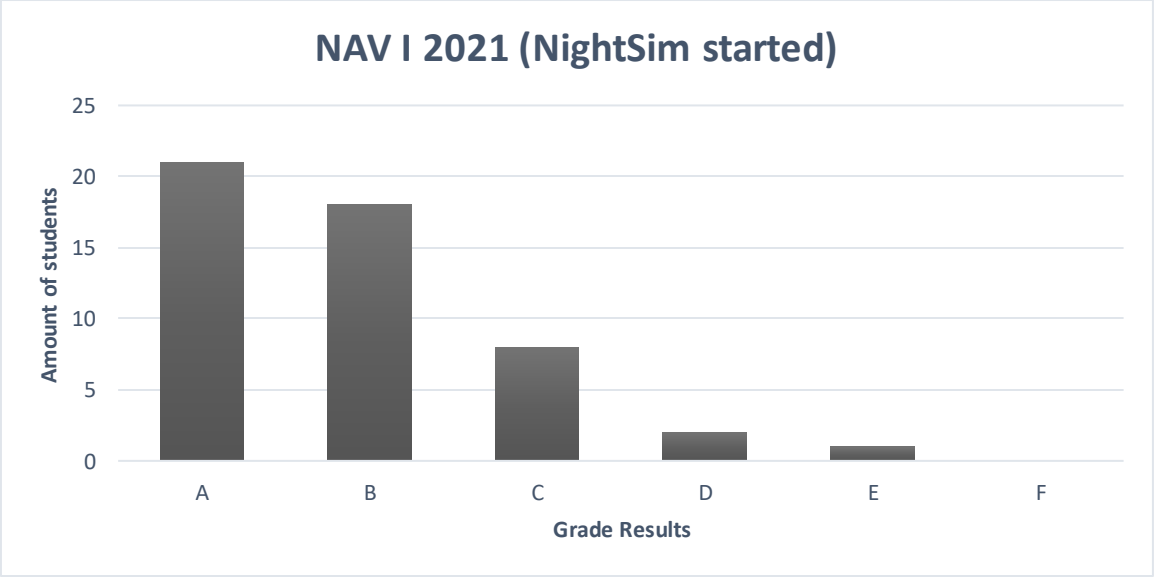


Figure 8: Nav I grades 2021

In 2021, NightSim was started, and the students who had the exam in Navigation 1 are shown in Figure 8.

- For the students who had the exam in 2021, the average grade was 5.12.
- The average for 2021 is approximately equal to the result for 2020.

If we put the three years, we compare the results in Figure 9.

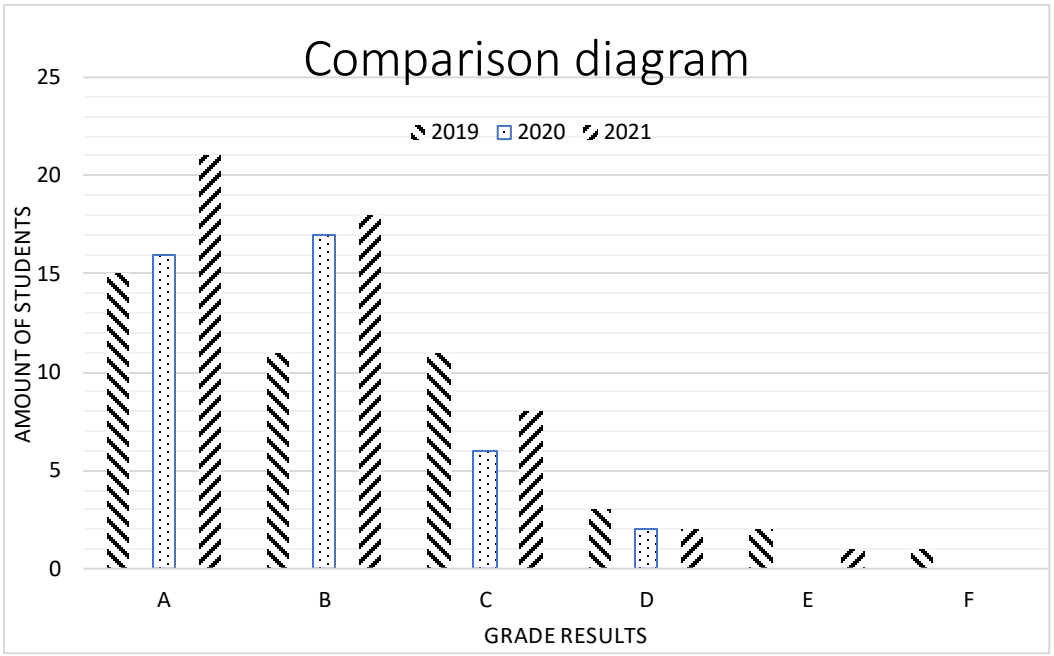


Figure 9: Grades comparison 2019-2021

The number of students who took the practical simulator exam in *Navigation 1* during the different years was:

- 2019: 43 students
- 2020: 41 students
- 2021: 50 students

The statistics, therefore, show that the grade average has not gone up, but we observe an increasing trend in the number of students getting good grades. By this, we mean grades A and B. Compared to the previous year, there was also a 22% increase in the number of students who completed the simulator exam in 2021.

4.4.2 Practical exam results: Navigation 3

As for the subject *Navigation 3*, which is the last navigation subject one has in the nautical education, second-year students take the simulator exam in this subject. Just as we examined *Navigation 1*, we've compared last year's grades to previous years. In this course, we have only compared in the previous year's grades with the year before, i.e., 2020. The reason for this is that we wanted to compare the grades with years that have had approximately equal teaching if one disregards NightSim. Both of these years were affected by the Covid-19 pandemic in terms of educational methods, and we, therefore, believe that these grades are the best to compare with each other. Nevertheless, one of the differences between these two years is that the NightSim offer was only available to the students who completed the practical simulator exam in 2021.

In Figure 10 and Figure 11, we see the grades for 2020 and 2021. We have also calculated the average grade:

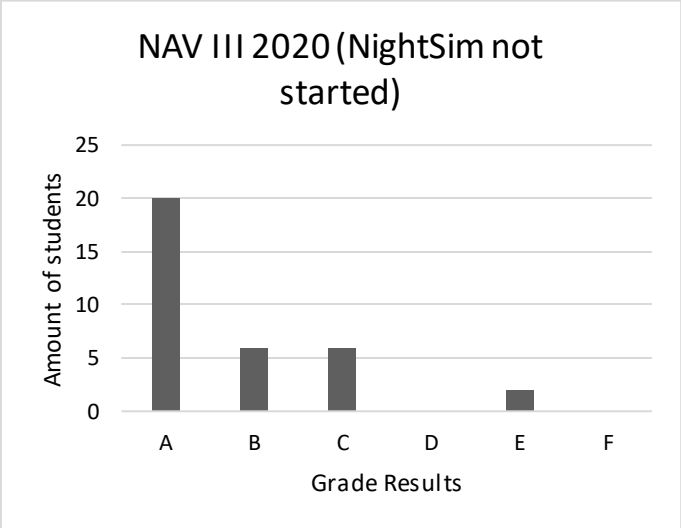


Figure 10: NAV III 2020

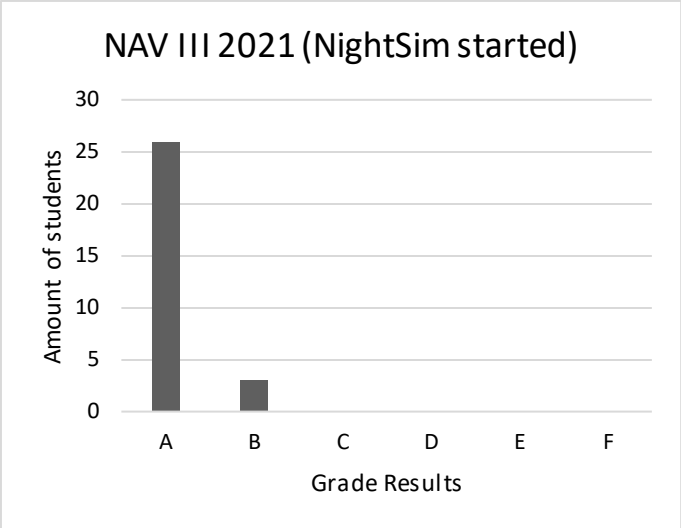


Figure 11: NAV III 2021

- For the students who had the practical exam in 2020, the average grade was 5.24
- For the students who had the practical exam in 2021, the average grade was 5.90

We compare the results in Figure 12.

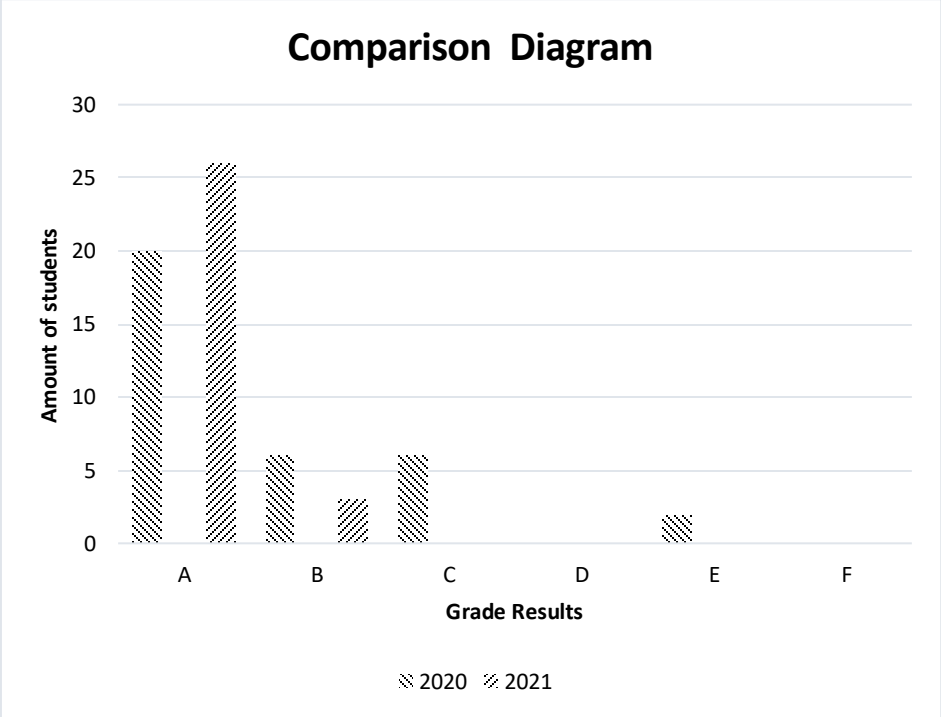


Figure 12: Comparison of NAV III 2020-2021

The number of students who took the simulator exam in *Navigation 3* in the two years was:

- 2020: 34 students
- 2021: 29 students

The statistics show that the grade average has increased by 0.66, in favor of the "2021 students" where NightSim was introduced as an offer.

We will discuss these findings in the discussion section.

4.5 In-depth interviews

As mentioned earlier, we interviewed 24 students and 3 teachers, the students were asked a total of ten questions and the teachers were asked nine. The answers will be presented and commented in the next subchapters, we do not consider it necessary for the assignment to present the entire transcript from the interviews. Because we only interviewed three teachers, their answers will not be presented using diagrams, but by summing up what they answered.

4.5.1 Student interviews

Questions 1, 6 and 10 are presented in table and/or text form. The rest of the questions are presented using diagrams, the question will be at the top, and the questions will be below each table, which presents how many people have answered this. Under the diagrams, the comments that belong to the question will be placed.

1. **What grade level are you in?**

We chose to ask this question to obtain an overview of which class the respondents were in, as well as what background the different students had. As written earlier, the number means which year the students go, "O" means that the students hold the “Higher Education Entrance Qualification,” and "P" means that the students hold a certificate as an able seaman, an overview of the respondents can be seen in Table 4 on following page:

Table 4: Respondent details

Class and background	Number
1-O	2
1-P	2
2-O	10
2-P	2
3-O	5
3-P	3

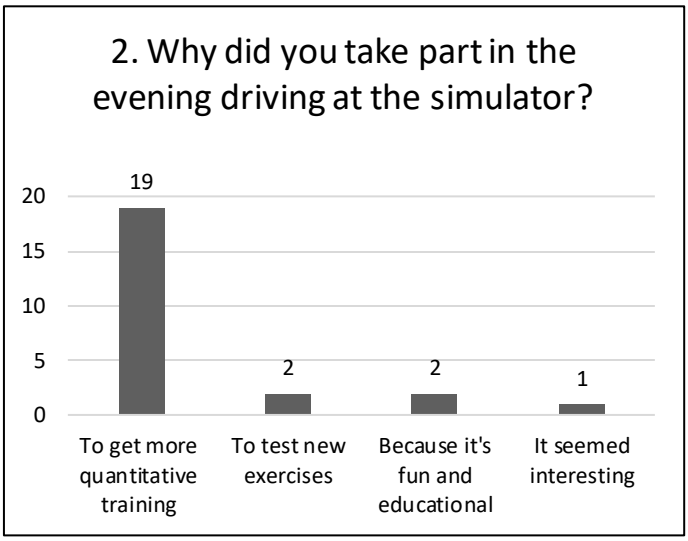


Figure 13: Question 2

In Figure 13, you can see that most of the respondents have participated in NightSim to get more quantity training. Others participated in testing new exercises, and some participated because they thought it is fun and educational or because they think it seemed like an interesting offer.

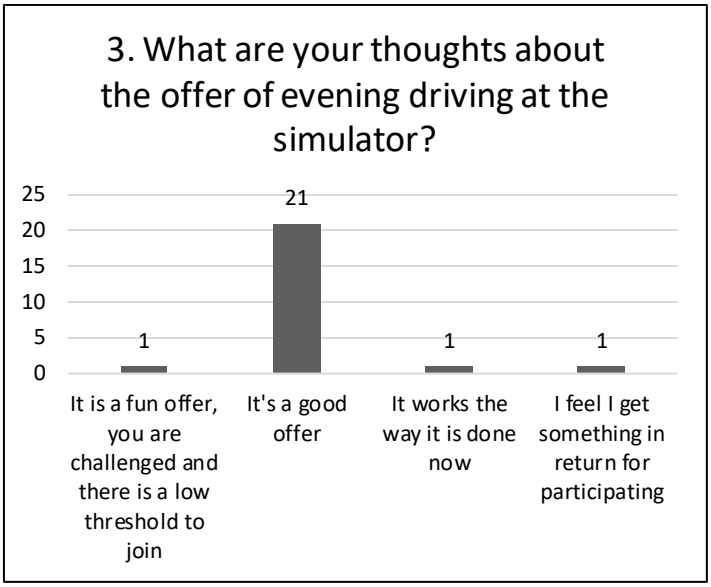


Figure 14: Question 3

In general, Figure 14 shows that the students are satisfied with the offer as it is today, as the answers we received are very positive. One respondent replied that they find it fun and challenging and that there is a low threshold for joining, while another replied that they get something in return for participating.

Figure 15: Question 4

Most students feel they have gained better practical skills on simulators, Figure 15. Two answered that they were unsure, and one replied that the competence had not improved, but it may be good to mention that these answers came from third-year students who are

the most experienced on the simulators.

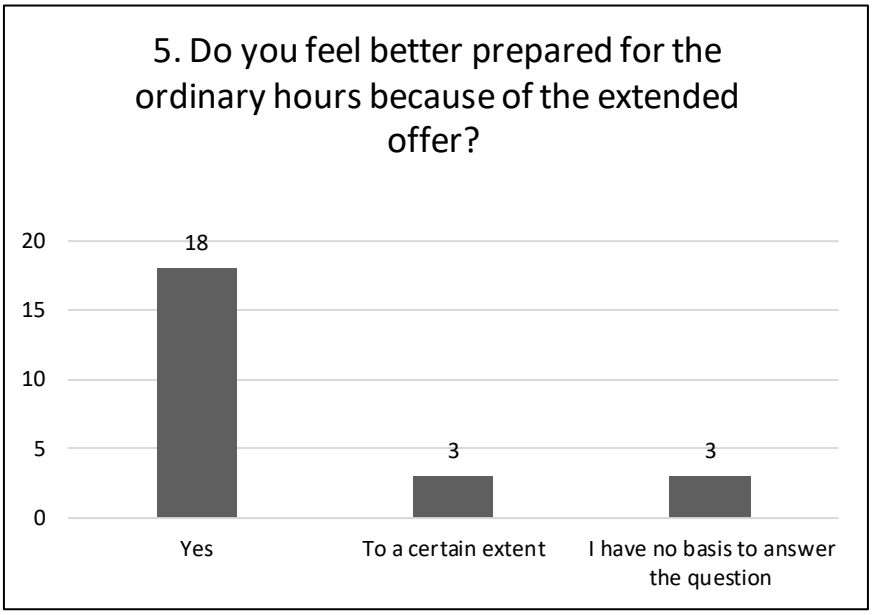


Figure 16: Question 5

In Figure 16, we see that 87.5% of the respondents believe that the offer has affected their competence to a greater or lesser extent. Three students felt that they could not answer the question.

6. Are you looking forward to the extra simulator lessons that take place outside the school's curriculum?

To this question, all the respondents answered that they are looking forward to the extra simulator lessons, several justifying this by saying that "it is voluntary, so I would not have signed up unless I would have wanted to."

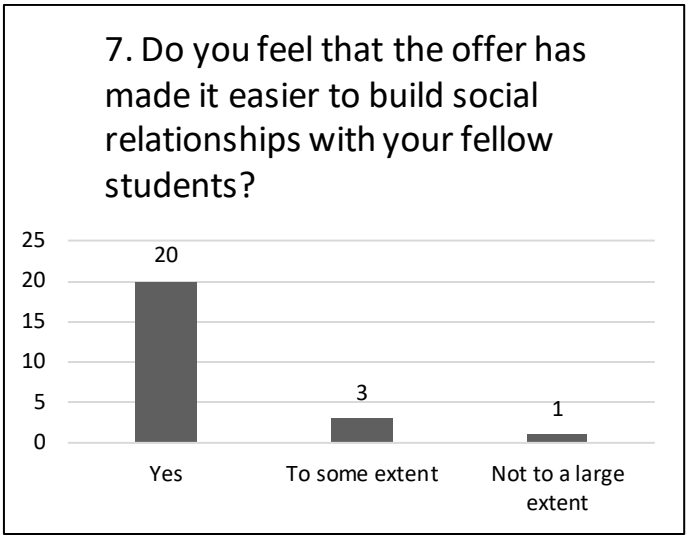


Figure 17: Question 7

Most of the students answer question 7, Figure 17, that they feel it has been easier to get in touch with fellow students regardless of which class they belong to. One student did not think that the offer made it easier to get to know other students.

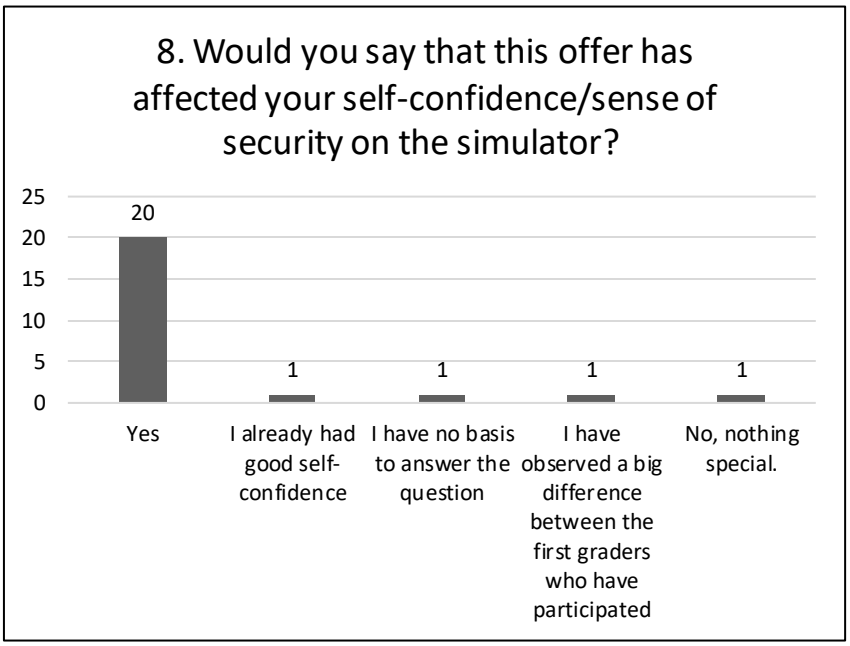


Figure 18: Question 8

Approximately 83% of the students answered that the offer had affected their self-confidence / sense of security in the simulator, others had not noticed any difference, and one specified that they have observed a difference in others (Figure 18).

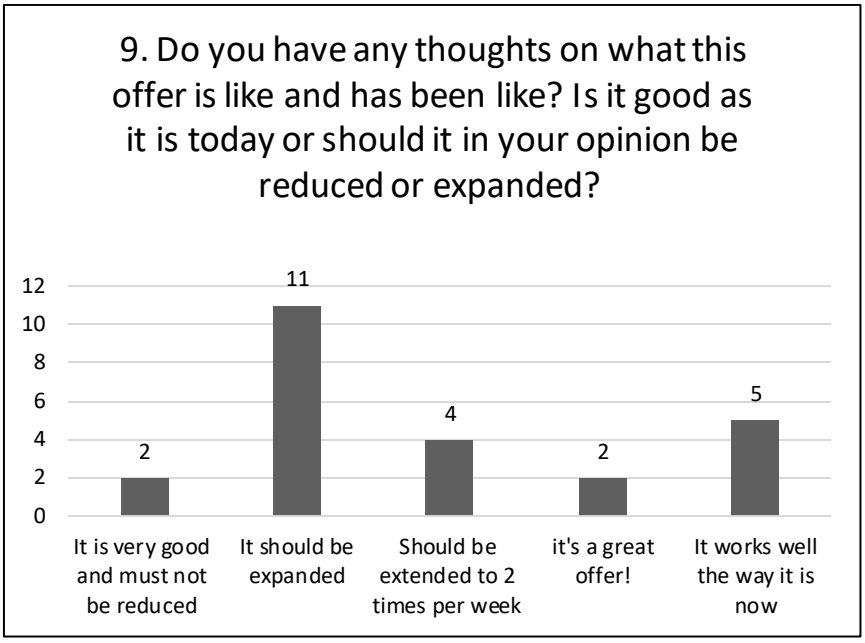


Figure 19: Question 9

Fifteen of the students want the offer to be expanded (Figure 19), and four of these want an extension of the offer to twice a week. Seven students think it is good as it is today, and two only answered that it is a great offer.

10. Is there anything else you'd like to add besides what we've talked about earlier?

The vast majority replied that they had nothing more to add, but some responded, and some of these quotes will be presented in the discussion section.

4.5.2 Teacher interviews

We have not produced statistics from the three teachers' answers, but under each question, there will be a section that contains a summary of the answers from the three teachers. In accordance with ethical purposes, all respondents are anonymized and ascribed a teacher number 1, 2 and 3 (i.e., T1, T2, and T3), it is these titles that will be used by direct quotations.

1. **What position do you have at HVL?**

All the three respondents are navigation and simulator instructors at HVL.

2. **Why have you engaged in the extra offer at the simulator?**

They have participated because they want to help offer more simulator education to the students, they believe that a simulator is a good tool for learning to navigate and maneuver ships, thus, they see the positive in that the student receives more quantitative training. They have always had the impression that the students want to use the simulators more than what is offered in the ordinary lessons and are happy that it is now offered. Teacher 3 also replied that he thinks NightSim is a good arena to test other things than what is in the school curriculum.

3. **How do you feel that this offer has affected the practical competence of the students?**

All of them think that it has been positive for the students practical competence, they believe that it is especially positive that students receive an increased amount of training for exams. They also believe that the project must last for a longer period of time to determine the extent to which the students competence is affected by the offer.

4. **Do you feel that the students are better prepared for the regular simulator lessons because of the extra offer?**

All three teachers agree that those who have participated have become better and are more prepared for the regular lessons, several student assistants have also received feedback on this from the students. They believe that all the extra experience from the instruments on the simulator makes them better at maneuvering ships, it is also positive for the older students that they have the opportunity to rehearse. Teacher 2 also said that the students who could really benefit from more simulator training had not taken advantage of the offer.

5. **Could this extra offer have been implemented in a different way?**

Teachers 2 and 3 had no particular opinion about this, but teacher 1 replied that it could certainly have been done differently, but that it works the way it is done today. One thing

this teacher emphasizes is that students should be more involved throughout the process, from planning to execution. This respondent also adds that a survey should be conducted on why some student chooses not to participate, are there job reasons? Is it that someone does not dare? Or are there other reasons?

6. **Do you feel that this offer has affected the environment in the classes? In what way?**

Teachers 1 and 3 have the impression that the offer has created engagement, they have observed that there is a good atmosphere and that the students have fun at the exercises, and that the students talk about the offer when they are at school. So, they think it has been positive for the classroom environment, the last teacher (T2) replied that it has certainly not had a negative effect but that it is difficult to say how positive it has been.

7. **- 2nd grade has had a simulator both before and after the offer came, do you feel that these students' self-confidence / sense of security on the simulator has been affected because of the offer?**

All of the teachers believe that the offer has affected the students self-confidence, to a greater or lesser extent. This is because the students get more knowledge of the instruments and more experience from the simulator, this probably makes the students behavior calmer.

8. **Do you feel that the students are more engaged in simulator than before the start of the project?**

Teachers 1 and 2 feel that the students are more engaged now than before, teacher 3 says this is difficult to answer, as the respondent believes that the students are always engaged. Teacher 2 points out that very few in first grade had dropped out of the study if one compares with the year before (when an extra simulator was not offered).

It is said that this may have a connection with the offer or that it is at least one variable that influenced this number. In first grade, there are over 50 students left, Teacher 2 has never experienced this at the college as long as the respondent has worked there.

9. Is there anything else you'd like to add besides what we've talked about earlier?

In conclusion, the teachers say that they are happy that the offer is up and running, and that it is important that we continue the work so that we can build up a good library with simulator tasks. One input from teacher 1 was that it is desirable that more teachers and students are involved in the program, one idea is that we can create exercises that involve other subjects, such as loading technology, ship construction or radio communication, etc.

In the next chapter, we will discuss the findings that have come up against the theory presented in this bachelor thesis.

5. Discussion

In this task, we wanted to find out the following research question: "What effect does increased hours of training on a simulator have on students practical navigational skills?"

To find out that thoroughly, we also chose to include two sub- research questions, to get a good basis of empirical data to answer in the best possible way:

- Whether the student performs better on practical exams
- Whether the students feel that the project makes them more engaged during their studies.

In this section, we will discuss the results together with the theory we have presented and the findings we have made.

At the beginning of this project in January 2021, we had a hypothesis that more quantity training on simulators would ensure that the students were even better than before and that this would be reflected both in terms of better practical skills on simulators, better exam grades and a higher student engagement.

Based on the interviews with the students, the results show that the majority of the students feel better and safer in the simulator, this may be due to the ordinary lessons, NightSim or a combination of these. The students point out that NightSim has specifically influenced their self-esteem and sense of security in the simulator, on the question of whether students feel better prepared for the ordinary hours as a result of NightSim, the majority replied that they did. One student said the following: «*Yes, in part. It's not always the same tasks, but you certainly learn important things that you can take with you in the ordinary teaching.*" Based on these answers, it turns out that the students have become better and safer due to the interaction between NightSim and the ordinary classes. This assertion will be strengthened if one looks at the change in the average grade after the offer arrived, this will be discussed in the next section.

The answers previously presented can be seen in the context of the relatively large increase in top grades in NAV 3, if you compare it with the grades the year before. The average increased by 0.66 character points, and it can then be speculated if this has been affected by the supplementary offer NightSim. The validity of this data against our research questions cannot be determined, as there are many factors that can affect the grade average from year to year. As mentioned in the theory chapter 2.4 learning, this thesis uses Lars Løvlie's definition of learning, which is as follows: *"Learning is shown as more or less change in behavior as a result of experience or exercise"* (Enerstvedt, 1986). The combination of such a large change in grade point average and the answers from the students suggests that the students behavior on the simulator has changed, this, in turn, suggests that the students have learned and acquired more knowledge.

We started the NightSim project before writing this thesis and only then immersed ourselves in learning theory. At the start of the project, we had to decide how the simulator exercises should take place in practice and what role we instructors should have. We made several decisions regarding this, completely unaware that it would turn out that we practiced previously designed models and older learning perspectives.

The model we have practiced is the previously presented model of David A. Kolb, where experience is transformed into learning (Kolb, 1984). This model is presented in *2.4.5 Experiential Learning*. The students conduct a specific exercise on the simulator, then everyone gathers for a debrief, furthermore, it is the task of the students to process and understand the impressions from the exercise and the debrief, when this is done, the students find themselves at the last point of the model. Now the students have acquired experience and knowledge, which affects their behavior and pattern of action in simulators. A specific example that the instructors observed at an exercise was that a student took a turn too late and went ashore, the next week, the same student participated, the task was not the same, but the vessel was similar. This time, the student used the experiences from last week to perform a good and safe turn. In a conversation during the debrief, the student said that the experiences and learning outcomes from the week before led to a change in their pattern of action in the simulator. This is just one of several examples where it has been observed that experiences have been turned into learning.

All the learning theory that we have reviewed contains themes regarding the importance of the instructor's role, and while working on this task, we have realized that the instructor role we have practiced at NightSim is a combination of the instructor's role in both the cognitive and sociocultural learning perspectives. We facilitate the students by holding, planning, structuring, and managing exercises, and the cognitive learning perspective focuses on the fact that knowledge should be "built" inside the student. In the context of what has previously been discussed regarding Kolb's model, it can be said that the cognitive learning process takes place in the "formation of abstract concepts and generalizations" point, where the students themselves form their reality picture and thus learn.

The sociocultural learning perspective focuses on all learning taking place in social settings. At NightSim, students are placed on bridges with both known and unknown students, which leads to students having the opportunity to learn from each other. This makes it possible for the students to acquire individual learning while creating a common understanding, the role of the instructor in this learning perspective is to be a "sparring partner" for the students. Both teachers and instructors have tried to facilitate the offer in such a way that an informal atmosphere is created, precisely so that the instructors can cooperate and work together with the students on the simulator, which regularly happens. The instructors often stop by the bridges and come up with tips, communicate, and perform navigation and maneuvering operations together with the students. In short, Kolb's model is practiced during the exercises, while the instructor's role is to facilitate the students, as well as to be a "sparring partner".

“Simulator training is the absolute most relevant in relation to the job we are going to do," did one student clarify during the interviews we conducted. As earlier mentioned, the simulator is a fantastic tool for testing the theory one has learned in practice and seeing if one can learn the skills behind the theory. Training with a simulator can transfer the competence that the students have acquired in theoretical learning into real-world situations. In other words, the students get to test theories and lectures in practice, and they get to see how it plays out and is done, what consequences it has, and what consequences the actions the students take on the bridge have.

In theory section 2.5, Simulator learning, Halvorsen mentioned that simulator training should be combined with other types of learning to give maximum effect. This is relevant since much of the research that (Dietel, Bewley, Chung, Vendlinski, & Lee, 2012) writes about shows that simulator training gives students the opportunity to learn from each other, each other's mistakes, individual learning and from the student assistants. Furthermore, there is also research showing that simulator training can provide skills such as communication, management (Baldauf, Schröder-Hinrichs, Kataria, Benedict, & Tuschling, 2016), situational awareness and decision-making (Maung C. T., 2019), skills that are hugely important for the future sailor. By increasing the number of hours with simulator training through NightSim, it may be that students will have more time to learn technical and non-technical skills, which will make the students better at implementing practical navigation skills. The results from the practical navigation exam show that the students performed better after we increased the number of hours of simulator training.

In another interview, one student pointed out that it was obvious that the students who have participated at NightSim and hence received more quantitative training would perform better on the practical exam because "the more you train, the better you get". Like Halvorsen, we believe that simulators should be combined with other learning to provide the best results (Halvorsen, 2014). We believe that a good academic environment, good simulator lessons with good tutors and good debriefing, will benefit the most for the students. What we mean by this is that: once the students have learned the theory behind a skill, the skill can be tested in the simulators, where they can get feedback on their performance, this is repeated until the skill is perfected, furthermore, the simulator's feedback and the students assessment regarding this will give a more accurate indication of whether the student has passed the task or not.

As mentioned in the theory section, it is often said that debriefing is the "heart and soul" of the simulator experience (Fanning & Gaba, 2007), this claim is something that we as instructors will largely agree with. As written earlier, it is Kolb's model of learning that has been practiced on NightSim, here, it is seen that without the "observations and reflections"-point, it will not be possible to complete the learning circle. This suggests that debriefing in a simulator context is crucial to the learning outcomes of the students, therefore it is not surprising that 14 out of 14 European simulator centers that participated in a survey

answered "debriefing", when asked what the most important part of simulator training is (Rall, Manser, & Howard, 2000).

Debriefing is carried out shortly after each exercise, this starts a thought process in the students, where they think, discuss, and assess their own and others' performance during the simulator exercise. Based on how the information from the debrief is recorded and processed in the individual, one consequence will be that the individual mindset of the students changes, which in turn can lead to new and better choices being made during the next simulator exercise. Another positive thing about debriefing is that students become more critical in their thinking, as they become "forced" to find errors and deficiencies in their own and others' performance. In short, the use of debriefing is a good and effective tool to increase learning outcomes, experiences, and the professional understanding of the students, we have both observed and experienced this since the start of the project.

When we were students in first grade at Western Norway University of Applied Sciences, simulator training was without a doubt the most fun subject. But as the school-hours were set up, we felt we had too little time on the simulators. The mandatory hours we were given were not enough for us to explore the systems ourselves, and when we had little time for exploration, the hours became very formal and structured, and we wanted to do everything correctly all the time. It turns out that it is not just us who felt that way, from the interviews, a student replied this, *"during the ordinary hours everyone is doing their part, but at NightSim, there is more room to stop and walk away to ask/discuss with the sideman, it's nice that one can learn from each other."*

As previously mentioned in the theory section, engagement among students has a critical role in both performance and learning (Kahu , 2011). The idea behind NightSim being less formal and more fun would promote open communication and peer relationships. This also shows the feedback we have received in the interviews; the students feel it is easier to make friendships, and the students are looking forward to NightSim. One of the respondents replied: *"Yes, for me, it's one of the highlights of the week!"* By forming an environment where students get to test themselves through fun and demanding tasks where they can explore as much as they want, it is allowed to try and fail without it having negative consequences, the engagement around NightSim has become a success.

It also supports the theory of (Tews, Michel , & Noe, 2017) that fun helps to build relationships by putting people in greater and more frequent contact with each other and that fun creates an atmosphere that encourages friendly connection. Where students can seek out others to ask questions and search for skills. In interviews with the teachers, the teachers had the impression that the offer NightSim had created engagement and that they had observed that there was a good atmosphere, and the students were having fun at the exercises, also that the students were talking about NightSim while at school. The teachers believe such an offer has been positive for the class environment. In the theory section, (Bayoumy & Alsayed, 2021) shows that institutions that engage their students to a greater extent should be considered of higher quality that in practice, will increase the students competence and skills. This also reflects the grade increase between NAV 3 from 2020 to 2021.

We are not claiming that NightSim alone has made students better, but that increased engagement can be a factor in the grade increase is entirely possible. Kahn claims that to engage an individual in learning the students must feel safety, meaningfulness, and availability (Kahn, 1990). Meaning that students will seek an environment and people who do not judge them negatively within these three topics.

Furthermore, we defined engagement in theory section 2.6 engagement; engagement is not something physical that you can access at any time. Engagement is more of a feeling about something that really interests you, which makes you excited and happy. NightSim can create an environment that is accommodating, educational and fun, but the very motivation to be engaged comes from within each individual. By facilitating for the students, the engagement may also stay high.

6. Conclusion

In this bachelor's thesis, we have used qualitative and quantitative methods that have given us a foundation for responding to the main research question and the two sub- research questions. The main research question in the assignment is "What effect does increased hours of training on simulator have on students practical navigation skills?".

The two sub- research questions were:

1. Whether the student performs better on practical exams and
2. Whether the students feel that the project makes them engaged during their studies.

We believe that it can be concluded that an increased amount of training on simulators gives the students better practical skills on simulators and in real life. As mentioned earlier, it is not the offer NightSim alone that has provided this, but a combination of the regular simulator lessons and NightSim as an offer to those students who want to get even better.

When NightSim was offered to the students in the autumn of 2021, it was quickly noticed that this was a very popular offer for especially first-year and second-year students. About 40% of the students from these classes received 6-8 hours more training on the simulators than they would otherwise get. Participation from third-year students was relatively low, where 25% of the class participated 1-2 times. This is probably due to the fact that the third-year students do not have a practical exam in navigation during the last year of their education. Furthermore, 33% of the students from this class were also working this semester on ships for 6-8 weeks in the subject integrated practice and were therefore absent from school during this time.

After the results of the practical simulator exam in the subjects Navigation 1 and Navigation 3 were published, we started by analyzing these to see if we saw a change in the average grades both before and after NightSim was started. Navigation 1 is the first practical exam in nautical science education, and it is first-year students who are taking this exam.

Navigation 1 data showed that the average grades were almost the same compared to the previous year when NightSim was not started. That said, there is more focus on voyage planning and knowledge of the instruments on the simulator than there is on maneuvering skills in this practical exam. At NightSim, the focus has mostly been on navigation and maneuvering.

Furthermore, Navigation 3 was investigated in the same way, and here an increase in the average grade of 0.66 grade points was seen. This practical exam is in the curriculum for second-year students. In this practical exam, the main focus is how good the students are at maneuvering a ship. One can therefore assume that NightSim can have made a positive impact on this increase.

When we conducted an in-depth interview, 24 students and 3 teachers in the navigation subjects were recruited. These students represented 33% of all students who had participated once or several times on NightSim. The questions the respondents received were divided into two categories where one dealt with whether they felt they had gained better practical skills on the simulator, while the other part dealt with whether the students felt more engaged in their education. Teachers were also asked approximately equal questions within these two categories.

The key findings from the student interviews about how they felt about practical skills after attending NightSim were as follows:

- The students want to get quantity training to get better at ship simulators. (79% of the respondents answered this)
- The students are very pleased with the offer NightSim as it is today. (88% of the respondents)
- The students feel that they are gaining better practical skills on the simulator, from having participated in NightSim. (83% of the respondents)
- Students feel better prepared for the ordinary simulator exercises in their education. (75% of the respondents)

When students were asked about their engagement, we found the following:

- All of the students replies that they are looking forward to the additional simulator exercises that NightSim offers.
- Students feel NightSim has made it easier to connect with fellow students from both their class and the other classes when participating on NightSim. (83% of the respondents)
- Students feel the NightSim exercises are affecting their confidence and confidence on simulators after attending. (83% of the respondents)
- A majority of the students want the offer to be extended from once per week to twice per week.

When the teachers were interviewed, the following key findings emerged:

- They feel that it is too few mandatory hours on the simulator in the curriculum.
- They mean that simulator exercises provide good training on learning how to navigate, acquiring expertise and getting more quantity training.
- They believe that the offer has had a positive effect on the competence of the students who have participated.
- They assume that the students feel better prepared for the compulsory hours, as they have had more immersing themselves and gained better control of ships and instruments.
- They have observed that the students talk about the evening driving and say it is fun.

The feedback from the students and teachers has therefore been overwhelmingly positive, and the results show that NightSim as a voluntary offer to the ordinary teaching seems to influence the students practical skills, exam grades and engagement in a positive direction.

The NightSim project can therefore be said to be a success, and the school has stated that they want to continue with this model until HVL gets its simulator center in 2025. The plan is then to offer students more accessible access to the simulators, but the exercises created in conjunction with NightSim will be used to provide future students with exciting scenarios.

7. Further Research

- The results presented in this task would be strengthened if one observed the effect of NightSim over a longer period of time, to see if the positive trend is maintained.
- It would give the research greater credibility if more students were examined.
- A follow up research could be to investigate what effect NightSim had on the students taking the subject Navigation 2, which is a subject that runs in the spring semester.
- There are also large amounts of raw data collected from all the interviews in this thesis, which have been anonymized. This material may be of interest to further research in Coast.

8. Sources

Bailey, N., Housley, W., & Belcher, P. (2006, mai 1). *Navigation, interaction and bridge team work. The Sociological Review, 54(2), 342–362.* Retrieved from https://journals.sagepub.com/doi/epub/10.1111/j.1467-954X.2006.00617.x: https://doi.org/10.1111/j.1467-954X.2006.00617.x

Baker, A. C., & Jensen, P. J. (1997). *In Conversation: Transforming Experience into Learning.* doi:10.1177/1350507605058130.

Baldauf, M., Schröder-Hinrichs, J.-U., Kataria, A., Benedict, K., & Tuschling, G. (2016). *Multidimensional simulation in team training for safety and security in maritime transportation.* Journal of Transportation Safety & Security, 8(3), 197–213.

Barsan, E. (2009). *Sea Service Equivalency for Full Mission Simulators Training .* Constanța: Constanta Maritime University.

Bayoumy, H. M., & Alsayed, S. (2021). *Investigating Relationship of Perceived Learning Engagement, Motivation, and Academic Performance Among Nursing Students: A Multisite Study. Advances in medical education and practice, 12, 351–369. https://doi.org/10.2147/AMEP.S272745.* Giza, Egypt: Cairo University, Department of Nursing.

Carolyn, P., & Salas, E. (1997). *Situation assessment for routine flight and decision making. International Journal of Cognitive Ergonomics, 1(4), 315–324.*

Carretta, T. R., & Ree, M. J. (1995). *Determinants of Situational Awareness in US Air Force F-15 Pilots. Situation Awareness: Limitations and Enhancement in the Aviation Environment.* Lindbergh, United states.

Cross, S. (2019). *Quality Aspect of Simulation in MET: 17th International Navigation Simulator Lecturers Conference Hosted by Hochschule Wismar,.* Rostock: Dept. of Maritime studies 3-7 september .

de Água, P. G., da Silva , F. A., Carrasqueira, M. d., & Daniel, J. M. (2020). *Future of maritime education and training: blending hard and soft skills.* Naval, Lisboa, Portugal: Centro de Investigação.

Dey, I. (1993). *Qualitative Data Analysis.* London: Routledge.

Dietel, R., Bewley, W. L., Chung, G. K., Vendlinski, T., & Lee, J. J. (2012). *Key Findings From Simulation and Technology Research (CRESST Policy Brief No. 12). Hentet 6 april 2021, fra: http://cresst.org/wp-content/uploads/SimulationTech_PB12_v3.pdf.* University of California. California: National Center for Research on Evaluation, & Student Testing.

Digital didaktikk. (2013). *Digital didaktikk*. Retrieved from http://digitaldidaktikk.no/: http://digitaldidaktikk.no/refleksjon/detalj/laeringsteorier

Drews, F. A., & Bakdash, J. Z. (2013, september 26). *Simulation training in health care. Reviews of Human Factors and Ergonomics, 8(1), 191–234.* Retrieved from https://journals.sagepub.com/doi/full/10.1177/1557234X13492977: https://doi.org/10.1177/1557234X13492977

Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine : the power of human intuition and expertise in the era of the computer.* New York: Free Press.

Duenger Bøhn, E. (2019, februar 16). *Store norske leksikon*. Retrieved from https://snl.no/empirisme

Emad, G., & Roth, W.-M. (2008). *Contradictions in the practices of training for and assessment of competency: A case study from the maritime domain.* Las Vegas: Macrothink Institute, Journal of Education and Training.

Enerstvedt, R. T. (1986). *Hva er læring?* Oslo: falken forlag.

Fanning, R. M., & Gaba, D. M. (2007). *The role of debriefing in simulation-based learning, Volume 2 - Issue 2 - p 115-125.* Stanford: Stanford university. doi: 10.1097/SIH.0b013e3180315539.

Fredrickson, B. L. (2001). *The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. American Psychologist, 56(3), 218–226.* First Street, NE Washington, D.C.: American Psychological Association.

Fredrickson, B. L., & Cohn , M. A. (2008). *Positive Emotions. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), Handbook of Emotions (pp. 777-796) (3rd ed.).* New York, NY: Gilford Press.

Gekara , V. O., Bloor, M., & Sampson, H. (2011). *Computer-based assessment in safety-critical industries: the case of shipping.* Journal of Vocational Education & Training, 63(1), 87-100.

Halvorsen, F. H. (2014). *Virtual Reality Simulation in Laparoscopic Surgical Education.* Oslo : Oslo Universitetssykehus; https://www.duo.uio.no/handle/10852/40305.

Hancock, P. A., Vincenzi, D. A., Wise, J. A., & Mouloua, M. (2009). *Human Factors in Simulation and Training.* Boca Raton: CRC Press.

Haug, E. (2000). *Er dagens utdanningsforskning basert på behavioristisk tenkning? : drøfting av TIMSS' læreplanmodell fra et matemtikkdidaktisk synspunkt.* Nesna: Høgskolen i Nesna.

Høiback, H., & Ydstebø, P. (2012). *Krigens vitenskap - En innføring i militærteori.* Oslo: Abstrakt forlag AS.

Helle, L., & Bø, I. (2008). *Pedagogisk ordbok: praktisk oppslagsverk i pedagogikk, psykologi og sosiologi.* Oslo: Universitetsforlaget.

Holmen, H. A. (2021, desember 17). *Store norske leksikon*. Retrieved from https://snl.no/: https://snl.no/rasjonalisme

Holte Haug, K. (2016). *Digital historiefortelling i arbeidsplassbasert barnehagelærerutdanning – arbeidsmåte for individuell og kollektiv læring.* Oslo: https://utdanningsforskning.no/.

Hontvedt, M. (2014). *Simulations in Maritime Training: A video study of the socio-technical organisation of ship simulator training.* Oslo: University of Oslo; Faculty of Educational Sciences.

Hutchins, E. (1983). *Understanding Micronesian navigation.* Hillsdale: University of California (University of California San Diego).

Hutchins, E. (1990). The Technology of Team Navigation. In E. Hutchins, *The Technology of Team Navigation* (pp. 191-220). University of California, San Diego.

Hutchins, E. (1993). *Learning to navigate. In S. Chaiklin & J. Lave (Eds.), Understanding Practice, Perspectives on Activity and Context. (pp. 35-63).* Cambridge: Cambridge University Press.

Hutchins, E. (1995). *Cognition in the Wild.* cambridge massachusetts: Massachusetts institute of technology.

Jacobsen, D. I. (2015). Hvordan gjennomføre undersøkelser? In D. I. Jacobsen, *Hvordan gjennomføre undersøkelser?* (p. 15). Oslo: Cappelen Damm AS.

Johannessen, A., Tufte, P., & Christoffersen, L. (2016). *Introduksjon til samfunnsvitenskapelig metode.* Abstrakt.

Kahn, W. A. (1990). *Psychological Conditions of Personal Engagement and Disengagement at Work; The Academy of Management Journal, Vol. 33, No. 4 (Dec., 1990), pp. 692-724.* Briarcliff Manor, New York, USA: Academy of Management.

Kahu , E. R. (2011, August 18). *Taylor & Francis Online.* Retrieved from https://www.tandfonline.com/: https://www.tandfonline.com/doi/full/10.1080/03075079.2011.598505

Kaiser, M. (2000). *Hva er vitenskap?* Oslo: Universitetsforlaget.

Kezar, A. J., & Kinzie, J. L. (2006). *Examining the Ways Institutions Create Student Engagement: The Role of Mission.* Baltimore, maryland: Johns Hopkins University Press.

Kjerstad, N. (2008). *Fremføring av skip med navigasjonskontroll.* Bergen: Fagbokforlaget.

Kjerstad, N. (2015). *Elektroniske og akustiske navigasjonssystemer, 6.* Bergen: Fagbokforlaget.

Kjerstad, N. (2019). *elektroniske og akustiske navigasjonssystemer.* Bergen : Fagbokforlaget.

Kjerstad, N. (2021, November 26). *Store Norske Leksikon*. Retrieved from SNL: https://snl.no/navigasjon

Kjetil Sander. (2020, august 2). *Estudie*. Retrieved from https://estudie.no/: https://estudie.no/sosialkonstruktivisme/

Kolb, D. A. (1984). *Experiential Learning: Experience As The Source Of Learning And Development.* New Jersey, USA: Prentice-Hall.

Kongsberg. (2021, mars 31). *Kongsberg*. Retrieved from https://www.kongsberg.com/no/digital/: https://www.kongsberg.com/no/digital/products/maritime-simulation/k-sim-navigation/

Kuh, G. D. (2001). *The National Survey of Student Engagement: Conceptual framework and overview of psychometric properties.* Bloomington: Indiana University Center for Postsecondary Research.

Lützhöft, M. (2004). *"The technology is great when it works" Maritime Technology and Human Integration on the Ship's Bridge .* Linköping, Sweden: University of Linköping .

Lützhöft, M., & Ljung, M. (2014). *Functions, performances and perceptions of work on ships.* Malmö: World Maritime University.

Lützhöft, M., & Nyce, J. M. (2008). *Integration work on the ship's bridge. Journal of Maritime Research, 5(2), 59–74.* Journal of Maritime Research.

Lützhöft, M., & Nyce, J. M. (2014). *Integration work on the ship's bridge. Journal of Maritime Research, 5(2), 59–74.* Journal of Maritime Research.

Lillebø , R. S. (2018). *Masteroppgåve - Kva kan skape motivasjon i musikalsk sampelprosjekt på musikklinja i vidergåande skule?* Høgskulen på vestlandet.

Matthews, B., & Ross, L. (2010). *Research Methods: A practical guide for the social sciences.* Harlow: Pearson Education Limited.

Maung , C. T. (2019). *Simulation training and assessment in maritime education and training. SIMULATION TRAINING AND ASSESSMENT SYSTEM ON MARITIME EDUCATION AND TRAINING.* Malmö, Sweden: World Maritime University.

Maung, C. (2019). *Simulation training and assessment in maritime education and training.* Malmö: World Maritime University.

Muirhead, P. M. (2004). *New technology and maritime training in the 21st century: Implications and solutions for MET institutions.* World maritime University.

Nilstun, C. (2018, mai 7). *Store norske leksikon*. Retrieved from https://snl.no/: https://snl.no/entusiasme

Nilstun, C. (2021, November 8). *Store norske leksikon*. Retrieved from https://snl.no/: https://snl.no/vitalitet

Noe, R. A., Tews, M., & Marand, A. (2013). *Individual differences and informal learning in the workplace; Journal of Vocational Behavior 83(3):327–335.* DOI:10.1016/j.jvb.2013.06.009.

Orekhov, N. D., & Aizinov, S. D. (2010, november 12). *Simulator training for the high technology ship crews. Gyroscopy and Navigation, 1(4), 258–262.* Retrieved from https://doi.org/10.1134/S2075108710040048

Panksepp, J. (1998). *Attention Deficit Hyperactivity Disorders, Psychostimulants, and Intolerance of Childhood Playfulness: A Tragedy in the Making? Current directions in Psychological Science, 7, 91-98. https://doi.org/10.1111/1467-8721.ep10774709.* First Street, NE Washington, D.C.: American Psychological Society .

Paulsen, G. (2022, Februar 17). *Store Norske Leksikon*. Retrieved from SNL: https://snl.no/DNV

Rall, M., Manser, T., & Howard, S. K. (2000). *Key elements of debriefing for simulator training. European Journal of Anaesthesiology, 17, 516-517.* Cambridge, UK: Cambridge University Press.

Rosness, R., Grøtan, T., Guttormsen, G., Herrera, I. A., Steiro, T., Størseth, F., . . . Wærø, I. (2010). *Organisational Accidents And Resilient Organisastions: Six Perspectives. Revision 2.* Sluppen: Sintef.

Rothbard, N. P., & Patil, S. V. (2011). *Being There: Work Engagement and Positive Organizational Scholarship.* Pennsylvania: University of Pennsylvania.

Sampson, H., Gekara, V., & Bloor , M. (2011). *Water-tight or Sinking? A Consideration of the Standards of the Contemporary Assessment Practices Underpin ning Seafarer License Examinations and Their Implications for Employers.* Maritime Policy & Management 38(1):81-92.

Saus, E.-R., Johnsen, B., & Eid, J. (2010). *Perceived learning outcome: the relationship betweenexperience, realism, and situation awarenessduring simulator training.* Bergen: University of Bergen.

Säljö, R. (2006). *Læring og kulturelle redskaper Om læreprosesser og kollektiv hukommelse.* Oslo: Cappelen Damm akademisk.

Säljö, R. (2010). *Digital tools and challenges to institutional traditions of learning: technologies, social memory and the performative nature of learning.* Gothenburg: University of Gothenburg; Department of Education.

Schaufeli, W. B., & Bakker , A. B. (2004). *Job demands, job resources, and their relationship with burnout and engagement: a multi-sample study.* Utrecht, The Netherlands: Utrecht University, Department of Psychology and Research Institute Psychology and Health.

Sellberg, C. (2017). *Training to become a master mariner in a simulator-based environment.* Göteborg: University of Gothenburg.

Sellberg, C., & Rystedt, H. (2015). *Temporal and Material Conditions for Instruction in Simulation-Based Maritime Training.* Gothenburg, Sweden: University of Gothenburg.

Siddle, B. K. (1995). *Sharpening the Warriors Edge: The Psychology & Science of Training.* San Diego, California: PPCT Research Publications.

Sigmundsson, H. (2010, mai 21). *Forskning*. Retrieved from https://forskning.no/: https://forskning.no/hjernen-skole-og-utdanning-barn-og-ungdom/kronikk-laerere-vet-ikke-hvordan-hjernen-laerer/1181022

Stuedahl Mohn, H. (2013). *Læring gjennom refleksjon - en studie av debriefing etter simulatortrening.* Trondheim: Institutt for voksnes læring og rådgivningsvitenskap, NTNU.

Svanberg, R., & Wille, P. (2009). *La stå! Læring - på veien mot den profesjonelle lærer.* Oslo: Gyldendal akademisk.

Tøsse, S. (2011). *Historie, praksis, teori og politikk om kunnskapsgrunnlaget for voksnes læring.* Trondheim: Tapir akademisk forlag.

Temby, P., & Stephens, A. (2014). *Development and Evaluation of a Novel Method for Basic Marksmanship Training on an Australian Army Course.* Melbourne, Victoria, Australia: Land Division DSTO Defence Science and Technology Organisation.

Tetzchner, S. V. (2021, desember 31). *Store norske leksikon*. Retrieved from https://snl.no/: https://snl.no/internalisering

Tews, M. J., & McConnell Dachner, A. (2010). *Learner Engagement: A New Perspective for Enhancing Our Understanding of Learner Motivation and Workplace Learning.* Briarcliff Manor, New York, USA: Academy of Management.

Tews, M. J., Michel , J. W., & Noe, R. A. (2017). *Journal of Vocational Behavior.* Amsterdam: Elsevier.

Tjeldvoll, A. (2018, september 10). *Store norske leksikon*. Retrieved from https://snl.no/: https://snl.no/pedagogikk

Training Industry. (2022, Januar 1). *Training Industry*. Retrieved from https://trainingindustry.com/: https://trainingindustry.com/glossary/informal-learning/

Trowler, V., & Trowler, P. (2010). *Student engagement evidence summary.* Lancaster: University of Lancaster, Department of Educational Research.

Vygotskij, L. S. (1978). *Mind in society : the development of higher psychological processes.* Cambridge: Harvard University Press.

Wickers, M. P. (2010). *Establishing the Climate for a Successful Debriefing. Clinical Simulation in Nursing.* Wilmington: Los Angeles Harbor College.

Wikipedia. (2022, Februar 1). *Wikipedia*. Retrieved from https://no.wikipedia.org/wiki/Portal:Forside: https://no.wikipedia.org/wiki/Artefakt

Wittek, L., & Brandmo, C. (2016). *Når læring er det viktigste, undervisning i høyere utdanning.* Oslo: Cappelen Damm Akademisk.

Østbøll, K. K. (2009). *Simulator i lederutdanning : en undersøkelse av kadetters oppfatninger og vurderinger av den taktiske treneren som læremiddel i Krigsskolens lederutdanning.* Oslo: Universitetet i Oslo, det utdanningsvitenskapelige fakultet.

9. Attachments

9.1 Attachment 1 - Consent form

1. Background for the task:

Our theme is based on the project COAST. This is a collaborative project where the four educational institutions that offer nautical education collaborate to offer "The World's Best Simulator Education". In this collaboration, researchers, teachers, representatives from the business community and students work together to achieve this goal. We believe that increased access to simulator centres will lead to students gaining better skills and experience, by spending more time in the simulator than previous students have been. We as a group have worked a lot with COAST, where we have, among other things, started the project "Evening driving at simulator center" here in Haugesund. This has proved to be a popular offer, as all the available places have been used by the students at all exercises.

Based on this, we want to examine whether increased quantity training on simulators has an effect on the students' practical competence, in the form of exam results on the practical exams. The way we want to do this is to look at previous exam results before the "Evening Exercises" was initiated and the exam results published at the end of the autumn semester 2021. We also want to investigate this topic, by asking students and teachers if they observe some kind of effect.

2. What personal data will be stored and processed:

- Name
- Telephone number
- Email address
- Audio recording
- Campus
- Position (not geographically)

3. Storage and processing of personal data:

All data collected will be stored on an external hard drive. On this hard drive we will store the information in encrypted folders to increase security.

4. Storage time of personal data:

All data will be deleted after the task is completed. The date for this is 30.06.2022.

5. Who has access to your personal data:

Bachelor's thesis group
- Andreas Tøsse
- Sander Rossland
- Andreas Flo

Supervisors
- Margareta Lützhöft
- Meric Karahalil

6. **Contact information for data protection officer at HVL Haugesund**

If you have any further concerns or questions to this project, you can also contact HVL data protection officer:

Trine Anniken Larsen
Phone: 55 58 76 82
Mail: trine.annikken.larsen@hvl.no

7. Data controller for the project

Høyskolen på Vestlandet

Fakultet for ingeniør- og naturvitenskap

Institutt for maskin- og marinfag

Phone: 52 70 27 29

8. Your rights to withdraw your responses from the project:

So long as you can be identified int the collected data, you have the right to:

- Access personal data that is being processed about you
- Request that your personal data is deleted
- Request that incorrect personal data about you is corrected/rectified
- Receive a copy of your personal data (data portability)
- Send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data.

If you choose to withdraw your answers for the project, this is fine. We will then delete all information and responses you have provided to the project from our database. If you wish to withdraw, please notify one of the group's members in writing.

9. Publication of the project:

The thesis will be published on 01.05.2022.

8 Change of personal data

If your personal data changes during the time period specified in point (4), please contact us by email or phone. Contact information will be disclosed on the last page of this document.

9 **Do you agree that we process and store your personal data for the period specified in point (4)? And that we can publish your responses anonymously?**

YES	NO

10 **Do you consent to the interview being recorded, stored, and processed for the period of time specified in point (4)?** * | YES | NO | | | ** |

*This is done for the purpose of being able to reproduce your answers as precisely and accurately as possible.

** If you have answered "NO", we will only take notes from your interview.

By signing hereunder, you agree that you have read and understood this document, you also agree that you give those involved in the project access to store and process your personal data, as well as publish your responses in such a way that it cannot be linked to you as an individual.

....

Respondent Sander Rossland

HVL

Contact information for the Survey Leader:

Sander Rossland
Leitevegen 1D, 5522 Haugesund
Phone: +47 45 27 39 23
586428@stud.hvl.no

9.2 Attachment 2 – Interview guide for students

Introduction

- Thank you for the respondent's support
- Oral review of consent form
- Signature (on both copies)
- Explain the content and length of the interview

Questions

Practicality:

- What grade level are you in?
- Why did you take part in the evening driving at the simulator?
- What are your thoughts on the offer of evening driving at the simulator?
- Do you feel that your competence has improved as a result of the offer?
- Do you feel better prepared for the ordinary hours because of the extended offer?

Engagement:

- Are you looking forward to the extra simulator lessons that take place outside the schools curriculum?
- Do you feel that the offer has made it easier to build social relationships with your fellow students?
- - (to 2nd graders) Would you say that this offer has affected your self-confidence/sense of security on the simulator?
- Do you have any thoughts on what this offer is like and has been like? Is it good as it is today, or should it in your opinion be reduced or expanded?
- Is there anything else you'd like to add besides what we've talked about earlier?

Thank you for your participation!

9.3 Attachment 3 – Interview guide for lecturers

Introduction

- Thank the respondent for showing up
- Oral review of consent form
- Signature (on both copies)
- Explain the content and length of the interview

Questions

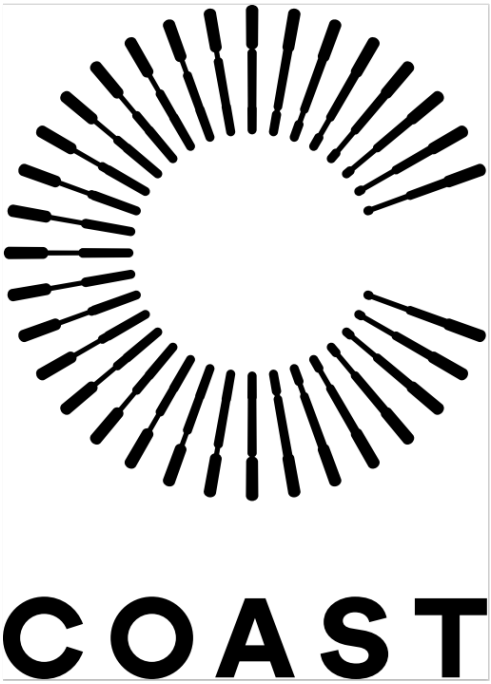
Practicality:

- What position do you have at HVL?
- Why have you engaged in extra offer on the simulator?
- How do you feel that this offer has affected the practical competence of the students?
- Do you feel that the students are better prepared for the regular simulator lessons because of the extra offer?
- Could this extra offer have been implemented in a different way?

Engagement:

- Do you feel that this offer has affected the environment in the classes? In what way?
- - 2nd grade have had simulator both before and after the offer came, do you feel that these students' self-confidence / sense of security on the simulator has been affected because of the offer?
- Do you feel that the students are more engaged in simulator than before the start of the project?
- Is there anything else you'd like to add besides what we've talked about earlier?

Thank you for your participation!


COAST