UiT The Arctic University of Norway

Faculty for Humanities, Social Sciences and Education.

“Regardless if you succeed or not, interdisciplinary teaching is not a wasted effort.”

Benefits, challenges, and facilitating factors for interdisciplinary teaching.

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Abstract

This study looks at the benefits of interdisciplinary teaching for students and teachers, and investigates what teachers believe needs to be facilitated in order to promote interdisciplinary teaching in lower secondary school.

This study is a cross-subject collaboration between English didactics and Social Studies didactics. Our findings are based on empirical data gathered through interviews of teachers and on previous research on the benefits of interdisciplinary teaching. These show that both teachers and students experience a heightened sense of motivation when interdisciplinary teaching is implemented into teaching practice. Students also develop the ability to see and understand connections between school subjects, which is an important condition in in-depth learning. The results describe two different approaches for working with interdisciplinary teaching. To further develop interdisciplinary practice in schools, school leadership has to facilitate teacher cooperation and create guidelines for planning and reflection. This study may contribute to a wider understanding of how interdisciplinary teaching can be used, and we hope it can inspire other teachers and school faculty to start the development of an interdisciplinary practice.

Sammendrag

Denne studien ser på fordelene ved tverrfaglig undervisning for elever og lærere, og vil undersøke hva lærere mener må legges til rette for å fremme tverrfaglig undervisning på ungdomsskolen.

Studien er et tverrfaglig samarbeid mellom engelskdidaktikk og samfunnsfagdidaktikk. Funnene våre er basert på empiriske data som er samlet inn gjennom intervju av lærere og på tidligere forskning som er blitt gjort om fordeler av tverrfaglig undervisning. Funnene viser at både elever og lærere opplever økt motivasjon når tverrfaglig undervisning er implementert i undervisningspraksis. Elever utviklet også evnen til å se og forstå koblinger mellom fagene, noe som er en viktig del av dybdelæring. Resultatene våre beskriver to forskjellige måter å tilnærme seg tverrfaglig undervisning. For å utvikle en tverrfaglighet praksis i skolen, må skoleledere legge til rette for samarbeid mellom lærere og lage retningslinjer for planlegging og refleksjon. Denne studien kan bidra til en bredere forståelse av hvordan tverrfaglig undervisning kan bli brukt, og vi håper den kan inspirere andre lærere og skoleledere til å starte utviklingen av en tverrfaglig praksis.

Acknowledgments

Five years at the University of Tromsø is coming to an end and it has all come down to this.

It has been a time full of experiences which have developed us as human beings and as future teachers. This thesis is something we believe will help us in furthering our teaching practice, and we hope it can help others develop their knowledge on interdisciplinary teaching.

We value the opportunity we were given by the administration of ILP to write a master's thesis with a cross-subject collaboration.

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1 Introduction

> The school subjects need a renewal to meet future requirements for competence in work life and in society. For education to contribute to students' mastery of life as a private person, a citizen and in professional life, schools have to, in cooperation with the home, facilitate for students to develop many different competences and a good understanding of what they learn. (The Ludvigsen Committee, 2015)[our transl.]

We live in a society that is in continuous motion and our education has to adapt to these changes. There are problems in our world that are impossible to solve without the contribution of multiple fields and perspectives. It may require new knowledge that does not yet exist. But how can we teach future generations something we have little knowledge about? Teaching students how to learn is more important than ever as more and more new information is made available. Students have to be able to navigate and, in some cases, produce reliable information to find the answers needed to better humankind. To do this, it may not be enough to learn subjects separately. How can you explain sustainability without touching on both Science and Social studies? How can you learn to communicate in a global world without knowing the lingua franca and learn about religion, culture, gender, and sexuality? Interdisciplinary teaching may be one way to approach this challenge as we progress into an unknown future. This is the inspiration for our study. As future teachers of English and Social Studies, we want to partake in finding ways to make interdisciplinary teaching more appealing and easier to implement into the school day. We also believe that both English and Social Studies play an important part in further implementing interdisciplinary teaching into the Norwegian classroom.

The Norwegian Directorate of Education and Training [Utdanningsdirektoratet] describes Social Studies as a "central subject for students to develop into participating, engaging, and critical thinking citizens" (Norwegian Directorate for Education and Training, 2020). The students are also to explore their identity and local community, as well as national and global issues. Even with its overarching and societally important issues and themes, a debate about the subject's place in upper secondary education and training has recently arisen. A suggestion to move the subjects of Social Studies and History from being compulsory subjects to voluntary subjects which the students chose themselves, is the cause of the debate. White Paper 21 (Ministry of Education and Research, 2021), which the suggestions are based

upon, wants fewer compulsory subjects to make room for the students to immerse themselves more in four main subjects. This can point to a limited perception of what Social Studies is and how it contributes in creating a deeper understanding and is therefore viewed as a less important subject. Our opinion of Social Studies differentiates from this view. We want to accentuate the importance the subject holds, not only in the classroom but in everyday life as well. Particularly its relevance within an interdisciplinary context.

The revised curriculum emphasizes new sides to the English subject, which promote the students' interest, involvement, and opportunity to explore the subject. English is far more than simply language learning. It brings with it important themes such as cultural understanding, communication, globalization, the ability to navigate and understand a highly diverse world. The new focus aims to create a consciousness within the students about how and why they use the English language both in the classroom and outside. This brings us to *intercultural competence*. Intercultural competence can be understood as the ability to communicate in an appropriate and purposeful way with people from a different cultural background (Dypedahl, 2007 p.4) [our transl.]. English as a language has the status of being a lingua Franca which means that the availability of texts with a different cultural perspective is increased. Language teachers have the ability to teach about cultures outside of the English-speaking world. The world is a large place, and one role of the English subject is to give the students insight into this expansive world.

All subjects can be implemented in an interdisciplinary project, both as main subjects and tools for instruction. The difference in these is that main subjects often set the standards and supply the content of the project and tool subjects provide the methods and procedures. Most subjects have both thematic content and methods that can be incorporated into interdisciplinary projects, depending on what is being taught and how. Social Studies as a subject contains multiple themes relevant for other subjects. It then becomes easy to implement Social Studies in interdisciplinary teaching. English can be used as the language of instruction, and the subject becomes a tool to learn topics from other subjects. However, as the subject has evolved to adapt to modern times, English has become a subject with its own goals and issues, especially in relation with the addition of intercultural competence. This is also reflected in the new curriculum for English, here quoted from the section on its relevance and central values:

> English is an important subject when it comes to cultural understanding, communication, all-round education and identity development. The subject shall give the pupils the foundation for communicating with others, both locally and globally, regardless of cultural or linguistic background. English shall help the pupils to develop an intercultural understanding of different ways of living, ways of thinking and communication patterns. (Ministry of Education and Research, 2019)

Our interest for interdisciplinary teaching stems from our own experiences from when we ourselves were in school. Our experiences from participating in interdisciplinary school projects were largely positive and motivating. This perspective followed us into university. We both have experience with planning and teaching smaller interdisciplinary projects from our time as student teachers. All of this accumulated into a desire to research and write about interdisciplinarity. We were originally going to write masters in different subjects, however our shared interests brought us together. After some thought and consultation, we decided to request permission to write an interdisciplinary master between English and Social Studies. However, we do believe that the results of our study are transferable to all school subjects, as interdisciplinarity is relevant to all parts of education.

We wanted to look at interdisciplinary teaching in Norwegian schools. How are teachers planning and executing interdisciplinary lessons, and more importantly what do they believe are important factors for interdisciplinarity to be possible in schools? We wanted to ask teachers who have a passion towards this topic and have implemented interdisciplinary teaching into their own practice to share their experiences and what they have learned. Another point we wanted to discuss was what benefits interdisciplinary teaching can have on students and teachers. Teachers' first-hand experience with the topic is something we believe to be valuable to our study because it can reflect upon how interdisciplinary teaching works in practice. We also want to look at previous research. To summarize what we want to uncover in our study, we have constructed this research question:

> *What are the benefits of interdisciplinary teaching and what factors are needed to promote it in Norwegian schools? What are teachers' experiences with interdisciplinary teaching and what do they believe need to be facilitated in order to promote it*?

The study takes a dual approach: 1) a theoretical discussion of the presumed benefits of interdisciplinary teaching, and 2) a discussion based on our empirical findings which are grounded in our interview data from six teachers with experience in interdisciplinary teaching.

Interdisciplinary teaching has been relevant since the early 1900s and has been discussed on and off in that time period. In this study we use an understanding that closely relates this topic to the new curriculum LK20. The understanding we use presents how interdisciplinary teaching can be implemented in school practice, and that there are different degrees of interdisciplinarity. The different degrees of interdisciplinarity are illustrated through a model which shows various possible ways to implement interdisciplinary teaching into the classroom. There has been a new resurgence of interdisciplinarity in the school over the past few years. Bringing meaning to learning is encouraged, and critical thinking and metacognition are both required in teaching students how they learn.

This current focus introduced the new term *in-depth learning.* The understanding of in-depth learning, according to the Norwegian Directorate of Education and Training, is the ability to connect knowledge and skills to a multitude of real-life situations. This means that students should learn topics across subjects to make what they learn more cognitively accessible. Because it is established that one should facilitate in-depth learning to ensure students' mastery of new situations and to promote a lasting understanding of different topics and subjects, it is natural to assume that there will be a surge of schools who will start the process of implementing interdisciplinary teaching (The Norwegian Directorate of Education and Training). It is therefore important to find out what elements are considered vital when working with interdisciplinarity, and how these elements affect the different parts of interdisciplinary work. A considerable number of teachers have been working with interdisciplinary teaching for a long time, however, it is currently not a general practice in Norwegian schools. The teachers who have previously worked with interdisciplinarity possess knowledge that is valuable for furthering the education in Norway.

We are going into this project with the mindset that interdisciplinary teaching is beneficial to the students and their future, as we believe that interdisciplinary teaching promotes in-depth learning.

1.1 Background: A Revised Curriculum

In the fall of 2020, the process of introducing the revised curriculum into the Norwegian school system began. The renewal of the curriculum from 2006 presented a new focus concurrent with some of the elements from the previous competence aims.

1.1.1 NOU 2015:8

In 2017 the first phase of revising the curriculum for the Norwegian education system started. The decision to revise the curriculum were based upon White Paper 28, which again were based on two official review documents made by the Ludvigsen Committee, NOU 2014:7 and NOU 2015:8. The latter document presents which competences are deemed important by the committee for the students' future. According to the document NOU 2015:8, the education should contribute to the development of knowledge and competence needed to become active and participating citizens in an everchanging society (The Ludvigsen Committee, 2015). The document states that the development of the students' identity and their personal advancements to become independent are important aspects that the Norwegian school system should support. The education should be based on values and norms established by the society to ensure that its students develop the necessary skills to be active members of society. Values, attitudes, and norms change with the times. The educational system plays an important role in supporting the values and norms society is built upon, but it is also a key player in affecting the changes. It is therefore essential that the educational system changes continuously and that the curriculum is revised to better suit today's students. Change and further development within the subjects and the curriculum is a condition for the student´s potential to be realized. Students' educational development is connected to society´s development, because of how active and closely the school interacts with its local community.

The committee presents four competence areas in the document, which they argue should act as a base for the new and revised content. The four areas are *subject specific competence, learning competence, competence to communicate, interact and participate,* and lastly the *competence to explore and create*. The four areas combine cognitive, practical, and social skills with emotional learning and development. We will be focusing on subject specific competence and learning competence. The skills combined in the competence areas can be promoted through interdisciplinarity in the classroom, we explore this further in the Chapters 2, 3, and 4.

The area of *subject specific competence* aims to provide the students with adequate knowledge of the most prominent methods, principles, and terms each subject consists of. The committee argues that a subject's methods and way of thinking is an important part of what they call cornerstones. Cornerstones refers to the subject's core content and competence. The cornerstones are of both practical and theoretical nature, which means that every subject has a theoretical and a practical side. In our opinion, the cornerstones are important to promote in-depth learning within the individual subjects and are therefore also the basis of interdisciplinary teaching.

Learning competence is according to the Ludvigsen committee the students' ability to be reflective of their own learning. Developing a learning competence entails create an awareness in the students about their own learning, and to teach them to be reflective of the purpose of their education and how they learn. Doing this they obtain what is called metacognition. This competence area should make them more able to reflectively solve challenges, according to the committee. Metacognition is a condition within in-depth learning. To develop a deeper understanding within a specific subject or across different sections of subjects, the students are required to obtain knowledge and be able to reflect on what they have learned. Metacognition is important in all school subjects, whether the subject is practical, theoretical, or esthetically based.

In-depth learning does not mean a constant deeper degree of learning for all students in all subjects. The instruction should be adapted to each student through level differentiation. The committee argues that to be able to learn something more thoroughly, the students need to be actively involved and be able to make decisions about their own education. The school's responsibility is to facilitate for the best possible learning situation for its students. For that to happen the committee argues for sufficient time for specialization, challenges tailored to each individual student, and that the teacher provides the students with support and guidance. According to the Ludvigsen Committee, in-depth learning will contribute to the students' ability to master the key elements in each subject and make it easier to transfer knowledge from one subject to another. When the school facilitates for its students' individual learning processes, it creates a deeper understanding which can lead to a strengthened feeling of motivation and achievement. Interdisciplinary teaching is a way to achieve in-depth learning and to exercise the ability to transfer knowledge across subjects. Creating broader connections

between themes is an important reason to why teachers conduct interdisciplinary teaching; this is something we will revisit in Chapter Four, Results and Findings.

1.1.2 LK20

The revised curriculum of 2020 is a renewal of the content of each subject within primary and secondary education in Norway. The renewed curriculum is more precise and concentrated on what is most important for the students to learn, according to White Paper 28, which the renewal is based upon (Ministry of Education and Research, 2016). The General Section of the curriculum of 2006 is now replaced by The Core Curriculum. The Core Curriculum aims to provide educators with directions for teaching and training in the subjects. The Core Curriculum consists of three main chapters*: Core Values of the Education and Training, Principles for Education and All-round Developmen*t, and *Principles for the School's Practice*. The values and principles of the school system is based on the objectives clause of the Education act, which has the purpose of expressing values that unify us as a society (Norwegian Directorate for Education and Training, 2017). *Human Dignity, Critical Thinking and Awareness,* and *Democracy and Participation* are some of the values that are listed as core values. The values should have a presence in each of the school subjects because they represent the foundation our democracy is built upon, according to the Norwegian Directorate of Education and Training. The revised curriculum has fewer and more explicit competence aims than its predecessor. In addition to more specified competences aims, each subject curriculum has a section on core elements. The core elements act as guidance to which priorities should be made in each subject in terms of content. The subjects in elementary and secondary school are revised to provide Norwegian students with better and deeper learning, as well as enhanced understanding of the world they live in.

Another change from the LK06 curriculum is the inclusion of interdisciplinary topics. The topics *Health and Life Skills, Democracy and Citizenship,* and *Sustainable Development* are based on societal challenges and the intention of including them in the curriculum are for the students to develop their understanding of how different subjects are connected. By connecting the interdisciplinary topics to the competence aims, one can ensure that each subject's integrity and identity is still intact when working across subjects. The interdisciplinary topics are connected to several of the different subject's competence aims, which ensures a clearer connection across the subjects when working with one of the topics.

The development of the students' subject specific competence is highly focused on in the revised curriculum and it is closely related to the interdisciplinary topics.

In-depth learning is given a more prominent position in the renewed curriculum. This is to be ensured through fewer and more specified competence aims, as well as through integrating the interdisciplinary topics in each subject. The goal is to facilitate the development of fundamental competences and skills in the students, transversely between the subjects. There is also to be a strengthening in students' involvement in their own learning process to activate metacognition. This is compatible with the core element *Learning to Learn* in the Core Curriculum which states that the school should help its students to reflect and understand their own learning.

1.2 Outline of thesis

In Chapter 2 we explore what previous research has established as benefits of interdisciplinary teaching and bring in central terms and perspectives related to the field. In the same chapter we explain central terms and perspectives of particular relevance for our study. In Chapter 3, we present our method of research. In this part we will have a closer look at the research process and some ethical considerations. Following in Chapter 4 we present our findings. Next in Chapter 5, we discuss these findings in relation to the theory and previous research and connect it to our own reflections. Finally, in the concluding Chapter 6 we summarize our findings and propose some avenues of further research related the topic.

2 Theoretical and Thematic Field

In this chapter we present central terms and perspectives which are important to our understanding of interdisciplinary teaching. Because we want to identify the supportive elements that are necessary for interdisciplinary teaching, we look at previous research to see how interdisciplinary teaching can be done and what benefits it can have. Our selection of research material is based on finding factors and reasons to why teachers want to conduct interdisciplinary teaching. We will also present how Senge's five disciplines are important to changing and developing teaching practice.

2.1 Interdisciplinary teaching

Interdisciplinarity has existed since the early 1900s. It has since faded in and out of popularity periodically, even though there is substantial evidence that students benefit from an interdisciplinary curriculum (Campbell & Henning, 2010). Several different understandings of interdisciplinary teaching, in the form of an integrated curriculum, have been proposed during that time. The term has recently experienced a resurgence due to the introduction of the new curriculum, and one can see tendencies towards interdisciplinarity in the use of theme-based instruction and learning in context.

Bolstad (2020) notes that interdisciplinary teaching can be used to achieve in-depth learning, though it is not a requirement. Some premise for in-depth learning are continuous involvement with the school subjects, that students find the schoolwork meaningful, and that students learn to discuss and cooperate on different subject matters. An interdisciplinary approach facilitates all those points.

2.1.1 Definition and understanding

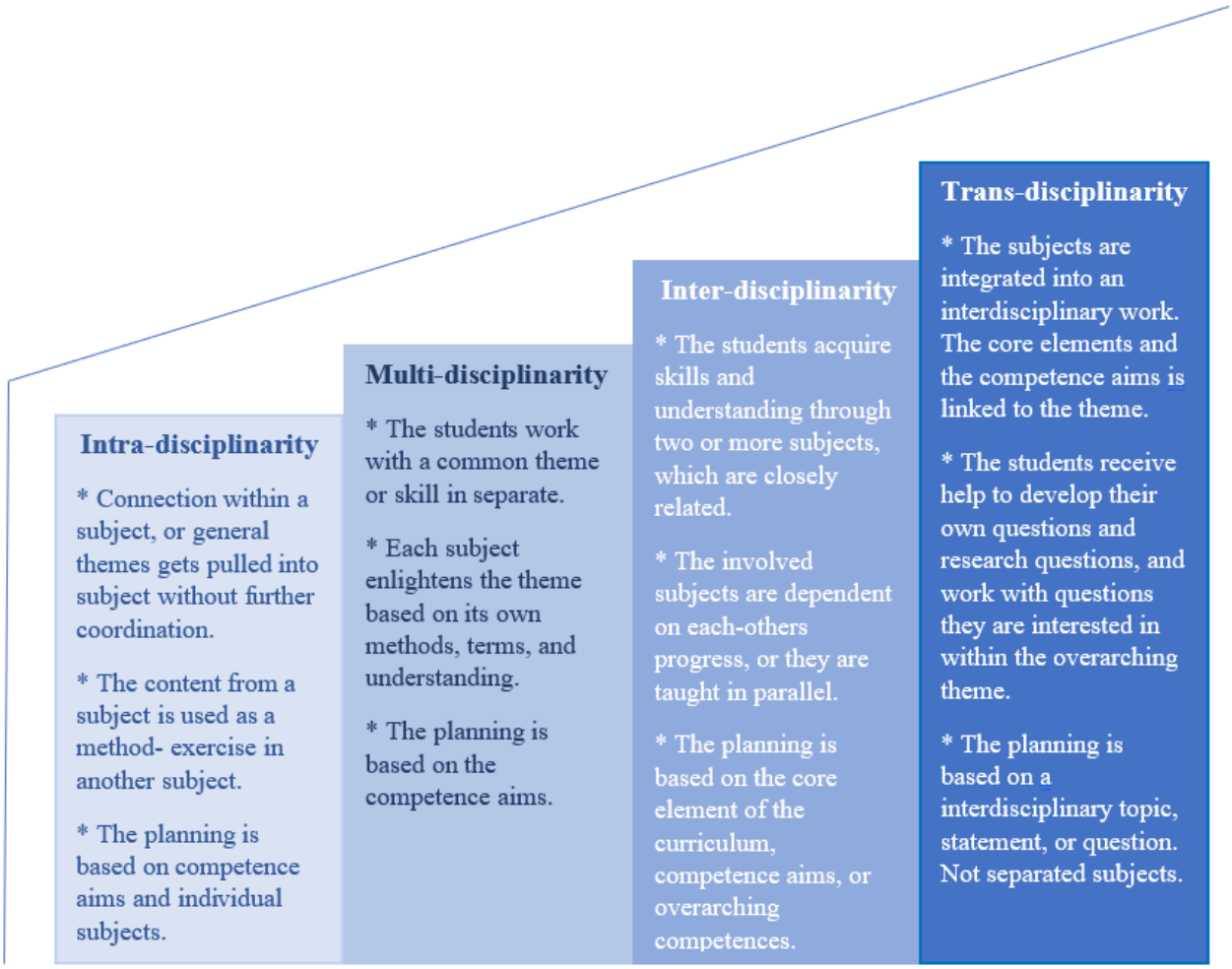
Interdisciplinarity can be understood in multiple ways. These different understanding are presented by Bolstad (2020), where the author has comprised research done on the field. He connects the research to the NOU and the new revised curriculum. Bolstad also refers to Norwegian teachers with experience in interdisciplinary teaching. One understanding of an integrated curriculum as it is presented in Costley (2015) is by Malik and Malik (2011). They defined it as the organization of teaching matter and to connect subjects which are usually separated. Another definition focuses on how learning is organized around problems and issues that is relevant for the students (Campbell & Henning, 2010 in Costley, 2015 p.2).

Integrated curriculum can be understood as the application of skills and vocabulary from more than one subject to teach a central topic or theme (Shriner, Schlee & Liber 2010, in Costley, 2015). The term can be understood as enhancing personal and social integration through an organization of curriculum to focus on important problems and issues. These issues are identified in collaboration with the students (Beane, 1997 in Costley, 2015 p.2). Bolstad (2020) combines these understandings and organizes them into a model. He exemplifies them and suggest how these understandings can be applied into Norwegian schools.

Interdisciplinary themes often touch on central societal challenges that cannot be solved by only one field of study. Examples of such themes/topics are the interdisciplinary themes introduced in the new curriculum, LK20: Health and Life Skills, Democracy and Citizenship, and Sustainable Development. These topics are intended to regulate the content of school subjects and involve all of them. There is also an understanding of interdisciplinarity as a pedagogical approach to organize teaching activities and education. School subjects are linked together in different degrees. The overarching themes encourage an interdisciplinary approach to teaching because they are relevant to multiple subjects (Bolstad 2020, p.26).

Bolstad (2020) explains that schools can work with interdisciplinarity in two ways. One way is to separate the subjects, which is the traditional approach to teaching in Norway, and implement relevant content applicable to the interdisciplinary themes into the teaching material. An example of this can be using topics from Social Studies in the English classroom. Another way is to reverse the order by starting with an interdisciplinary theme and then pulling in the relevant subjects. Examples of this can be projects where school subjects work together to teach about a topic or a theme such as diversity, which can be connected to the interdisciplinary theme Democracy and Citizenship. These two approaches do not cancel each other out, because schools can work interchangeably with them. Bolstad (2020) distinguishes between *moderate interdisciplinarity* and *integrated interdisciplinarity*. Moderate interdisciplinarity is based in competence aims and overarching competencies while integrated interdisciplinarity is based on themes that include multiple subjects and preferably are of interest to the student.

Interdisciplinarity can be categorized into four different steps as presented by Bolstad (2020) depending on the degree of interdisciplinarity. The four degrees of interdisciplinarity are based on several studies from research field (Bolstad 2020, s. 30). We will be referring to the steps as the *interdisciplinary staircase* as Bolstad (2020) does not give a name for this model. Bolstad argues that one degree of interdisciplinarity is not preferred over the other. The choice of method depends on what the students are to learn and the context in which the learning takes place. The different steps, from a lower degree of interdisciplinarity to a higher degree, are presented here in this model:



Degrees of Interdisciplinarity. A model after the Kaufman/Moss/Osborne study of 2003 and the Drake/Reid study of 2018, presented in Bolstad (2020)

An *intra-disciplinary* approach, or fusion, is the simplest form of interdisciplinarity. It is when teachers agree to base their lesson material on a common theme for a period of time without any extensive communal planning. When doing this, teachers connect topics from different school subjects. Establishing this simple form of interdisciplinarity can be done by helping the students see links between topics in the teacher's own subject in addition to another subject, or by using content and/or methods from other subjects to explain something in their own subject.

Multi-disciplinarity is when students work with the same theme in different subjects. There is a closer collaboration between teachers on this step than with the intra-disciplinary approach. The subjects are still separated and made distinct by the fact that the theme is approached with the specific methodology and structures of each respective subject. The planning of the interdisciplinary work is often based in the school subjects and not in overarching themes. This type of interdisciplinary cooperation between the subjects does not disrupt the traditional division of the school subjects. Teachers and students can still follow the established schedule (Bolstad 2020, p.31). An example of this can be if the students are learning about the industrial revolution in Social Studies and how it improved the quality of life for many, and then learn about simple machines in their Science class.

Inter-disciplinarity is when students acquire skills and understanding through working with two or more subjects that are closely related. An example can be reading comprehension which is both required and developed in Norwegian and Social Studies through reading and analyzing different texts. In this example the lessons can have parallels to each other. There are also times when subjects are dependent on each other's progression. The planning for inter-disciplinary lessons is based in overarching competencies, on competence aims or on core elements of the respective subjects (Bolstad 2020, p.31)

Trans-disciplinarity or *curriculum integration*, the highest form of interdisciplinarity, transcends the traditional understanding of subjects. The lessons are formed by a "real-world problem" that needs input from multiple subjects. There is no longer a clear separation between the subjects, the theme or problem becomes the main focus and the basis of the teaching. Examples of such themes are the interdisciplinary themes introduced in the new curriculum. The teaching material flows between the subjects, and the subjects act as one to

best teach the students (Bolstad 2020, p.31). Students are encouraged and expected to ask questions and find problems to solve, in which they have an interest. The goal is not necessarily that all the students acquire the same knowledge, but that they learn to ask questions and find answers. The students take an active part in forming the content of the lessons. It is not the teacher who presents the topic questions and tasks; they are created by the students. This is distinctly different from the approach where students center their work around a theme that the teacher has decided. Instead, it becomes a democratic process that the students are an active part of. For curriculum integration to be possible, educators have to be open to co-determination between students and teachers on what and how the students are to learn (Bolstad 2020, p.32). An example of this kind of interdisciplinarity is using a project-based working method which is grounded in student participation.

2.1.2 Thematic instruction and interdisciplinarity

The terms thematic instruction and theme-based instruction are used interchangeably and entails centering instruction around themes. This is also done in interdisciplinary teaching. Although these terms are linked, theme-based instruction does not have to be interdisciplinary. Interdisciplinary teaching is, however, often theme-based.

Lederman and Niess (1997) underline the importance of teachers being able to teach topics that are important to the discipline of their respective subjects, without having to be concerned with a theme or problem. It is generally accepted that relating subjects to real-life situations and interests eases the learning process. This is addressed by Brevik, Skarpaas and Isaksen (2020) in their chapter on vocational English, in the Tessier and Tessier (2015) study and in Nutting (2001). Breivik, Skarpaas and Isaksen refer to a study where an English teacher used vocational topics to help her students learn English. She planned the lessons around a theme that the students were familiarity with. By doing this, the students could focus on learning to use the target language. The goal of the lessons was to develop the skill of communicating in the target language. The study argues that communication based around a familiar theme can show the students' competence more accurately than basing the communication around an unknown one.

Penna-Baskinger (2018) connects thematic instruction to interdisciplinary teaching. She argues that teachers can base their lessons around themes that are connected to multiple

subjects. The teacher can then specify to the students why the theme is relevant for that subject and teach integral parts of the discipline in a way that is perceived as meaningful by the students. The importance of explicitly linking knowledge and skills between subjects is something we also see in our findings.

2.2 Critical thinking as a condition within in-depth learning

The Norwegian Directorate of Education and Training uses the term "in-depth learning" in their curriculum, and the definition of the term is based upon the reports by the Ludvigsen Committee (The Ludvigsen Committee, 2015). In-depth learning is defined as gradually developing knowledge and a lasting understanding of methods, terminology, and connections between different subjects (Norwegian Directorate for Education and Training, 2019). This understanding of the term also entails a reflection upon one's own learning and an ability to use acquired knowledge across different situations. The school has a responsibility to ensure that its students acquire these skills.

Critical thinking is a key element within in-depth learning. The school is an important arena for the development of social engagement, critical thinking, and participating citizens. The education in Norwegian schools (grade 1-10) shall provide its students with the ability of critical and scientific thinking. Critical thinking is the ability to actively evaluate the constant flow of information that we experience in our everyday life. This notion of critical thinking can be linked to American philosopher and educator John Dewey`s definition of reflective thinking: "Active, persistent and careful consideration of a belief or supposed form of knowledge in the light of the grounds which supports it, and further conclusion to which it tends"(Dewey, 1997, p.6). Critical and reflective thinking is therefore an active choice of evaluating the information at hand, instead of resorting to blind belief. Critical thinking also entails the ability to understand connections. In order to assess an issue critically, one can not only look at an isolated component. The underlying contexts and different perspectives that influence the isolated component must be considered, in order to be able to form a reflective opinion (Ferrer, Wetlesen , Jøsok, Ryen, & Aas, 2019)

Critical thinking serves an educational purpose which is to provide the students with an understanding of how knowledge is developed, and to assess different sources of knowledge. Critical thinking also refers to how we apply reason in an inquiring and systematic way when

working with practical challenges, phenomena, expressions, and forms of knowledge. This is described in the core curriculum under the subpoint *Core values of education and training* (Norwegian Directorate for Education and Training, 2017). These values reference critical thinking and ethical awareness as key in the education of reflective and responsible human beings and their development of good judgment. According to the Norwegian Directorate of Education and Training, training in critical thinking should create an understanding of how new information and newfound knowledge may be influenced by a point of view or personal convictions and experiences. Information literacy, the ability to critically assess the validity of sources, is an important element within this understanding of critical thinking. The students should be able to assess whether information is reliable based upon the source's origin.

The development of participating citizens that are socially engaged and can show the ability of critical thinking, is a central value within the subject of social studies. The subject plays an important part in ensuring informed choices based on values such as democracy, human rights, environmental thinking, and diversity. Social studies should also encourage an urge to create and explore, as well as critical thinking and engagement (Norwegian Directorate for Education and Training, 2020). One of the core elements within social studies is the ability to use critical thinking and to see how different aspects of the world are connected. The world is connected through the past, the present and the future, and it is because of this connection that everything we do has a larger impact on both humankind and society (Norwegian Directorate for Education and Training, 2020).

The connection of the past, present, and the future is also evident in the term *historical consciousness*. B.E. Jensen (1996) accentuates the relation between the three time dimensions in his definition of historical consciousness:

> Historical consciousness is based on the fact that the past is visible in the present as memories and interpretations of the past, and that the future appears as a set of expectations. The term directs its attention to the human condition of existence, that a lived present includes a remembered past as well as an expected future. It refers to the relation between humanity's interpretation of the past, understanding of the present, and expectation of the future (Jensen, 1996, in Lund, 2016, p.23). [our transl.]

Lund (2016) emphasizes the relation between the time dimensions in Jensen's definition. The knowledge and information we currently possess about the past influences our perception (p.24). Newfound information can provide a different insight to a topic. Critical thinking and historical consciousness are therefore important in order to make the students aware of how their world view are affected by the current understanding of the world.

Ferrer, et al. (2019, p.17) argue that critical thinking must be a condition for democratic participation and to ensure that a society remains democratic. This correlates with Bolstad's (2020) presentation of interdisciplinarity, more specifically the fourth step on the staircase; trans-disciplinarity. In this step of interdisciplinarity, the students are highly encouraged and expected to be active participants in their own learning. Through a democratic process, the students are actively involved in forming the lesson in terms of topics and methods. Through asking questions, solving problems, and being able to take part in their own learning process the students experience real democratic participation. Critical thinking becomes important for the students to ask relevant questions and to be able to discuss and compose informed answers.

2.3 Advantages of interdisciplinary teaching

Many of the studies we refer to use the word thematic or theme-based instruction, however the examples presented can be linked to our understanding of interdisciplinary teaching which is presented in part 2.1. The studies we present in this section can give some perspective on what can motivate teachers to implement interdisciplinary teaching into their practice. The studies in this section look at how interdisciplinary teaching can benefit both students and teachers.

2.3.1 Student engagement

Theme-based instruction has been found to increases student engagement. O'Neal (1998) observed multiple students that showed signs of engaging more than usual in the themes they were discussing in their lessons. They used knowledge they had acquired in conversations outside of the classroom in their spare time. As O'Neal writes, "Students were mentally, emotionally, socially, and physically engaged in the topic being studied." (O'Neal 1998, p.79). This was also reflected in Penna-Baskinger's (2018) study on teachers' perceptions on theme-based lessons and how they affect student engagement from 3rd to 8th grade in the US

school system. Penna-Baskinger interviewed teachers who had executed theme-based lessons and what impression they had of student engagement. The participants said that "students were actively learning and engaged throughout themed-based lessons since students were able to make connections and become more involved in classroom discussions" (Penna-Baskinger, 2018 p.53). The participants also noted that "students were more focused and showed signs of interest in the lesson through active participation and engagement" (Penna-Baskinger, 2018 p.55). Teachers observed higher student engagement when themes were incorporated into the subjects. The students became more active when the themes brought up in the lessons were discussed in multiple subjects. One of the teachers who was interviewed said that "When I teach a lesson that has another subject area or theme infused, the students seem more into the lesson. I think it's because the students feel like they know it already since they've 'seen it before'" (Penna-Baskinger, 2018 p.55). The theme used in the lesson activated pre-existing knowledge in the students which helped stimulate the students' activity level positively.

The teachers in the study noted that they had observed "students' ability to show confidence and their ability to recognize skills and content learned in other classes." (Penna-Baskinger, 2018 p.56). From this Penna-Baskinger draws a link to pre-existing knowledge. According to this study, theme-based instruction is beneficial in making learning useful and making knowledge and skills learned accessible regardless of context. All of the teachers participating in this study noticed that students seemed more engaged in their schoolwork and showed signs of connecting subjects together through their theme-based lessons. Penna-Baskinger states this as a part of her findings.

> The data also shows that not only did participants experience an increase in the student engagement, the teachers also observed students showing signs of using prior knowledge. Participants noted student engagement and eagerness to learn based on personal experiences within the classroom, especially during lessons that involved skills and knowledge from other content areas. (Penna-Baskinger, 2018 p.71).

2.3.2 Selection of theme – Relevance outside of the lesson

As mentioned earlier the theme used to frame the lessons has to be perceived as meaningful and relevant by the students. This point is made in Brevik, Skarpaas and Isaksen's chapter on vocational English. They argue that instruction has to be designed based on "relevance connected to their use of English in society at large, in their youth culture and for personal purposes" (Brevik & Rindal, 2020 p.65). The teacher should according to research, consider what the students find relevant and base their lessons on that topic/theme. The focus should be on student needs and there should be dialogue between the teacher and the students to pinpoint those needs. This can increase motivation and engagement, which in turn will create a better learning environment (Brevik & Rindal, 2020 p.86).

Tessier and Tessier's (2015) results also reflect that the students who felt that the theme was relevant for their career or personal interest were more motivated to learn. Connecting the course to an already known theme provided a scaffold that improved learning of new material: "Placing the learning of a relatively new concept of art around a known concept of healthcare facilitated relevance which allowed for greater and more meaningful learning" (Tessier & Tessier, 2015 p.13-14). Theme-based instruction, if implemented correctly, can give meaning to the learning process, and motivate students by giving the lessons a sense of usefulness. For this to happen the theme has to be relevant for the students. The result by Tessier and Tessier illustrates this, as one of the courses stood out negatively in terms of perceived relevance and students' positive feeling towards the course (2015). Tessier and Tessier theorize, based on their results, that this is due to a lower level of theme-integration in the course. This meant that the connection between the theme and the course was not as prominent as in the other two. Another reason presented was that the students taking the course were from different majors (Tessier & Tessier, 2015 p.15). The last point signifies the importance of catering to individual needs when considering the theme for instruction. Tessier and Tessier conclude that those who want to apply a thematic approach to their teaching should "strive for a high degree of thematic integration" (Tessier & Tessier, 2015 p.15)

What connects Tessier and Tessier (2015) and Brevik, Skarpaas and Isaksen (2020) is the consensus that the theme for instruction should be perceived as relevant to the students outside of the subject/course. This makes the knowledge applicable outside of the learning

situation. This is something we found reflects our findings on student influence in interdisciplinary teaching. The notion of connecting school subjects to the world outside is something that is prevalent in the NOU:2015 that the new curriculum is based on through its focus on preparing students to be active members of society.

2.3.3 Student motivation and cross-age relevance

Multiple studies have found students' experiences with theme-based instruction to be positive. This is apparent in Tessier and Tessier (2015) and O'Neal (1998) and Penna-Baskinger (2018). They all report that thematic instruction encompasses what is considered to be important for a good learning environment. In her paper, O'Neal focuses mainly on students' attitudes towards learning. The students observed in the study were in primary school and showed positive responses to thematic instruction. O'Neal mentions acceptance, student's engagement, and competence through a sense of mastery as integral for a positive learning experience and describes observations in her research which showed these factors being present in the students she observed. The students talked about the themes used in the lessons outside of school and showed pride in their accomplishments (O'Neal, 1998). She argues that integrated thematic instruction creates a safe space for learning.

This is also reflected in the Tessier and Tessier (2015) paper about the use of thematic instruction in college classes where the curriculum was based around a theme. The theme was used to highlight the subject and motivate students by being relevant to their career path or their personal lives. The theme helped students in the face of an unfamiliar and/or uninteresting subject. It also helped the students with motivation and interest towards the course (Tessier & Tessier, 2015 p.14). The apprehension that can occur when one has to learn a subject which is unknown can be reduced through a familiar theme. Thus, theme-based instruction promotes safety in learning situations and motivates students. Theme-based instruction helps students find enjoyment in learning and gives students a feeling of competence. This is reflected in Nutting (2001) and is something we will discuss further by connect this factor to our findings.

One point that is of interest when looking at O'Neal's (1998) and Tessier and Tessier's (2015) studies is that thematic instruction appears to have positive effects across age groups. O'Neal studied primary school while Tessier and Tessier researched undergraduate students. Both age

groups were observed to have an increased motivation and generally finding the learning process positive. This may indicate that thematic instruction can be beneficial regardless of age. This can be a motivation for teachers to implement interdisciplinary teaching in all levels of education.

2.4 How English and Social Studies can be used in interdisciplinary teaching

Theme-based instruction seems to be used to give a meaningful context to language acquisition. A paper by Alptekin, Erçetin and Bayyurt (2008) looks at the use of theme-based instruction in the English classroom. The focus of Alptekin, et al.'s study is how a theme-based syllabus can be effective in learning a second language, L2. The study looks at the significance of an interdisciplinary approach to theme-based instruction.

The students participating in the study were separated into two groups where the control group had a grammatical syllabus where the students went through explicit grammatical lessons. The treatment group had a theme-based syllabus which implemented themes from Science and Social studies that the students were introduced to in their native language prior to the English lesson (Alptekin, et al., 2008). The students were therefore already familiar with the topics discussed in the English lesson. The treatment group performed better than the control group in reading, writing and listening. The theme contextualized the language skills. Instead of focusing on explicit language learning, the students could focus on the theme of the lesson and through it acquire and develop knowledge and skills related to English as a subject. Not only do the students learn language in the theme-based lessons, but they also get the opportunity to further process the themes from their other subjects. "The social and academic contexts in which the learners find themselves provide interesting resources for learning language while language itself becomes a medium for learning relevant content" (Alptekin, et all., 2008).

Alptekin, et al. introduce an interdisciplinary approach to theme-based instruction where the different subjects are still largely distinct. The collaboration between the subjects is mutually beneficial and helps the students draw lines between them. A theme-based approach to language learning can make students feel accomplished: "the learners' schematic knowledge of the given topic blends with the L2 systemic data, giving them a sense of accomplishment

based on the impression that they have studied authentic content material in the L2" (Alptekin, et al. 2008).

This study exemplifies how English can be used in interdisciplinary teaching. English becomes the language of instruction while the themes and topics used are from other subjects. Though it may be an effective way to learn English, as the study suggests, there is a possibility that some parts of English as a subject are neglected. This is something we will discuss further when we connect this point to our findings. We will also connect this way of conducting interdisciplinary teaching to the interdisciplinary staircase as presented in Bolstad (2020).

Social Studies is an important subject within interdisciplinary teaching because of its relevant topics and the way it intertwines with other subjects. It can therefore be used as a tool to bind other subjects together when working with interdisciplinary topics and projects. The interdisciplinary topics presented in the revised curriculum of 2020 should be present in each subject's competence aims to a certain extent. Approximately all the competence aims belonging to social studies are connected to one of the three interdisciplinary topics: Health and Life Skills, Democracy and Citizenship, and Sustainability. Skills such as critical thinking and information literacy which can be found in the curricula for Social Studies, also highly applies to other subjects. The development of these skills is therefore vital. These are crucial skills in everyday life and teaching them to students is therefore a part of the school's responsibility in developing reflective and responsible human beings.

Social Studies in Norwegian lower secondary school is a combination of three individual disciplines: History, Geography, and Social Studies. Both Social Studies and History provide a good basis for interdisciplinary teaching. History professor Maureen Murphy Nutting at North Seattle Community College presents a method within interdisciplinary teaching which is called "The Linked Course" (Nutting, 2001). Nutting describes how she has conducted the Linked Course method with other teachers at a college level and how the history subject can be linked to other disciplines to emphasize logical connections. Nutting uses different aspects of the subject American History as an example on how to link courses together. Latin American history for instance, is naturally complementary to a Spanish language course with a focus on Latin American culture, according to Nutting (Nutting, 2001, p.4). Nutting also

explains that within the Linked courses, there is not a significant alteration to the individual courses. The teachers only made small modifications to emphasize the connection between the subjects, but both the premise and the core value of each subject stayed the same.

The method of Linked Course was constructed with college subjects in mind; however, it is highly adaptable to primary and lower secondary school. The special focus on history as a connector and a foundation for interdisciplinary teaching is especially useful and relevant on lower secondary levels. The competence aim for social studies after 10^{th} grade is written in a manner which invites interdisciplinary teaching. Broad competence aims which concern historical conditions, central historical conflicts, and societal changes seen through a historical context are easily linked to other subjects to provide a greater understanding of connections. Historical context can also be seen as essential for the students to understand significant connections, both within the disciplines of a subject or across subjects.

Nutting lists some of the benefits she has witnessed when working with the method. She mentions that her students learned to recognize the importance of the interdisciplinary exchanges in areas of critical thinking and problem solving. Another benefit the students reaped through linking courses, was being able to see that different methodical approaches and subjects can tackle the same topic and that the different outcomes are beneficial to broaden their perspective. Nutting also claims that the students were able to make connections between different areas of knowledge and integrate them into their other subjects, events, and issues (Nutting, 2001, p.11).

As shown, interdisciplinary teaching can implement subjects in different ways. One way is to incorporate different disciplines and themes from the subject, another is to use methods and skills. English can be used as a tool for instruction where the focus is to develop the students' language skills. Social Studies is an important subject where different disciplines can be used to view a topic from multiple perspectives. Topics related to the subjects are important to understand the society we live in. Because of this, it is natural to incorporate themes from Social Studies to other subjects.

2.5 Important factors when changing teaching practice

For some schools the new curriculum, with the introduction of interdisciplinary teaching, will entail a change in teaching practice. Peter Senge, a renowned figure in the field of *organizational learning*, presents five disciplines that enable the development of skills and knowledge in an organization. We believe the five disciplines *systems thinking, personal mastery, mental models, team learning,* and a *shared vision* are important for developing new teaching practices. Feldman (2013) connects these disciplines to school development and discusses how these can present themselves in a school setting.

Systems thinking is operating on the understanding that different parts of an organization are interconnected and dependent on each other (Senge, 2006 in Feldman, 2013 p.21). Feldman (2013) states that "With relationships come dialogue and discussion and a start to systems thinking. Effective school leadership should foster and develop the needed dialogue and discussions needed for change" (Feldman, 2013 p.22). She believes that systems thinking starts discussions and dialogue that develop professional relationships. Systems thinking is, according to Feldman (2013), dependent on the school leadership as they create the opportunity for change.

Personal mastery is "the focus of our efforts and the ability to see in an objective manner, our sense of commitment, and the deepening of our personal vision" (Feldman, 2013 p.22). Personal mastery is something that exists within the individual and is the source of motivation for participating in school development. Feldman notes that:

> Mandatory professional development, while designed to improve school success, is not personal mastery; personal mastery is intrinsic and stems from a concrete personal vision. Attaining personal mastery involved continually focusing and refocusing on what is wanted and, once attained, permits a greater connection to the world. (Feldman, 2013 p.22)

Personal mastery cannot be forced through mandatory professional development, though it can support the individual in developing personal mastery. Personal mastery is also something that has to be developed continuously to further a learning organization that adapts to a forever-changing world (Feldman, 2013 p.22). If the change is forced on teachers, they may

not experience a feeling of ownership and consequently not feel connected to the interdisciplinary work. The motivation for participating in the collective work towards interdisciplinary teaching is in that case not intrinsic, and that can hinder personal development. Therefore, it is important that the teachers taking part in interdisciplinary teaching find it engaging and are actively taking part in the development work.

Mental models are, in short, “the generalizations we make and the pictures or images we form in our minds […] Mental models increase personal awareness, influence what we see and how we act” (Senge, 2006 in Feldman 2013 p.22). These models are created through the individuals understanding of the world. Sharing ways of thinking and being open to the influence of others are also included in this discipline. Working with mental models develops the skills for reflection and inquiry on the individual and team level (Feldman, 2013 p.22).

Shared vision is created through personal mastery and the sharing of mental models. “Shared vision, the shared and collective goals, values, and missions that characterize an organization. To truly share a vision, visions of the future are unearthed to gain greater commitment” (Feldman, 2013 p.23). A shared vision creates a sense of community and identifies a shared goal that the team works towards.

The last discipline, team learning, is built on the notion that ‘the whole is greater than the sum of its parts’. “A team is far more than just a group of people who happen to work for the same company or in the same department. To be a learning team, members must have a shared vision, comparable purpose, and complement another's efforts” (Senge, 2006 in Feldman, 2013 p.23). Team learning is the culmination of the other disciplines. The whole team develop personal and collective skills and knowledge by cultivating personal mastery and a shared vision, which grows and evolves through the sharing of mental models.

3 Method of Research

In this chapter we present our chosen method for conducting a qualitative study. We disclose our process of gathering data and how we have managed the material. Further on, we assess the research project in terms of validity and reliability.

3.1 Research design: Qualitative study

Qualitative research has historically been, and is at present, used to study people, according Postholm and Jacobsen (Postholm & Jacobsen, 2018, p.99). Describing and understanding behaviors, experiences, or views, is the basis of qualitative research. Because it is the researcher who draw meaning from the data material, the researcher will affect the research to some degree. This has been criticized for being too subjective and that the results of the research can be untruthful because of misinterpreted data. However, in our time, there is a wider acceptance for the fact that the researcher's experiences will affect what is being researched, and how the gathered data is understood (Postholm & Jacobsen, 2018, p.99)

One characteristic presented in Creswell (2014) is that the researcher is the key instrument in qualitative research. The researcher is the one collecting the data either through interviewing participants, observing behavior, or examining documents. The researcher may use a tool for collecting the data, a protocol (Creswell 2014, p.185). In our research we interviewed teachers with an interview guide that was produced by us to fit our needs. We, as the researchers, were collecting the data we needed to answer our research questions.

In our study we wanted to get insight into the experiences of teachers who have worked with interdisciplinary teaching. Postholm and Jacobsen (2018) note that researchers can collect data by listening to the participants' stories and derive meaning from the experiences linked to these stories. This is a narrative approach to qualitative research (Postholm & Jacobsen 2018, p.78). We looked for teachers' experiences and narratives to answer part of our research questions. The data we collected were the opinions of teachers and represents what they believe would help facilitate interdisciplinary teaching.

Emergent design, as Creswell (2014, p.186) describes, is when the research design changes or shifts during the different phases of the project. This follows the main idea behind qualitative research, which is to "learn about the problem or issue from participants and to address the

research to obtain that information" (Creswell 2014, p.186). The design of our study emerged as we gathered more interviews and we had to change some parts of the design to fit the different narratives. Our research question also evolved during the process. There was a shift in focus from how interdisciplinary teaching facilitates for in-depth learning to how teachers and schools can facilitate interdisciplinary teaching. The earlier focus concentrated on the reason for why one should implement interdisciplinary teaching in their teaching practice.

Constructivism is a philosophical point of view where the researcher tries to interpret the beliefs and meanings others have about the world. Constructivist research follows the assumption that humans construct their meanings through interaction with the world and how they interpret it. The researcher is also aware that their background will influence them, and therefore positions themself in their research to acknowledge their personal experiences in relation to their interpretation of the research (Creswell 2014, p.8-9). Because we acquired knowledge through conversations with our informants, we are operating on the belief that they possess valid information which is relevant to our study. We believe that the people who have most experience in how interdisciplinary teaching can be done in schools and who know the groundwork required for it to be beneficial to both students and teachers, are the teachers in question. In particularly teachers who are actively engaging in the topic and have experience with interdisciplinary teaching. This is why our study is close to constructivism in its ontological perspective. We also acknowledge the fact that our experiences with interdisciplinary teaching and our stance regarding the topic affect our interpretation of our findings.

3.2 Gathering data

We conducted interviews to gather data for our study. We interviewed a selection of teachers with an interest in and experience with interdisciplinary teaching. We used a tape recorder that we borrowed from the responsible institution (UiT) to record the interviews. We transcribed the interviews to make them easier to analyze and to be able to categorize the statements made in them. To analyze the interviews, we isolated the meaningful content and categorized it before we moved on to interpret them.

3.2.1 Research interviews

The knowledge gathered through the interviews is in its nature interpersonal. It is created between the interviewer and the interviewee through a conversation (Kvale & Brinkmann, 2009). We wanted to gather knowledge on teachers' experience with planning and conducting interdisciplinary teaching, what they believe has to be in place for interdisciplinary teaching to be possible, and how schools can facilitate for interdisciplinary teaching based on these beliefs. We believe that the conversations led us to valuable information.

When conducting an interview in a qualitative study there are three distinctive ways to structure it, as presented in Postholm and Jacobsen (Postholm & Jacobsen, 2018, p.120). The level of structure can be determined by the researcher's involvement in the interview. We decided to conduct a semi-structured interview as it gave structure to the interview while still giving us the opportunity to follow up on topics that presented themselves in the interviews. A semi-structured interview is also the most expedient way to gather information on the candidates' perspective and experience. This type of interview can open up the conversation and bring us down unforeseen roads that lead to answers and topics we did not predict beforehand. We prepared an interview guide that was sent to the interviewees before the meeting so that they could prepare. We hoped that this would ensure that the information we gathered would be relevant to our research questions.

The questions in the interview guide were prepared beforehand and were based on what we believed would be relevant to our research questions. The first questions were regarding general information such as how long the individuals have worked as teachers, what subjects they teach and what grade they currently teach. We also wanted to establish a common understanding of the terms used in the interview. The next step in the guide asked about the interviewees' experiences with interdisciplinary teaching. Then it continued with asking what must be present to facilitate for interdisciplinary teaching. Lastly, we wrote a question regarding the benefit of interdisciplinary teaching, if they had seen a benefit and, in that case, what benefits they have experienced together with their students and colleagues.

When gathering informants, we used different methods to contact teachers. We started with sending e-mails to the schools in the area, some that are connected to the university and some that operate in the vicinity. We got word back from two schools which led us to our first two

informants. We also wrote a Facebook post in a group for teachers. In it we wrote information about our study and that we were looking for teachers that had an interest in interdisciplinary teaching and had some experience with interdisciplinary instruction. Through that post we were contacted by a teacher from the west of Norway. The fourth informant was contacted directly, as they are one of our own former teachers from lower secondary school. The reason we contacted them was that they had conducted an interdisciplinary project in that time. We got our last two informants through a tip from a work colleague.

The interviews were mostly conducted over the digital meeting platform, Zoom. We found this to be the most appropriate solution when considering the ongoing pandemic. It was only in the first interview we conducted that we met the informant face to face. We were careful to maintain the recommended distance between the participants. The interview where we met in person was the longest one, close to an hour in duration. It was much easier to interpret body language and it was easier to hold an actual conversation. It was also easier to follow up on tangents that led to information we found to be relevant. The interviews that were conducted digitally were generally shorter and more to the point. This could be caused by the fact that the informants had prepared in different degrees. Some had visibly prepared by taking notes and referring to the interview guide, while others were less prepared. We conducted six interviews in total.

We conducted a pilot interview with a fellow student. There were different factors that could play a part in the execution of the interviews and we wanted to work out the kinks beforehand. Elements we needed to test out were both of the technical kind and in terms of the questions themselves. Since we were to conduct most of the interviews over a digital platform, we needed to ensure that the tape recorder would pick up a decent sound. We also found it necessary to test the flow of the questions in the interview guide in case there was a need for adjustments or reorganization.

3.2.2 The Research subjects

The candidates we interviewed were from different parts of Norway. The teachers had different subject backgrounds and had worked as teachers for different lengths of time. However, they all teach lower secondary levels. There was also a difference in the amount of interdisciplinary teaching they had conducted. Some had many years' experience, while others

had started recently. In the period we conducted the interviews we called them interview A, B, C, D, E and F. While analyzing the interviews we used candidate A, B, C, D, E and F to differentiate between the informants. We later on gave them names to easier distinguish between them. Candidate A was assigned the name Alex, B got the name Blake, C was called Charlie, D was named Drew, E was titled Evan and F then became Fallon. We decided on these names for their gender-neutral quality as we do not consider gender to be a relevant factor in our study.

Alex has worked on and off as a teacher since the late 90's. Alex has experience with interdisciplinary projects where multiple subjects were clearly represented. The school Alex worked at was structured differently than the others. Their school was organized into larger units where 8^{th}, 9^{th} and 10^{th} graders were mixed together. The larger units have the same topics in the different subjects. The teachers take turns in planning the lessons. One teacher or a small group of teachers plan for all the others for a period of six weeks. The interview we had with Alex was the first we conducted.

Blake has worked 10 years as a teacher and has worked with interdisciplinary teaching to some degree most of that time. One of us had Blake as a teacher in lower secondary school. Blake works at a lower secondary school with traditional grade separation. Their school has worked systematically with interdisciplinary teaching since the NOUs, which the new curriculum is based on, was published. The interview was conducted digitally over Zoom and recorded on a tape recorder, as were the interviews with Charlie, Drew, Evan, and Fallon.

Charlie has worked three years as a teacher. They had not worked as much with interdisciplinary teaching as the two previous teachers. Charlie also works in a lower secondary school at the time of the interview.

Drew has worked with interdisciplinary teaching for multiple years, previously with just their own subjects, Norwegian, Social Studies, and Food and Health. Now they work more with a colleague who brings in other subjects such as Mathematics and Science. They also work at the lower secondary school level.

Evan is still a student themself but has worked in a lower secondary school for just a under a year. However, Evan has worked as a substitute teacher before and has experience with interdisciplinary teaching from their study practice periods.

Fallon has worked five years as a lower secondary school teacher, with the subjects Norwegian, Mathematics, Science, Programming and English. They were a part of the first waves of teachers with master's degrees in their main subject. Fallon has experience both as a subject teacher and as a class contact teacher.

3.2.3 The Analysis: To condense meaning

We decided quite early on to condense the meaningful content in the interviews. We believed this would make the interviews more manageable and would help us isolate the meaningful content of the interviews. One of the ways to analyze interviews presented by Kvale and Brinkmann (2009) is to condense meaning. When researchers condense meaning they compress long sentences by rendering the immediate meaning with only a few words. Instead of using the complete phrasing from the interviews, we draw out the meaning to find the factors that affect interdisciplinary teaching and use those in the discussion. This can be seen in our analysis of the interviews. We have drawn out a point of interest and have exemplified it by referencing statements from the interviews.

When analyzing the interviews, we started by looking over the transcribed interviews and isolated what we thought were relevant findings. We then looked closer at our findings and categorized them into three main categories; the initiation force behind the interdisciplinary work, which we categorized into two parts; leader- and teacher-initiated. The second category was planning, execution, and reflection. Our last category was requirements for teacher competence. The relevance of the last category was something that became apparent to us later on when we were discussing our findings from interview E and F. We also saw a need to present some of the teaching examples from the interviews so that we later could connect them to our theoretical understanding of the topic.

The two under categories linked to initiation are leader-initiated interdisciplinarity and teacher-initiated interdisciplinarity. The category is meant to show who is the driving force behind the work and what is motivating them to continue. The part concerning planning, execution, and reflection is about the more practical aspects of implementing interdisciplinary

instruction into teaching practice. The last category regarding teacher competence looks at what the interviewees perceived to be important skills and knowledge when conducting interdisciplinary teaching. We decided on these categories because we saw distinct patterns concerning the driving force behind the interdisciplinary work. We also found it natural to look at how interdisciplinary teaching is planned, executed, and reflected on amongst the teachers. When analyzing the interviews, we came across an interesting point of discussion where teachers had different ideas on what competence teachers should have. These categories are the basis of our findings and part of our discussion.

3.3 The Role of the researcher and ethics

When using condensed meaning as our method of analysis we as researcher are given power to define what we consider to be relevant knowledge. We have tried to preserve the initial meaning behind the candidates' quotes by extracting the essence of their statements. By selecting what we consider to be relevant information regarding our master thesis, we are aware that we have the power to interpret the meaning from the candidates' statements and that it is our responsibility to ensure that the candidates' voice is accurately rendered.

To ensure that the ethical aspect of the research has been conserved throughout the process of gathering data, we have followed the ethical research norms of the National Committees of Ethical Research. The Committees aim to promote good scientific practice by providing research projects in Norway with guidelines for ethical dilemmas, and to help the researcher develop better ethical judgement and reflection surrounding research. The guidelines are created on the basis of Social Sciences, Humanities, Law and Theology, but is also used within Pedagogy and Psychology (The National Committees of Ethical Research, 2016). The committees' use of the term *research ethics* refers to a diversity of norms, values, and institutional arrangements which are concretized through practical, ethical considerations for the scientific practices. The norms, which aim to regulate the research activity, are divided into four areas: norms for good scientific practice, norms which regulates the research community, the research's commitment to the participants, and the research's relation to the community. The norms for good scientific practice refer to how we as researchers aim to obtain relevant and trustworthy information. The research's commitment to the participants of the research, in this case the interview candidates, is connected to their rights in term of

informed consent, the right to withdraw ~~said~~ consent at any moment, confidentiality, and to preserve the human dignity of the candidates.

Human dignity is connected to the individual's inviolable rights. The respect for human dignity is ascertained in numerous international laws and conventions regarding human rights. For our research, human dignity entails the preservation of each individual candidate's interest and integrity, which cannot be compromised for the benefit of the research or to favor the community. It is therefore important that the researcher is aware and respectful of the element of human dignity within the research project. Although the research aims to highlight human dignity, it could also possibly threaten it if the researcher is unaware of ethical research practices.

3.3.1 Ethical questions and considerations

Before starting the process of conducting interviews we reported our research project to NSD (Norwegian Center of Research Data). Through NSD we constructed the informational document which we sent to the interview candidates well ahead of the scheduled interview. The document included information about the project and the purpose of their participation in it. The candidates were also presented with their rights regarding the project through the informational document. The responsible institution for the project is UiT, faculty of Humanities, Social Science and Teacher-Education. The candidates were presented with the opportunity to contact us directly or to contact the representatives within the responsible faculty if they had any questions about their participation in the project. The candidates were also informed that their participation entailed a scheduled interview which would approximately take 30-45 minutes to conduct. They were given the main questions of the interview in the form of the interview guide a week in advance of the interview. This way, the candidates had time to prepare their answers and they knew the structure of the interview. We also informed the candidates that the form of the interview was semi-structured, which meant there could be other questions in addition to the initial ones. This was highly dependent on the conversation and the candidates.

The informational document included the candidates' rights regarding informed consent and participation, how their privacy and anonymity would be preserved, storage of personal information, and the right to withdraw consent at any given moment in the process. The

participants were all anonymized throughout the project and we have only included information that is relevant to our master thesis. Gender, age, and which school they are employed at are subtracted from the final text. The interviews were recorded by a tape recorder borrowed from UiT. We used an external device to record and store the interviews to ensure the candidates privacy. The interviews were only stored on the external device. The tape recorder was used during the interviews conducted through the digital platform Zoom, despite the platform's own recording function. We made the decision to not use the recording function because it entailed videorecording the candidates. This would have been an ethical issue in terms of what the candidates had agreed upon ahead of the interview. The interviews being video recorded could potentially have interfered with the gathering of data because of the researcher's and candidate's awareness of being filmed. The voice recordings from the interviews will be deleted at the projects' end, which is May 18th, 2021.

Throughout the process of structuring our study, our research question has changed a few times. It also changed after we started the interview process, which entailed that the research questions the candidates were presented with through the informational document are not the same as the ones we have operated with in the analysis. The main difference is the focus shift which is now on what factors teachers believe facilitate interdisciplinary teaching in classrooms. We believe this does not affect the candidates' position in the research project or compromise their responses. This is because the interviews were designed to focus on interdisciplinary teaching and the interview guide were mainly about how to conduct and facilitate interdisciplinary teaching.

3.4 Self-assessment of the research project

3.4.1 Validity

To assess the quality of a research project it is common to consider its validity and reliability. Validity in a qualitative project entails that the researcher checks for accuracy in their findings by employing certain procedures which is presented in Creswell's Research Design (Creswell, 2014, p.202). One of the procedures Creswell mentions is to clarify the researchers' bias in the research project, because the active role the researcher plays in the project is a factor when assessing the validity. In our case, this particularly applies to the interview process. Our biased opinions can be identified from when we started constructing the interview guide, all throughout the analysis and in the use of our findings in the discussion. Our view on the topic

is based on the experience we have with interdisciplinary teaching and the theoretical basis we have used in this paper. The topic is something we are highly enthusiastic about and find immensely interesting. Therefore, we had certain expectation of what our findings would be. When we searched for candidates to act as informants, we specifically targeted teachers who had experience with interdisciplinary teaching and who were passionate about this way of teaching. Therefore, it was not unexpected to be met by an exclusively positive attitude towards the implementation of interdisciplinary teaching. This could make it challenging to get a well-rounded view on the subject which also highlights the possible disadvantages of interdisciplinary teaching. However, when we designed the questions for the interview we tried to account for both benefits and challenges of working with interdisciplinary teaching to provide a wider insight and create a depth which could give a more accurate description.

The information we gathered through the interviews were highly experience-based, which was our intention. We sought out teachers with experience with interdisciplinary teaching who could share their thoughts about the subject. The questions which the interview candidates were asked were designed to gather information about benefits and challenges to interdisciplinary teaching as well as concrete examples of lessons the candidates had conducted. Consequently, the information extracted from the interviews is defined by the candidates' reality. The information becomes constructed knowledge through the candidates' narratives and the researchers' interpretation through the analysis. Because of our narrow sample size, we are hesitant to conclude our findings as universal. However, because the majority of our informants shared similar perceptions, we can assume there is some degree of credibility to the statements made. With that tendency, our findings can be an indication that others share the same experiences. Our sample size of informants differs in gender, age, working experience, schools, subjects, and work in different parts of the country. Even though we have gathered subjective opinions about the topic from multiple independent sources, we have been able to construct a shared context. This is further supported by the broad and general questions we asked in the interview, which led to similar answers in a majority of the interviews.

Through a qualitative research interview, such as the ones we have conducted, the intention is to develop knowledge within a specific subject. The knowledge is constructed between the researcher and the interview candidate (Postholm & Jacobsen, 2018, p.117). Creswell points

out some limitations interviewing can have when used to gather data material. For one, an interview provides indirect information filtered through the views of the interview candidates (Creswell, 2014, p.191). We are very much aware that our type of study and our findings are experience-based and are constructed through narratives born from each of the candidates own reality. Creswell also lists the presence of the researchers as a factor which can bias the candidate's response. It is natural for the researcher to be an active participant in an interview. We are aware that we are a part of constructing the findings with our responses and interaction with the interviewees. The main questions for each interview were the same, however, it is a conversation between two parties which entail that the interview could take different routes based on the answers.

We conducted the interviews in Norwegian and therefore also transcribed them in Norwegian. When selecting which statements from the interview we would use to present our findings, we needed to translate the segments into English. A few of the terms used by the candidates are highly subject-specific and consist of Norwegian compound words which cannot directly be translated. These proved to be a difficulty during the translation process because we had to be careful not to lose the initial meaning behind the terms. Some phrasings and sentences had to be fully reconstructed to reflect the original sentiment. We have a responsibility as researchers to ensure that our informants are correctly represented in the text. We became aware of this predicament early and were therefore able to ensure that each quote from the candidates used in the analysis was explained to retain the content of the statements.

Our experience with conducting interviews before this study is limited. To prepare for the interview process we read up on theory concerning methods of interviewing and processing data material. We had a steep learning curve and noticed that each interview we conducted went more smoothly than the previous one. Since we are two people doing the research together, we needed to establish a set of rules and assign different roles in the interviews. To keep the interview as orderly as possible for both ourselves and the interview candidates, we decided that only one should ask the questions and engage in the conversation. The other researcher spent the interview taking notes and paying close attention to the answers to construct possible follow-up questions. The notes mainly consisted of the most important points the candidate made, and immediate thoughts connected to these notes. This made us able to draw meaning and make interpretations from the very beginning of our research

process. Our initial thought was to switch the roles for each interview, but we concluded after the first interview that the same person should lead every interview. We came to this decision to keep the premise of each interview as similar as possible.

3.4.2 Reliability

Postholm and Jacobsen describe the reliability of a research project as a way to define the research results' consistency and whether or not the result can be reproduced and retested (Postholm & Jacobsen, 2018, p. 223). In our case, with a qualitative study which gathered data material from semi- structured interviews, it is difficult to recreate the exact conditions that led us to our findings. The findings are also experience-based and constructed from the interview candidates' reality. Postholm and Jacobsen present a method to determine a research projects' quality, however, the method does not differentiate between quantitative and qualitative research. To evaluate the findings by retesting is a more common method within a quantitative research study, and even there it can provide problems. Postholm and Jacobsen state that a qualitative study would prove extremely difficult to replicate due to the fact that the condition where the researcher, the candidates involved, and the research field meets is impossible to replicate (Postholm & Jacobsen, 2018, p.224).

To evaluate the reliability of our research projects we aim to determine the consistency of the approach and the findings. One way of determining the reliability of a research project is to carefully document the process and crosscheck the transcriptions. This is a method presented by Creswell to specifically evaluate a qualitative research project (Creswell, 2014, p.203). As stated above, we took notes during each of the interviews to preserve every major point and any initial thoughts we had. We have organized each part of the process in different documents to create easy access and to track our progress. After we transcribed the recorded interviews, we made several categorial systems which broke down segments from each interview into smaller and smaller pieces. This way we could more easily interpret the meaning behind the statements before using them in the analysis. As mentioned by Creswell, it is important to make cohesive codes and categories. We made sure to cooperate on an organized system of codes and categories which were to be used during the analysis of our findings. This way we avoided inter-coding and having to cross-check the codes' meanings. Our system of coding the interviews was created during the analysis process, but the names of

the categories changed after a reorganization of the chapter Results and Findings. This does not affect the coding system because the initial meaning of the used term was preserved.

Of the six interviews we conducted, five of them were done through a digital platform and one was performed in person on the school where the candidate worked. All the interviews share the same basis, as the candidates received the same questions beforehand in the form of an interview guide. Nevertheless, we noticed a clear difference between the digital interviews and the in-person one. The in-person one lasted much longer than the average of the five others. We experienced it to be easier to interpret body language and to create a relation when sitting in the same room as the informant. The interviewer also found it easier to read whether to move on with the questions. We are hesitant to call this a margin of error because we cannot predict if we could have gathered more information from the other interviews if they had been in person, however we recognize that it was easier to obtain additional information through a face-to-face conversation.

During the analysis of the data material, we were able to detect a consistency between our findings and our theoretical research. Therefore, we are able to conclude our findings as a representation of reality to a certain extent. The connections we have uncovered between our findings and the theoretical research will be further displayed and clarified in the Discussion.

4 Results and Findings

In this chapter we present our findings from the six interviews. We will separate them in four main parts: examples of interdisciplinary lessons, incentives for interdisciplinary teaching, planning, execution and reflection, and teacher competence.

4.1 Examples of interdisciplinary teaching presented by the interview candidates

During our interviews, we asked the candidates about their personal experience of conducting interdisciplinary teaching. The responses varied from specific projects to more general concepts. The interdisciplinary projects that the interviewees described shared some similarities, however, they also unveiled structural differences. We have chosen to present three different examples from the candidates Blake, Fallon, and Alex. We chose to highlight these three because the interdisciplinary work that went into the project were structured differently. These are examples we intend to use later on in the discussion.

The candidates Blake and Fallon described two very different ways of how they normally plan and conduct interdisciplinary teaching lessons. In Blake's case the encouragement and facilitation for interdisciplinary work is leader-initiated and is more systematically conducted. Blake described the process of working interdisciplinary as systematic and organized. The planning process is carefully arranged by the school's management. To increase the teaching hours in the interdisciplinary lessons, the management redistributes time from every subject. The teachers have five weeks of scheduled time to conduct the project and to reflect upon it. The school operates with "goal sheets", which are given to the students at the beginning of a new project. This sheet includes the goal the students should reach at the end of the working period and information about the goal. The school operates with both knowledge themes and skill themes. Themes which focus on the skills rather than knowledge, could as an example be to instead of naming the project WW2, they call it Cause and Effect and incorporate WW2 as one part of the project. The skill is more important and allows the project to touch upon several different knowledge themes.

The increase of interdisciplinary teaching in Blake's school was a part of development work initiated by the school leader and management. In correlation with that, the school uses the Interdisciplinary Staircase presented by Bolstad (2020) for evaluation after a project. They

also use the goal sheet to assess the students' understanding of the theme and from there they can make the necessary adjustments. The systematic interdisciplinary teaching, which includes every subject and teacher, is specifically used in larger theme-based projects. However, smaller theme-based lessons across subjects do occur on a weekly basis. In Blake's reflection, they stated that their school has different degrees of interdisciplinary teaching and the interdisciplinary work is heavily affected by local teaching plans and the school's own long-term plans.

Fallon described their school's approach to teaching across subjects as teacher initiated and often emerge through a conversation between two teachers over a cup of coffee. The starting point of planning an interdisciplinary project can seem a bit accidental according to Fallon, but then it evolves into a more structured and detailed plan. Fallon gave an example of a specific project they worked on for almost the entirety of last fall, which dealt with sustainability. The project originally included Norwegian, English, and Natural Science, and used Minecraft as a learning platform. The students build and developed a society in the online game where they interacted with each other. They used Natural Science to inform the students and develop their knowledge on sustainability. This was then implemented into Norwegian and English by creating discussions about resources and distribution.
As the project developed, the teachers found it natural to include both Mathematics and Social Studies to the project. Social Studies was included as a way to incorporate democracy and citizenship. This became necessary when the students started arguing over the distribution of resources. They used the opportunity to develop a set of laws and rules which had consequences when broken. To reach an agreement about the laws, the students held a debate. The project was dynamic and evolving, and an example of how changes and challenges can occur along the way of an interdisciplinary project.

Alex spoke about an overlapping collaboration between Social Studies and English with the overarching theme *The Industrial Revolution.* They used authentic sources from the time period depicting the living conditions, from which the students learned the historical background. The students were to assess the living conditions in England during the industrial revolution based on reports of child labor, factory work, diseases, and so on. The reports and texts were also used to exercise the students' ability to assess credibility of different sources. Both *Oliver Twist* and *The Chimney Sweeper* were used as literary sources in the lessons. The

students were involved in which evaluation method they wished to be assessed by. Some of the students performed an oral presentation and others submitted written texts. Since the project covered both the subjects of English and Social Studies, the students could choose which language they wished to be assessed in, Norwegian or English. The interdisciplinary work Alex described at their school can be seen as a combination between leader-initiated and teacher-initiated. We wish to make the distinction that the structures Alex described as part of the planning process were already established at the school ahead of the collective focus on implementing interdisciplinary teaching. The structure of the school facilitates for teachers to collaborate across subjects, however, they are not created solely to promote interdisciplinary teaching, as we will further account for in 4.3.1.

4.2 Incentives for interdisciplinary teaching

One point which became apparent through our interviews was that there seemed to be a difference in the source of implementing interdisciplinary teaching in schools. In most cases the work starts with the teachers, which means that it is the teachers who initiate the work and are the ones driving the work forward. In other cases, it is the school leaders who are the driving power of the change of teacher practice. This can be done by encouraging teachers to develop their teaching practice further by making time for collective planning and reflection. From the interviews it became evident that both teacher initiation and leader initiation are regarded as necessary in order to develop and change teaching practice.

4.2.1 Leader-initiated work

Two of the six candidates expressed in particular that the leadership of the school encouraged and specifically made room for cooperation and information sharing. The planning and reflection surrounding the interdisciplinary work was described as systematic and organized. Time was made for meetings that focused on planning and reflection surrounding the interdisciplinary lessons.

In the second interview, Blake said that the processes around interdisciplinary teaching was carefully facilitated. Blake explained something their school called TT-time: a five-week period where the teachers are given ample time to plan the next interdisciplinary project and reflect on the previous one. The task of facilitating the teachers' interdisciplinary activities lies largely on the schools' leaders, according to Blake.

There has to be a system around it. There is a need to establish a system that facilitates interdisciplinary work. One can't just say to a group of teachers "from now on we are working interdisciplinary, here you go". That is not how it works. That is bad leadership. It is a leader's duty to make room so that teachers can develop their understanding and skills in regard to interdisciplinary instruction.

Blake states that it is the leader's task to help teachers develop their practice by enabling cooperation, collective reflection, and the sharing of information. This is, according to most of the candidates, imperative in order to develop interdisciplinary practices in schools. The school leaders have to be on board with change and encourage it. Evan expressed that there should be a collective agreement on a grade level or in general at the school. Good routines are also necessary in implementing the new curriculum effectively. All of these points are something the school leader can facilitate by giving teachers time to cooperate and communicate with each other, according to both Blake and Evan.

The remaining four of our small selection of teachers said that there was a lack of leader guidance surrounding the development of new practice, in this case interdisciplinary instruction. Most of the instruction the teachers had planned and executed were initiated and driven by the teachers who have a special interest in interdisciplinary teaching.

4.2.2 Teacher-initiated work

In four of the interviews there was a clear tendency towards the initiative for interdisciplinary teaching originating from the teachers themselves. According to those teachers, both larger projects and interdisciplinary topics that are more incorporated in everyday teaching were initiated and lead by themselves and their colleagues. The teachers we talked to all had a special interest in interdisciplinary and theme-based teaching and believed the teaching method to be highly beneficial for both students and teachers.

4.2.2.1 Collegial Collaboration

When asked whether they have noticed any specific benefits of working across subjects with other teachers, all of the candidates mentioned a higher level of cooperation within the teaching staff. In their interview Charlie talked about how they experienced planning and executing an interdisciplinary lesson with other teachers to lead to more collaboration between the teachers and increased socialization in the workplace. Charlie also said that by

creating something together it enhanced the sense of affiliation within the teaching staff. Charlie explained this further by stating:

> *And interdisciplinary teaching affects the social aspect because then we have time to sit down together and talk at school, which we normally struggle to make happen. Because otherwise we sit on our own desks with our heads buried in our own work. But when we work in an interdisciplinary way, and all the classes are in on it, everybody is involved in one way or the other.*

Three of the candidates made the specific statement that working together across subjects can make the threshold for collaborations and sharing of work much lower. They also stated that sharing and collaborating is important factors when working with interdisciplinarity. In this context Blake talked about *systematic interdisciplinary teaching*. Blake elaborated on their understanding of the term and how it applies to the collaboration between the teachers. They argued that there needs to be a larger and more systematic collaboration between teachers to ensure systematic interdisciplinary teaching throughout the school, and the different grades and classes. If there is not a system which facilitates for a higher level of collaboration between teachers when working with interdisciplinary teaching, which groups of students that get to experience this type of teaching becomes haphazard. Blake made this argument by stating:

> *But then it becomes a bit random which class gets it and when one manages to make it happen. If one manages to introduce systematic interdisciplinary teaching, that is when real change occurs. There is no use in only one class receives a lot of interdisciplinary teaching when the other hundred classes don't get it.*

The teachers we interviewed all agreed that in order to be able to conduct interdisciplinary teaching in a beneficial way for all students, there is a need for support and facilitation on an administrative level. This way the responsibility to implement the work is not solely on the independent teacher. As two of the candidates mentioned; the responsibility to find time to plan for interdisciplinary lessons lies with the individual teacher.

4.2.2.2 Beneficial factors for the teachers

A question we asked all the candidates was about the beneficial factors connected to interdisciplinary teaching. We wanted to know if they had personally experienced it to be beneficial for them as teachers. Higher level of collaboration within the teaching staff was mentioned by several of the candidates, and they also reported that they found working interdisciplinary to have a self-developing effect. Drew gave this answer to the question:

> *It is highly beneficial to be able to use each other through collaboration. To be able to hear other's thoughts and ideas. I think that has a huge benefit […] as long as you want to change and feel a motivation to make it happen, I believe that it is highly self-developing to conduct in-depth and interdisciplinary teaching as a teacher.*

Charlie also emphasized how collaborating with others have a self-developing effect, especially when working across subjects, through this statement: "*One can see that working across the teaching staff has a developing effect on yourself as a teacher. And you gain ideas that you can use in your own teaching, that way your 'resource bank' gets expanded*."

In Fallon's case the support and trust from colleagues and the management to try new things is vital for their motivation to continue working as a teacher. Both support and encouragement to try new methods fuels the candidate with motivation. Fallon stated the following:

> *It is more motivating to be a teacher when you feel like you have the freedom to try new things. And that your partner and the leader back you up when you want to try new things. And that they give you that trust and accept that it is okay to try new things. Then it is more rewarding being a teacher.*

Charlie also made the statement "what gains the students, gains the teachers as well" when talking about beneficial reasons to conduct interdisciplinary teaching. As a teacher you learn alongside your students, regardless of if the lesson went as expected or if you encountered unforeseen problems. When a teaching plan feels successful, you gain more confidence as a teacher and feel more secure about your own abilities. The candidate also said even though things do not go as planned in a lesson it ultimately does not matter because then you have tried and learned something from it.

Blake also had some thoughts about having space to try and fail, as well as be able to research your own practice:

> *You do research on your own practice. You try things and then evaluate it, so that is very self-developing. Not necessarily because it is interdisciplinary work, but because you are researching your own practice continuously […] We take the advantages interdisciplinary teaching provides and we try to develop it to something that gives the students more competence.*

Researching your own practice entails constantly evaluating yourself and your work, to always seek a way to improve your practice to benefit your students. Blake explained how there can be difficult to find time to properly assess and evaluate the lesson.

Much like what gains the students also gains the teacher; motivated teachers seem to create motivated students. Alex stated that the teacher's motivation behind a project has a strong influence on the students. Motivation and enthusiasm are contagious, according to the candidate. The students will pick up on the teacher's enthusiasm and their interest for the project may heighten. One candidate stated that motivated teachers are essential, while another expressed that it is easier to get the students on board when the teacher is enthusiastic.

As stated earlier, all of our interview candidates had a special interest in interdisciplinary teaching. They shared some thoughts on the new curriculum and how it can inspire more teachers to implement the method in their own teaching. Several of the candidates believed that by including interdisciplinary topics in the core curriculum it will give more teachers a push to incorporate interdisciplinary methods in their teaching practice. Since it is now an official part of the curriculum there is also a higher expectation of support and facilitation from the school's management.

4.2.2.3 Beneficial factors for the students

All of the teachers from our small selection of interview candidates stated that their greatest motivational factor as to why one should conduct interdisciplinary teaching is the students' learning benefits. A statement made by all the candidates when they were asked what the term meant to them, was that interdisciplinary teaching seeks to provide deeper learning and a greater context through connections between the different subjects. Charlie talked about how

they plan theme-based teaching involving different subjects and teachers by first looking at angles that feel relevant and current to the students. Using exciting and interesting topics where the students can draw from their own experience can make them more motivated and to see the topics in larger contexts. The idea of planning lessons based on current themes where the students could use their own experience and interest was recurring in the interviews. We asked all the candidates if they had observed any benefits to interdisciplinary teaching in the the students, and Charlie gave this answer: "*Yes, I can see that it creates enthusiastic and motivated students [...] But we also see that it creates in-depth learning, and that it creates variation in the everyday-life. So, they view it as quite positive and it makes them want to come to school*."

To focus on one topic which is taught across different subjects creates more specialized knowledge than after single lessons. Evan elaborated on the connection between interdisciplinary teaching and in-depth learning:

> *In-depth learning is the central part here and I feel like interdisciplinary teaching facilitates more for the students to go deeper into a project with various angles, since it includes multiple subjects. So, I absolutely see it as a benefit in that they are able to see a connection between the subjects.*

Most of the interdisciplinary teaching lessons which the candidates gave as an example in the interviews were project-based. All of these projects placed the students in groups to exercise the ability of working together through collaboration. Charlie said this about their use of collaboration between students to improve the classroom environment and to implement the building of relations:

> *There needs to be a good classroom environment for good learning to occur. And that in itself, makes the students more secure in themselves and that is extremely important in a classroom. One cannot sit as 21 individuals and not know each other and at the same time feel secure around one another. We can see that it has a significant effect on the classroom, and we can see that there is a good relation between teacher and students.*

A connection between a good social classroom environment, relation building, and working interdisciplinary was also suggested by Fallon. The classroom environment and the social

aspect are important conditions for learning to occur, and according to Fallon it is the social element that has created most of the challenges they have encountered when working with interdisciplinarity. Fallon also said that a substantial amount of time is spent working on the students' learning environment and increasing the level of collaboration between the students. Interdisciplinary projects provide them with more room to work on the social aspect in the classroom. Fallon summarized this point with this quote: "*If you don't feel content, then you don't learn. So, I believe that the interdisciplinary teaching provides more room to do more social activities."*

Charlie talked about how the students want to be involved in their own learning experience. The students get inspired by previous projects or elements from their personal life such as social media, interaction with their peers, and/or the current news. This can be implemented in the teaching plan by the teacher. Student involvement is an important motivational factor, according to Charlie, and a natural part of teaching practice. Charlie made this statement:

> *I feel like it is natural for the students to voice their opinion on what they want to do in the classroom. If they have a voice in things that concern them, then they carry it out in a good way because they were involved in designing it. It is also important that they have a voice in the classroom, and that they feel heard.*

Fallon also mentioned how student involvement have influenced their work with interdisciplinary teaching: "*A lot of the interdisciplinary work we conduct are in regard to the possibilities the students have and that they create along the way".*

Fallon further explained the statement by describing the interdisciplinary projects they have conducted as dynamic. The projects have unexpected twists and turns, and they are highly shaped by the participants. Fallon said that the students' conditions and possibilities play a substantial part in how an interdisciplinary teaching project evolves in the planning process, but also during the active implementation.

4.2.2.4 Sense of Consistency

The candidates reported that the students' experience of consistency and connections between topics across subjects are a motivation behind implementing interdisciplinary teaching in various degrees in the classroom. They stated that it serves as a motivational factor while the

students expand their cognitive categories. The students develop new tools to understand information and realize how this knowledge can be transferred across subjects. Alex used an example about assessing sources as part of the lesson and explained how the students were made aware that information literacy is relevant in all subjects, and not confined to social studies.
Alex described how they had used *Atlantic Crossing,* the controversial NRK TV series about crown princess Märtha and her escape during World War 2, as an example while working with information literacy and assessing credibility. This was a part of a lesson in the Norwegian subject, however, Alex emphasized that the students needed the historical background to understand the context and to better assess the credibility of the show. Alex stated that using history to draw connections and making the students see the connections, strengthens the students understanding. This is also an example on how subjects can improve each other by using elements from each other to enhance the learning benefits.

Theme-based teaching can also provide the students with a greater sense of consistency on a daily basis, according to the candidates. As opposed to working with different topics in each of the subjects throughout the day, the students can stay focused on a single theme presented through various points of view. Drew suggested that it may cause the students to lose interest in a topic when there is a longer time period between each lesson. The candidate used the subject of RI (Religious Instructions) as an example of a subject with few teaching hours per week, where the subject becomes a "happening" because of the limited lessons. In these kinds of smaller subjects, theme-based teaching across subjects can be an opportunity to dive deeper into topics and create in-depth learning. As one the candidates pointed out, if you run out of time in your lesson then another subject can pick up where you left off.

The fear of not maintaining the enthusiasm and motivation for a topic when there is a longer time period between each lesson was something Fallon also expressed concern over. They made the argument that when you begin a new and interesting topic in a subject that engages the students, you just have to hope that the passion is still there the next lesson. There is often an abrupt ending when the lesson is over, and another teacher is supposed to take over the class for a different subject. This became clear by Fallon's statement: *"And your students really want to continue working with the project, they are very excited about it*

and then you can't continue at that moment [….] which means the next time we will be working on it is next week and then you have to hope that spark is still there."

4.3 Planning, execution, and reflection

All of the candidates gave examples of projects they had executed in classrooms. They explained the different phases of the work process and shared their experiences with interdisciplinary teaching. There were a few key points that were mentioned multiple times in different interviews.

4.3.1 Planning

We asked the candidates about what went into planning and executing an interdisciplinary project, as well as which reflections were made by the candidates and their colleagues. We found that most of the planning was done by a team of 2-4 teachers with different subject backgrounds. The teachers seemed to often share a workspace which made it easy to talk with each other and share ideas. This eased the planning process and made it so that the reflection around the class instruction could happen continuously throughout the project over a cup of coffee.

According to the candidates, collaboration and communication are present in all parts of the interdisciplinary work. Alex, Drew, and Evan said that it is easier to plan something with a smaller group of teachers, up to three people. On Alex's school the responsibility of planning alternated between the different teachers. A teacher plans six weeks ahead and shares the plan with their colleagues. Alex noted that it was important that the different subject teachers communicated throughout the planning process so that they did not end up teaching the same content and have the same activities in different lessons. Open communication and a mutual understanding are needed to achieve effective and purposeful instruction. The way Alex's school is structured, all the classes have the same themes. The one and same lesson plan is supposed to be used in all classes. The plans are shared on a digital platform and all are obligated to follow it. This creates the existence of a collective understanding on what is being done across the school.

In Drew ’s case two teachers were working together in one class. They had most of the subjects between them, which made it easier to plan and execute interdisciplinary projects according to the candidate. Drew stated:

> *It makes us very lucky, but that is not the case for everyone. We are only two people who have to work together, while if this was in another class you would maybe have to get four other subject teachers that would sit together to pull in the other subjects. It requires finding more time, just to find room in the schedule is a challenge.*

Other candidates also mentioned that there is a lack of time in the workday to really plan together, much less reflect collectively after the project has ended. Evan had this to say about the matter: *“There is very little time set aside for teachers to immerse themselves in things, to navigate themselves in what is new and how we can work with it. And the planning itself, there is not enough time to facilitate for the students”.*

4.3.2 Execution

When asked about what one should consider when executing an interdisciplinary lesson. Alex mentioned the importance of making it clear to the student how the knowledge and abilities that are taught are linked to several subjects. Alex said:

> *Yes, I believe that it is important to help students make those connections. It is just like when in History the students don’t understand that the knowledge builds on a previous topic, or in our case it could be a topic they had two years ago. You have to help them see the links all the time and have the explanations ready for “now we do this, because…” and sometimes maybe overexplain why we have chosen those subjects.*

Another important thing to note is that one should not expect everything to go perfectly the first few times one tries to work in an interdisciplinary manner. A large degree of trial and error should be expected, as is the case for everything that is new. As Blake stated: “*If you want to achieve interdisciplinarity and especially in-depth learning, you have to plan a lot, and try and fail”.*

The same notion of trial and error was also expressed by candidates Charlie and Evan. Charlie said that there is room for error and one simply has to try something new and different. In Evan’s case the school leader expressed that the teachers should start their interdisciplinary

development by trying and failing. Evan stated: "*This fall we had multiple meetings with the school leaders where we were introduced to interdisciplinary teaching, and we were going to try and fail a little with a careful start. We could test it out and things didn't need to be perfect from the start".*

4.3.3 Reflection

A few of the teachers we interviewed had facilitated the assessment of the interdisciplinary learning by adapting the products the students were to produce. They made it so that several of the subjects could assess the same work. Alex reflected on this by stating:

> *It requires that we in some cases are three people who assess the texts. But it is important because I know I have assessed differently in Social Studies and in Norwegian, for example. And we believe it is good, for our sake and for the students. And it probably highlights that this is a theme that concerns multiple subjects.*

Drew also mentioned this as something that they had reflected on and wished to get better at: *"We are supposed to assess the same work and extract what we need from that. That is a thing we are working to get better at as a part of our reflection, that this is something we have to consider".*

In their interview Fallon told us they had reflected over and worked with parents who were skeptical to the new teaching approach and that it could be tempting to go back to old habits.

> *Because the parents have grown up in a very old school system that does not resemble the one we have today. And then it may be easy to fall back on the textbook and not dare to step out of your comfort sone. In a way, you don't have room from the parents to fail. Then it becomes difficult to try and fail.*

Fallon also gave a possible solution to this problem: "*I think parent-teacher cooperation is important, to have the trust of the parents. That despite the fact that we work two -three months with the same theme, we are going to practice everything in the competence aims throughout the lower secondary level".* Fallon believed greater communication would help teachers get parents on their side.

4.4 How teachers view Social Studies and English

In the interviews we can noticed some general attitudes toward English and Social Studies as subjects and what their role is in an interdisciplinary project. English as a subject was explicitly referred to as *a tool for instruction* and *a supporting language* by two of the candidates.

Alex said that, "*I believe that English is seen as a tool for instruction"* and they further explained: "*We talk about how the students have to be able to do eight different jobs when they are done here and are going to meet the world. They need English. And they need to read articles in English in all fields. It's a very important subject".*

Alex sees the importance of the English subject and believed that the students must learn English to operate in society. However, it can seem like the focus of the subject is language learning. This is further solidified by Alex's answer when asked about the subjects' integrity.

> *For English it can be as easy as that we have different ways to use cursive and quotation marks. Rules for using a comma and how to cite sources, and such. I don't believe that the subjects are going to fade out. And of course, in an English lesson I will teach in English. But that is not natural in a Social Studies lesson even is the content is the same.*

Alex expressed that the methods in English are easy to implement into interdisciplinary teaching but does not mention how central themes in English can be used. This is a notion reflected by Fallon

> *The other subjects are a little less rigid. I may not need to teach about a specific theme, but it is more about practicing different skills and to use a language, much like in English. There are few things you have to go through in English, but it has a big potential for finding information, interpret it and use it. They get to practice the skill even when it becomes a supporting language*

Fallon also has a focus on developing the language skill in English much like Alex. There seems to be a tendency to use methods from the English subject while the themes used in interdisciplinary teaching belong more to other subjects according to the teachers we

interviewed. Blake mentioned teaching their students to write a five-paragraph essay which is another method from English.

Social Studies is, according to Charlie, easy to incorporate into interdisciplinary lessons. *"I feel like Social Studies is involved in everything. The subject fits in most interdisciplinary projects"*, there are several themes in Social Studies that overlap with other subjects. Though Social Studies seem to be well represented in interdisciplinary teaching, the subject is in the process of losing some of its character according to Alex, *"Now there is less and less History in Social Studies, is has become more dependent on the teacher"*. Alex says that the inclusion of History in Social Studies relies on the teacher's interest in the field and to what degree they see it as important.

4.5 Requirements for Teacher Competence

Another point that was made by a couple of the candidates in terms of facilitating for interdisciplinary work, was the requirements for the teachers' competence. This concern was especially linked to formal training.

4.5.1 Teacher competence

Evan and Fallon both expressed some opinions about requirements for teacher competence when working with interdisciplinary teaching, however, they had different views on the matter. Fallon stated that:

> *Teachers have to be open to it, and to some degree be alright with putting away our pride when it comes to the feeling of having to know everything beforehand. But when it comes to in-depth learning, learning to learn, then it is not necessary. In a way, it is enough to be a professional teacher who knows how students operate, you know how learning happens.*

Fallon believes that some teachers have an attitude that teachers are supposed to know everything related to their field. However, according to Fallon, that is not necessary. Teachers are required to know how people learn and how students operate. Even though this may not apply to all subjects, they believe there is enough overlap in some subjects that teachers have the competence to teach subjects other than the ones they had during their teacher education. Fallon states this in their interview:

> *It is not a given that it works for all subjects. Mathematics requires a certain competence when it comes to calculations and counting and in Programming you have to know how to program. But Norwegian and Social Studies and Religion and such, are subjects you manage even if they technically are not your subjects.*

When asked about if they have seen benefits in using interdisciplinary teaching in their practice, Evan stated that:

> *I absolutely see a benefit, in that the student can see the links between the subjects. And that to work in an interdisciplinary way is something you can do in all subjects. That is something I believe everyone benefits from. I only wish that I had competence to teach more subjects.*

Evan wishes that they had competence in more subjects. When interpreting the quote above, one can pinpoint the reason to be that they believe interdisciplinarity requires competence in almost all subjects. Based on the quote, this can be because an interdisciplinary approach can be implemented in every subject. The question of what degree of competence a teacher needs in order to teach a subject when working with an interdisciplinary approach to teaching will be further addressed in our discussion.

4.5.2 Requirements for teachers vs. how they are equipped

Fallon explained in their interview the discrepancy between the new teacher education and the vision of interdisciplinarity in schools, as well as how previous practices can affect the implementation of interdisciplinary teaching.

> *I have a lot of subjects, so I have a good overview of where we are in the different subjects and what my students need to practice more. And my partner, who I share the class with, she also has many subjects so between the two of us we cover everything in a way. It is much easier to succeed.*

This statement expresses that it is important that teachers have enough time with their class to get a more comprehensive understanding of the students' learning. This becomes easier if a teacher is responsible for more subjects because they then have insight in how the students are doing in all those subjects and know exactly what is being done. Fallon stated in regard to

this: "*But the years where one has very few lessons in a class and is spread around, then it is much more difficult*". They believe that it is easier to conduct interdisciplinary teaching in classes that the teacher is more present in. If a teacher has very few subjects in a class, then it is more difficult to know what level the students are on.

Fallon explains that the Norwegian school structure, and how the teachers' time is distributed in regard to planning and lessons, counters the wish for more interdisciplinarity in schools and the new teacher education.

> *So, it may go a little against the new education that we are in, that we are supposed to have only one or two subjects. So, I am a little skeptical. I believe the competence that one gets through the education is important and that competence is needed to adapt and make the interdisciplinary lessons. However, schedule-wise, as it is in schools and how subject teachers are used, it is counterproductive. It at least requires that one has time to work with this.*

They are skeptical towards the specialization of teachers when looking at the school schedule which leaves little time for collective planning. Fallon believes that the current teacher education does give teachers the competence to plan and execute interdisciplinary teaching, but it is not compatible with how schools actually operate.

Another point Fallon makes is that old practices can affect the implementation of interdisciplinary teaching, because teachers who do not have the same degree of competence may feel insecure in trying interdisciplinary teaching. Especially if they are used to depend on the subject textbook. This quote from the interview illustrates this:

> *And I believe that is related to competence. Because I'm thinking, if you have the subject as your masters' subject then you probably see multiple solutions to how you can do things, but there are not many who have a masters' degree in Norwegian schools yet,*

and they continue with *"They are accustomed to use the textbook and they feel like they have to go through all the chapters".*

When asked what they believe is important factors in implementing interdisciplinary teaching, Drew noted that: *"Well, it is about daring to let go and the teachers who stick to the textbook have to let go and think anew. To be willing to change. Those are good elements for success"*. Drew believed that teachers have to be open to new ways of doing things and to let go of outdated practices.

4.6 Summary of findings

Our findings revealed the interview candidates' beliefs about both the ideal and the real practice regarding interdisciplinary teaching in Norwegian lower secondary schools. The different incentives we detected during the analysis were structured into Leader-initiated and Teacher-initiated. These incentives describe where the work originates.

The leader-initiated interdisciplinary work was described by two candidates as enablement for cooperation. The management played a more active role in facilitating for interdisciplinary teaching among the teachers and were more encouraging in making it happen. Several of the candidates, even the ones who described the motivation as teacher-initiated, said there needs to be a system of interdisciplinary teaching in place. The school management needs to be the one encouraging collaborations between teachers across subjects and is also the one who needs to create a viable system.

The teachers we talked to underline the importance of collegial cooperation when working with interdisciplinarity. Several of the candidates stated that working across subjects with other teachers creates a higher level of collaboration, sharing of work, and even expands the social sphere. Three of the candidates stated that they broadened their own level of knowledge by constructing lessons with teachers from other subject areas. One of the candidates used the term 'systematic interdisciplinary teaching'. This entails a more systematic collaboration between teachers, initiated from management, to ensure the same level of interdisciplinary teaching across the different classes. Another point that was made clear during the interviews was the importance of motivated teachers because motivated teachers create motivated students.

The teacher-initiated incentive for interdisciplinary teaching also revealed a student-influenced view, which entails that the motive for conducting the method is originated in the students learning benefits through their own interests and experiences. Using relevant themes

that play on the students experience and interests can serve as a powerful motivational factor, according to most of the candidates. One teacher explained that they always started looking at angles that the students might find relevant and interesting when planning interdisciplinary teaching. Working on one common theme across subjects can also create a greater sense of consistency for the students on a daily basis. The consistency will also help with making the students see larger connections.

Several of the candidates used project-based interdisciplinary teaching as an example of lessons they have conducted. All the cases were group projects where the students had to work together on a task. The collaborations between the students aspired to improve the classroom environment and to implement relation building. Students' involvement in their own learning experience also came up as a motivational factor in interdisciplinary teaching. This also applies to the classroom on a general basis. It is natural for the students to have a voice in what concerns them, and when they are a part of constructing their own learning experience it serves as an encouragement.

When it comes to planning and executing interdisciplinary teaching with others, the majority of the candidates agreed that a smaller group of collaborators is ideal. The group should preferably consist of 2-3 teachers and no more than four. This is to maintain the integrity of each represented subject and to make it easier to find time in the schedule for cooperation. When reflecting over the process behind planning and executing this type of teaching, some of the candidates mentioned assessment. The common thought was that there should be more consistency when assessing an interdisciplinary work. Instead of the students constructing four different products for the four different subjects involved, the teachers should find a way to evaluate one and the same product. The candidates who mentioned this all stated that this was an area where they had a large potential for improvement. The candidates also stated that, teachers need to be explicit with the students on which connections they want them to make. The connection can be with other subjects or it can include earlier themes in the same subject. Regardless, it is important to make it clear to the students' what competence and knowledge they should obtain from the lesson.

Interdisciplinary teaching brings with it requirements for teacher competence. The new teacher education equips new teachers with the skills required to plan and execute

interdisciplinary teaching. This was expressed by one of the interviewees. They also held the opinion that the new education does not fit with how the average school day is structured, and that this can lead to decrease in motivation for interdisciplinary teaching among teachers. They believed there is a correlation between the competence the teacher has and the willingness to diverge from a familiar practice. Another candidate believed that an important requirement for interdisciplinary teaching to work is the teachers' ability to let go of outdated practice and be open to new influences.

5 Discussion

This chapter will further discuss and link our findings from Chapter 4 and the theoretical field presented in Chapter 2 to our research questions. We discuss the different structural approaches to interdisciplinary teaching, which we have decided to call *Systematic Approach* and *Teacher-Initiated Approach*. We further look at the benefits the students reap by making connections across different subjects and themes. This part will look at the connection between in- depth learning and critical thinking when working with interdisciplinarity. We discuss how assessment can be used as a tool when working with interdisciplinarity. Lastly, we look at pitfalls and challenges which can occur when working with interdisciplinary teaching.

We discuss the benefits of interdisciplinary teaching and how it can be facilitated with a dual view as we include both teacher experiences and a theoretical perspective. These are the research questions we wish to answer in this discussion. What are the benefits of interdisciplinary teaching and what factors are needed to promote it in Norwegian schools, and what are teachers' experiences with interdisciplinary teaching and what do they believe need to be facilitated in order to promote it?

5.1 Different degrees of interdisciplinarity

Bolstad (2020) introduces different degrees of using interdisciplinarity in school, which are placed in the staircase model. In our findings we noticed a variation of interdisciplinary teaching projects which could be arranged on different levels of interdisciplinarity. The levels from the staircase are presented in an increasing order from intra- disciplinarity, multi-disciplinarity, inter-disciplinary, and trans-disciplinary. In the following we present and discuss some of the examples of teaching lessons in correlation with the staircase.

Our findings revealed different approaches to interdisciplinary teaching that show signs of different degrees of facilitations. This ranged from a systematic approach where the motive behind it mostly originates from the school’s management to a teacher-initiated approach where the projects were more dynamic. The candidates Blake and Fallon described two very different ways to how they normally plan and conduct interdisciplinary teaching lessons. The examples of interdisciplinary projects show the two ways of working with interdisciplinarity as presented by Bolstad (2020) in part 2.1.1. The project exemplified by Blake starts with the

subjects and then the theme is constructed based on the different subjects that are involved. In this type of interdisciplinary work, the theme is used as teaching material which can entail using a topic commonly taught in Social Studies in an English lesson. The theme is taught based on the premise of each subject and is characterized by the teaching methods in the individual subjects. The other understanding of how to conduct interdisciplinary teaching is by reversing the processes and starting with the theme. This way was demonstrated by Fallon through their project using Minecraft as a platform. The overarching theme was *Sustainability* and the starting point for the project. After deciding on the theme, the teachers began pulling in subjects which were considered relevant.

In the interdisciplinary staircase, as it is presented in 2.1.1, the exemplified project described by Blake can be placed on the multi-disciplinary step. Blake explained how they usually decide on a general theme which can fit with the involved subjects. This correlates with multi-disciplinarity as it is characterized by the common theme being taught separately in the individual subjects and are approached by the specific methodology of each respective subject. A multi-disciplinary way of teaching entails less collaboration across the different subjects after the theme is established. Blake's school has a higher level of organization surrounding interdisciplinary work. This is a part of the school's focus to gradually implement more interdisciplinarity into the teaching practice. Blake stated that the school management provides the teachers with scheduled time to plan and reflect upon the interdisciplinary teaching. Therefore, even though there may be a lesser degree of collaboration during the project, the teachers still evaluate the work together through reflection.

The *Sustainability* project described by Fallon was a larger collaboration between multiple subjects over a longer time period. The project started with the subjects English, Norwegian, and Natural Science, however, as it progressed, several more subjects were included. Fallon described the working process as dynamic and flexible, in the sense that the teachers organically could pull in additional subjects and sub-themes as the project evolved. Fallon explained that the project is representative to how the teachers at that school usually operate when working with interdisciplinarity. The project ties in with the trans-disciplinary way of teaching as it is characterized by the removal of the distinct separation of subjects within the work, which was something we saw was the case with this project. The students' involvement

in the process caused the teachers to integrate both Social Studies and Mathematics into the project as it went along. The project included thematic elements, methods, and competence aims from each of the subjects, yet the theme is still the main focus of the project.

We have concluded that Alex's project about the *Industrial Revolution* fits in with the third step, inter-disciplinarity of Bolstad's interdisciplinary staircase. This step is characterized by the close collaboration between two or more closely related subjects. What differentiates inter-disciplinarity from the step below, multi-disciplinarity, is that the subjects are co-dependent on each other's progress. The lessons are designed to follow up on each other. The Industrial Revolution project was a collaboration between the subjects English and Social Studies, two subjects that can naturally complement each other. The focus of the lessons was for the students to develop knowledge and an understanding about the living conditions in Victorian England. In terms of skills, the students were to exercise their ability to assess the credibility of sources and to develop information literacy. The inter-disciplinary lessons were based on an overarching theme which was supported by the competence aims from each involved subject. In this type of interdisciplinary teaching there is less focus on keeping a clear separation of the subjects, but not to the same extent as trans-disciplinarity.

The lowest form of interdisciplinarity and first step on the staircase according to Bolstad, is intra-disciplinarity. None of the examples we collected from the teachers during the interviews arranged itself on this level. However, the study done by Alptekin, et al. about the beneficial factors to a theme-based approach to learning English as a L2, can be classified as intra-disciplinarity. The study explored using interdisciplinary themes in the English lessons to promote language learning. This entailed no cross-subject collaboration, only the usage of known themes which had been used in other subjects.

5.2 How Interdisciplinary work can be approached

Through our findings we found two distinct ways interdisciplinary work can be approached. A *systematic approach* and a *teacher-initiated approach*. Each of the candidates disclosed that interdisciplinary teaching is conducted in various degrees at their respective school, and we were able to see a clear pattern in how interdisciplinary work is approached. What we mean by this is who initiates it, facilitates for it, and is the driving force in making interdisciplinary teaching happen.

5.2.1 Systematic approach

Blake describes their school's way of organizing the interdisciplinary projects as more systematic. The school leadership has allocated time to discuss the planning and reflect on the projects. Here the leaders are not only actively encouraging interdisciplinary work but are also facilitating for it. It is common knowledge that a teacher's time is limited by a number of tasks such as planning and customizing lessons, grading/evaluating, meetings and communicating with parents, and members of staff. When school leaders assign time to specifically work with interdisciplinarity, it also helps teachers develop better interpersonal, professional relationships. This notion is supported by Feldman (2013).

> Time is also an obstacle in the development of relationships among educators. Teaching in itself is a time-consuming endeavor as teachers have lessons to plan, papers to grade, and mandatory professional development for licensure. A systematic solution is to embed time for teachers to meet and the skills where needed to create meaningful professional relationships. (Feldman, 2013 p.22)

Five of the six interview candidates expressed that time was a significant concern when trying to teach in an interdisciplinary way. They also said that planning interdisciplinary lessons and projects take more time because of the cooperation that is needed, as one teacher cannot teach all subjects. In these cases, it did not seem to be the same degree of systematic approach that Blake described. There was no time specifically to work with interdisciplinarity. The management encouraged teachers to incorporate interdisciplinarity, however the discussions between teachers which are needed to plan interdisciplinary teaching was lacking.

Feldman (2013) argues that "Effective school leadership should foster and develop the needed dialogue and discussions needed for change" (p.22). This solidifies the fact that if schools want to develop a new practice which incorporates interdisciplinary teaching, the school leaders have to facilitate the time and environment that promotes that change. By facilitating the change, the school leadership also sends a message that it is something they believe in. It can help with motivating the teachers to develop their understanding and skills to better meet the challenges associated with interdisciplinary teaching.

5.2.2 Teacher-initiated approach

A systematic approach may be seen as ideal in order to facilitate and encourage interdisciplinary teaching, however too much involvement and direction from management may have the opposite effect. Management who lay too many guidelines on the interdisciplinary work may demoralize teachers, especially if they have no say in how the work is supposed to be conducted. A teacher-initiated approach is powered by the teachers' interest and motivation towards interdisciplinarity. The knowledge the teachers has on interdisciplinary teaching has been gathered through their own interest. In a teacher-initiated approach there is usually 2-3 teachers working together, and the practices are developed within that small group. There is a connection between two of Senge's disciplines, personal mastery and mental models, and a teacher-initiated approach as they revolve around personal development.

Five of the interview candidates told us that they were the ones initiating the interdisciplinary work. They expressed that the planning and reflection around interdisciplinary lessons happened in breaks between lessons or, if they are lucky, in a joint hour for planning. These joint hours are largely coincidental. If the collaborating teachers are located in the same office the planning of interdisciplinary lessons/projects become somewhat easier from the fact that the shared workspace enables more direct communication.

In five of six interviews, there seemed to be a somewhat similar structure. A few teachers work together without considerable participation from other colleagues, which separates it from the systematic approach to interdisciplinary teaching. This brings us to the point that it becomes largely coincidental which classes are subject to interdisciplinary teaching. To combat this, there should be collective guidelines which could make more teachers engaged in interdisciplinary work.

One thing we noticed in the interdisciplinary projects that were initiated and driven by teachers were that they are quite dynamic, as shown in the example by Fallon. Fallon explained how different subjects were needed to solve new issues that occurred. To see the connections, the teacher has to be actively engaging and reflecting around interdisciplinary teaching. This is connected to personal development and mastery.

5.2.3 Pros and cons of the two approaches

When looking at the two approaches separately one can see that they both leave something to be desired. If interdisciplinary teaching is only based on a systematic approach, there is a danger that teachers do not feel connected to the work and lose their autonomy as teachers. This can happen if the school leaders construct guidelines that are overly strict. On the other hand, if there is no structure teachers may lack time and resources to properly plan and execute good interdisciplinary lessons. In addition, there may be a shortage of collective agreement to implement interdisciplinary teaching, which can entail that schools cannot guarantee an exposure to interdisciplinary teaching for all the students equally. A structured approach facilitates a collective development of skills and knowledge, which according to Feldman (2013) is important for school development.

A teacher-initiated approach ensures that the teachers who work with interdisciplinary teaching are engaged in the work and participate actively. The teachers have autonomy and they can be creative and adaptive with their planned lessons. There are pros and cons to both approaches, but together they can complete each other.

From our findings we can see that there is still a lack of structure when teachers work with interdisciplinarity. In five of six cases the teachers were encouraged to implement interdisciplinarity into their practice, but there was little to no resources given to the teachers, especially in relation to time. Most of the time the teachers were the ones who initiated the changes, and it was up to them to structure and manage the work. This meant that they had to find the time to cooperate on their own. This may hinder the effectiveness of interdisciplinary teaching by not giving the teachers a structure to work with.

5.3 Different roles when working with interdisciplinarity

There are two different roles in interdisciplinary teaching. One is the teacher's role that focuses on lesson planning and execution, and then there is the leader role which focuses on time management and the facilitation of cooperation between teachers and the different school subjects. In a purely teacher-initiated process the management role is delegated to the teacher.

5.3.1 Requirements for school leaders

According to our findings, school leaders should support the collective work needed to develop a shared new practice. What we mean by this, is that the school management for one, makes time for collaborative planning and reflection around interdisciplinary teaching, and two, encourages teachers to share their experiences and knowledge around their practice so that personal development can promote collective development. By giving teachers time, which is specifically devoted to developing interdisciplinarity, the school leaders are signaling that it is something they believe in. This can motivate more teachers to participate in interdisciplinary teaching. Bolstad (2020) writes that "If more teachers are to cooperate on planning and executing lessons, they have to have the opportunity to plan together" (p.40) [our transl.]. He points out that teachers need time to plan interdisciplinary teaching together. He further explains that "If the leadership at a school wishes for teachers to cooperate and link subjects together, the leaders have to create a good structure of the cooperation" (p.40) [our transl.]. Bolstad (2020) supports the notion that the responsibility of structuring and making time for the planning of interdisciplinary teaching falls on the school leaders.

It may also be beneficial to the teaching staff that they are presented with guidelines that can give teachers direction on how to approach interdisciplinary teaching. This required the school leaders to be knowledgeable about interdisciplinary teaching, so that they can structure the work in a way that eases time management and promotes cooperation. The school management should give teachers time to both plan lessons and projects together, but also give teachers the opportunity to participate in team learning.

To continue on the point of school leaders and knowledge, we believe school management could supply teachers with material on interdisciplinary teaching. There is already a lack of time in schools, and many teachers may feel that they do not have the time to find information on interdisciplinary teaching. If the management supplies reading material, it can help teachers develop their knowledge on interdisciplinary teaching. It can also support the collective understanding by creating a common ground for further development and support team learning. This can help create collective mental models.

Four of the six interviewees mentioned that the school leaders had expressed an openness surrounding trial and error when implementing interdisciplinary teaching into the school

practice. This endorses an attitude that promotes development. The consequences of this attitude can be that teachers and others involved in implementing interdisciplinary teaching are focused on development instead of seeing perfect results from the first try. From our findings we could see the importance of the school management, as well as teachers, carrying this attitude. This acceptance resulted in the teachers feeling more comfortable with trying something new.

5.3.2 Requirements for teachers

The role of the teacher is multifaceted. They are the ones planning, executing, and developing interdisciplinary teaching. They have to accommodate the students and fine-tune the lesson plan. They have to develop their personal skills and knowledge surrounding interdisciplinarity and support the colleagues they are cooperating with.

5.3.2.1 Attitudes towards interdisciplinary teaching

From our findings we could see that there were some attitudes that promote interdisciplinary teaching and some that, quite naturally, hinder it. One of the attitudes some of the interviewed teachers expressed relates to openness and the ability to let go of control of the lesson/project. Alex, Drew, and Fallon express in their interviews that teachers need to learn to let go and compromise for interdisciplinarity to be possible. Alex points out that one should not only be concerned with teaching students the methodology and knowledge from a subject. This is because such an approach can hinder the teacher's ability to see the connections to other subjects. The problem can occur if teachers feel they have too much "to go through" to fulfill the competence aims in their subject. This attitude can hinder the development of an interdisciplinary practice. Therefore, it may be important that all the teachers who participate in interdisciplinary projects are open to suggestions from others. They also have to be willing to teach a theme that has its source in other subjects which they do not have formal training in.

It is also safe to say that a positive attitude towards interdisciplinary teaching is beneficial to both the quality of the work and in developing functioning collaboration between staff members. A positive attitude is a factor in creating a shared vision and also developing personal mastery, as discussed in part 2.2. Collective discussions may help promote positive attitudes by creating an arena for exchanging opinions and views. Blake expressed that some teachers were skeptical to the wider implementation of the interdisciplinary project and the

possibility of things not going as planned, after trying it for the first time. Instead of continuing to develop the project they wanted to distance themselves from it. It is a possibility that if enough teachers develop negative attitudes it could hinder further development of interdisciplinary teaching.

5.3.2.2 Teacher Competence

In their interview, Evan expressed that they wished they had more competence in different subjects to better be able to conduct interdisciplinary lessons. The feeling of insecurity when faced with an unfamiliar subject is a common one amongst teachers. Teachers may feel like they are not competent enough to teach subjects they themselves have no formal training in. This introduces the question of how much competence a teacher needs to be able to instruct in an interdisciplinary lesson that has elements from multiple subjects. Fallon believes, as stated in our findings, that teachers should be more open to take on subjects they are less familiar with. This is because many subjects overlap, and teachers are therefore more competent than they initially think.

Fallon, in their interview, explained that the most important competence a teacher has is the ability to facilitate learning and guide students. Fallon argued that teachers do not necessarily need to have formal training in more subjects, but they need to be more open to teach subjects that overlap with their own subjects. Bolstad (2020) writes that "Teachers who are going to conduct multi-subject or interdisciplinary work, should read the curriculum from all the subjects taking part in the work, not only the subject they have a responsibility of teaching" (p.39)[our transl.]. This is a beneficial activity for getting a holistic view of the students' learning.

When we interviewed Fallon, we noted that they described a discrepancy between the current teacher education and how the school schedule is structured. The teachers educated today for the grades 5 to 10 are equipped with just a few subjects. If teachers are only willing to teach subjects they have formal training in, they may only able to be a subject teacher spread across different classes. The teacher could, as an example, be responsible for all the English lessons in a school. It may then become difficult to incorporate a higher degree of interdisciplinary teaching. This is because the teacher could experience difficulty with finding time to cooperate with others and plan interdisciplinary lessons for every grade. This can also hinder the teachers' ability to see the whole picture of the students' learning. Bolstad (2020)

expresses the importance of teachers having insight into what the students are learning in other subjects:

> Regardless of whether a school is working with interdisciplinarity or not, teachers should know their students, and they should have a degree of insight in what the student are concerned with. In a school context, the students are concerned with other subjects. One argument for why teachers should read other subjects' curriculum, is therefore to know the student reality – also in school. For teachers to be able to help students make connections between subjects, they have to have knowledge about them (p.39) [our transl.].

Teachers should not only read other subjects' curricula in order to develop their own competence in a subject, but also in order to better understand the students. According to Fallon, the way lower secondary school is structured goes against the vision of increased interdisciplinarity in Norwegian schools.

5.4 Making connections and creating consistency

Creating explicit connection within and across subjects through themes has been highlighted as an important factor as to why one should conduct interdisciplinary teaching. The majority of the lower-secondary teachers we conducted interviews with stated this as the number one reason to why they execute interdisciplinary teaching in their classroom.

5.4.1 Pre-existing knowledge and contextual understandings

When working with interdisciplinarity, the students gain a larger perspective by being taught connections that link subjects together. It is also beneficial for the students because it provides them with tools that can be implemented across various scenarios. A greater contextual understanding through making connections can also create a larger sense of consistency within the school day. As stated by one of our interview candidates; instead of focusing on different themes in all of the subjects, the students can direct all their energy into the same theme presented through various points of views. The sense of consistency can also serve as a motivational factor. It became apparent in some of the interviews that the teachers fear the students may lose the motivation and enthusiasm they originally had for a theme when there is a longer time period between the lessons. In smaller subjects which only has one lesson per

week, this could mean using most of the time picking up the threads from the previous lesson and getting the students motivated again. When subjects complement each other on a higher level, it can be an opportunity for subject to dive deeper into the topic.

The Penna-Baskinger (2018) study reported that the participants experienced a more focused group of students which also showed signs of higher interest in the lesson through active participation and engagement. The teachers in the study connected this to the fact that when a theme is infused into multiple subjects the students feel like they already know it, which gives them confidence to be active in the lesson. It is easier to be engaged in a subject when you already have some knowledge about it. Penna-Baskinger connects this to activating pre-existing knowledge which further develops the students' cognitive skills. Using pre-existing knowledge to increase student activity and engagement in interdisciplinary teaching was a point that was also made during one of the interviews. The candidate stated that the planning phase often started with finding angles on a theme that is interesting and relevant to the students. The teachers also tried to find exciting topics where the students could draw from their own experience. The students have valuable experience and ideas surrounding their own learning that can be beneficial. Using a topic which is familiar to the students can also serve as a tool in subjects they find difficult. The familiarity of the theme can for example make language learning more manageable for the students. The study done by Alptekin, et al. (2008) stated that a theme-based approach to language learning can give students a sense of accomplishment because they have developed their language skills while further exploring known content.

Several of the interview candidates linked student involvement and relevant themes as motivational factors and a way to increase active participation in the classroom. This raises the question of whether it is possible to plan every lesson based on the premise of the students' experience and interest. With interdisciplinary teaching it is possible to use various angles to tackle the same theme to create a larger context across different subjects. Therefore, it is possible to incorporate a larger aspect of the topic, which you normally would not have time to include. An example of this became apparent in one of the interviews where the theme was 'Food and Result', which referred to sustainability. The teachers who led the project were able to include components such as social media and influencer to create awareness for information literacy, and where to find reliable information regarding health and nutrition.

Teaching lessons aim to provide the students with competence which can be used across different scenarios and implemented into everyday life. Therefore, the lesson needs to feel relevant and meaningful in the students' life outside of the classroom.

5.4.2 Critical thinking, in-depth learning, and interdisciplinary teaching

Social studies can provide the background knowledge to understand other subjects, for instance, through historical, political, ecological, or social viewing points. In the first interview we conducted, the teacher gave an example on a Norwegian lesson where the students practiced information literacy and assessing credibility towards historical depiction. The TV series *Atlantic Crossing* was used as an example and it was compared to an earlier history lesson the class had had about the topic of World War 2 and particularly Norway during this time period. Because the topic was familiar to the students it was easily incorporated into the lesson and the student could see that the topic had different usage areas than only within the original subject. The students used pre-existing knowledge and practiced a competence which stretched across different subjects. The history discipline acts as a natural backdrop in interdisciplinary teaching to emphasize larger, logical connections. Using history in this way also expands the students' historical consciousness (Nutting, 2001). Their perception of the past and the future is influenced by their current understanding of the present.

The use of history as a base for interdisciplinary teaching is supported by the Linked Course method by Maureen Murphy Nutting. The method shows how the numerous aspects of the history discipline can be weaved into other subjects. The interdisciplinary topics which are now included in the revised curriculum also accommodates for Social Studies to take on a more significant role in interdisciplinary work. The presence of the interdisciplinary topics of LK20 can be found in 18 of 19 competence aims for Social Studies.

Using a discipline, such as history, to connect subjects together in interdisciplinary work is beneficial for the students in terms of critical thinking, problem solving, and integrating knowledge into different areas of usage. The ability of critical thinking is presented as a core value within social studies. It is therefore arguable that the subject holds a certain responsibility to exercise the skill. Social studies encompass social issues which are highly relatable to the average citizens' everyday life. The skills of information literacy and critical

thinking are important to face these issues. Students today are required to be able to navigate, use, and produce reliable information. To properly equip the students, there is a need for critical thinking in correlation with in-depth learning.

The correlation between critical thinking and in-depth learning is a crucial element within interdisciplinary teaching. The main reason to why one should conduct interdisciplinary teaching is the students learning benefits. In several of the interviews we conducted, the candidates expressed a clear link between interdisciplinary teaching and in-depth learning. They argued that it creates more specialized knowledge when a theme is taught across different subjects, than after a single lesson. A reason for this is the variation of the unique angles, methods, and viewing points each subject provides, which can increase the students' deeper understanding of a topic. Working across subjects also means that one is able to spend more time on the specific topic, which could entail that more students develop a deeper understanding that they otherwise would not. Every student in a classroom have their own prerequisites which affect their learning situation. For some students the time spent on a topic can prove vital to their understanding. For the students who need more time to work on a specific topic to make the necessary connections and develop the deeper understanding, a longer time period can prove highly beneficial.

5.4.3 Assessment as a tool in interdisciplinary teaching

In Results and Findings, we present statements made by Charlie and Fallon regarding the students' involvement in interdisciplinary work. Both candidates called student involvement a motivational factor when conducting interdisciplinary teaching. Charlie argued that it is natural to involve the students in their own learning process and for the students to have a voice in things that concern them. Charlie also said that by giving the students influence in the classroom they felt more motivated and enthusiastic about doing a good and thorough job. There are multiple ways the students can have influence in the classroom. For example, by choosing the topic, teaching method, form of assessment, teaching activity, or by establishing an active and well-functioning student-democracy in the classroom. Fallon described the interdisciplinary teaching projects they conducted as dynamic, in the sense that they are evolving as a result of the students' involvement. The participants in any given situation are involved in shaping it along the way, the outcome is therefore rarely as one imagined it to be in the planning process. In the interdisciplinary projects Fallon described, the teachers found

it natural to include several more subjects than originally planned. This opened up the opportunity to address additional sub-topics and issues.

Assessment and self-assessment have been mentioned by several of the teachers we interviewed. The teachers believed it had the potential to be a beneficial tool in the students learning when working with interdisciplinarity. They also considered interdisciplinary teaching as a great opportunity to develop and exercise the students' ability to self-assess. This statement is in compliance with Bolstad's (2020) thoughts on assessment in interdisciplinary teaching. According to Bolstad (2020), interdisciplinarity provides an opportunity for a wide assessment of the students' competence where the students are involved in the evaluation process. The organization behind interdisciplinary teaching can also provide students and teachers extended time to work with a topic, which can give them time to assess the learning process as well as the result and product (2020, p. 43). By exercising the ability to self-assess and making the students aware of their own learning process, their metacognition is further developed. By engaging the students in the assessment process, they are made aware of how they learn and what conditions are required for further development. Bolstad (2020) presents two different frameworks for assessing interdisciplinary work; Know-Do-Be and KAB (knowledge, attitudes, and behaviors). The Know-Do-Be framework by scientists Drake and Reid bases itself on what knowledge, skills, and personal qualities the students should possess (2020, p. 44). This form of assessment can serve as a base in both formative and summative evaluation. The method also takes into account more than the student's knowledge and professional achievements. Scott Brown's KAB method entails observing the students' changes in knowledge, attitude, and behavior when they evolve and learn (2020, p. 45). Both methods center around developing the students' competence and skills by using formative assessment to promote learning benefits.

Both Alex and Drew shared some reflections on how one should use assessment when working with interdisciplinarity. In their experience, it is highly expedient for both the students and the teachers to lessen the number of products during one project. By having the students' work culminate into one product that is assessable in multiple subjects, the workload is eased for both parties. The individual subjects will still make an evaluation based on competence aims, goals, and the premise of the subject. Alex stated that they have good experience with three teachers assessing the same text. It requires more reflection and

collaboration between the teachers, something which, according to Alex, only served as profitable. For the teachers it meant exploring new ways of working with evaluation, while the students could focus on the quality of one product.

5.5 Pitfalls and challenges

Time was a topic that has been brought up multiple times throughout this study, more precisely the lack of time to manage planning and cooperation in a satisfactory way. All the teachers we interviewed mentioned that they lacked the time to plan interdisciplinary lessons. If there is not enough time to carefully plan and reflect on the interdisciplinary lessons the teachers may fall prey to challenges associated with interdisciplinary teaching. Time is also an important factor to develop functioning collaborations between teachers by strengthening their professional relations. This is where teacher attitudes become important, that teachers are helpful and accommodating towards each other.

Bolstad (2020) presents different challenges related to interdisciplinary teaching. One of them is to maintain the integrity of the subjects. Too much of a focus on teaching themes may cause the subjects to become blurry. This point can be linked to the discussion around Social Studies and History's place as subjects in upper secondary school, where the understanding of the subject has become warped and misunderstood. One of the interview candidates, Alex, mentioned a fear of History being included less in Social Studies as the subject becomes less defined. It is then largely reliant on the individual teacher's interest for the discipline. Bolstad notes that the teachers, together with the students, have to distinguish what competence aims from different subjects the students are working towards. This should happen in the beginning of a project but can also be done as the project evolves (Bolstad 2020, p.45). That was the case of the project Fallon described. To combat subjects becoming undefined it becomes even more important for teachers to explicitly show the links between subjects, much like Alex explained in their interview. Teachers have to clearly show the students how a theme, topic, or skill is connected to the subjects that are taking part in an interdisciplinary project.

Another challenge Bolstad (2020) touches on, is that a hierarchy might be created between school subjects. There is a danger that some subjects are the ones who always set the standards, by providing the content of the interdisciplinary project/lesson. While others often end up providing the methods and consequently become instrumental in nature. One example

of a subject that can be in danger of "ranking low" in the hierarchy is English. *Content and Language Integrated Learning* can be used as an example of this concept, which entails that a non-language subject is taught in a foreign language to enhance the competence in both the subject and the foreign language. English, in this context, is used as a tool for instruction, while the other subject supplies the content.

Themes from the English subject, as the field is today, overlaps largely with relevant themes in Social Studies. However, the teachers who mentioned English as one of the subjects in an interdisciplinary project, often relegated it to be the language of instruction and that students wrote or spoke in English in their assessments. With the new curriculum, English as a subject today has a focus on intercultural competence, but this notion has not necessarily reached the Norwegian classrooms quite yet. Themes such as diversity, life skills, cultural understanding, and development of identity are highlighted as important parts of the English subject in the revised curriculum. These themes, in addition to student involvement and interest, are linked to language learning and literacy to increase the students' consciousness about how they use the English language both within the classroom and outside. The new curriculum aims to promotes language awareness through developing the students' intercultural competence. We see that English as a subject transcends language learning, and is a subject that has important, meaningful content which is highly relevant for the world we live in.

The tendency to only use English as a tool for instruction seems to be a common practice based on our findings. In the study on English in the L2 classroom the subject was used as the language of instruction, and the focus is on developing the language skill, and not on intercultural competence. To combat this tendency, teachers need to develop a broader understanding of what English as a subject entails. It is also important that the subject is allowed to supply interdisciplinary project/lesson with more than methods and language. The teachers have to show students the intercultural space they are going to communicate in and what they have to know about themselves and others to travers said space. These factors can help develop and keep the integrity of English as a subject.

To properly implement interdisciplinary teaching into school practice, Bolstad (2020) recommends a gradual implementation:

> A development from a structure of strictly divided subjects to an interdisciplinary approach and structure is not just about teachers starting to use new teaching methods. Such a change presupposes that teachers, students and parents adjust their perception of teaching and learning. (p.46) [our transl.]

According to him, it is important to give all parties involved time to adapt to the changes an interdisciplinary approach will entail. This is something Fallon was conscious of and told us in their interview that it is important to get parents on the teacher's side. Parents who are used to the old school system may be more skeptical to the changes which are occurring in modern schools. Examples of this are the decreasing use of textbooks in the classroom, and teaching methods that focus on student participation and exploration instead of teacher instruction. A gradual implementation can introduce these ideas to teachers, students, and parents alike and help facilitate the changes. It can also give everyone involved time to gather knowledge and develop the skills necessary to properly conduct interdisciplinary teaching.

All these challenges culminate into structure and a lack of knowledge about interdisciplinary teaching. Teachers and school leaders have to be aware of the challenges and pitfalls that interdisciplinary teaching brings. Many of them can be combated by bettering structures around interdisciplinarity in Norwegian schools and developing knowledge and competence through team learning and personal development.

6 Conclusion

In this study we have looked at the benefits of interdisciplinary teaching and what factors are needed to promote it. Our discussion is based on both empirical findings and previous research. The teachers we interviewed described multiple benefits of interdisciplinary teaching, which they had experienced through their own practice. Some of the student benefits noted by the teachers were increased motivation and engagement in the lessons. This was partially because the material that was used was relevant for multiple subjects and the student perceived the content of the lessons as important. These factors have been shown to be true in previous studies such as O'Neal (1998), Nutting (2001), Tessier and Tessier (2015), and Penna-Baskinger (2018). Interdisciplinary teaching also promotes critical thinking, as it is important to see connections and develop a reflective world view according to Ferrer, et al. (2019). A theme-based approach to teaching, which is a common way to conduct interdisciplinary teaching, can also create a meaningful context for language learning (Alptekin, et al., 2008 and Brevik & Rindal, 2020). The teachers also saw a personal benefit when working with interdisciplinary teaching. They felt more motivated and advanced their personal development.

Time and collaboration seem to be the most important factors according to our findings, and these two elements are also connected. Teachers need time to develop working collaborations between school subjects. It is the school management's responsibility to facilitate the development of interdisciplinary teaching by finding time for team learning, and for planning and reflection around the interdisciplinary practice.

From our interviews we found two main ways to approach interdisciplinary teaching. One where the work was structured by the school leaders, which we called a systematic approach, and another that was teacher initiated, called teacher-initiated approach. The systematic approach promoted a shared goal and created more time to develop the teachers' interdisciplinary practice. The teacher-initiated approach showed signs of promoting deeper professional relationships between colleagues who worked together on an interdisciplinary project. The teacher-initiated approach also maintained the teachers' autonomy and therefore their personal motivation to incorporate interdisciplinarity into their practice. We believe that successful interdisciplinary teaching needs a combination of both approaches. The two approaches should be used together to fulfill and balance each other out.

When developing an interdisciplinary teaching practice, it is important for both the school leadership and the teachers to develop their knowledge on interdisciplinary teaching and how subjects can be incorporated without losing their distinctness. One way is to read the subjects' curricula transversely between the subjects. A pitfall when working with interdisciplinarity is that some subjects often decides the prerequisites for the lesson/project while others become tools of instruction. An example of a subject that in many instances is used as a tool for instruction is English.

English is about more than just language acquisition. With intercultural competence becoming more and more important, based on our results, teachers need to develop their understanding of English as a subject to better incorporate it into interdisciplinary projects. This was something we did not expect to find. However, because of our limited selection of teachers, this observation should be taken with a grain of salt. There is a need for more research to ascertain this.

Social Studies seems to hold a different role in an interdisciplinary lesson/project than the English subject. Because of its overarching and societal themes, Social Studies often provides the topic and the content in interdisciplinary teaching. The relevance the subject's themes have to everyday life and practice is something both our findings and the theoretical research revealed. Social Studies is therefore an example of a subject which often decides the prerequisites for the lesson/project.

Further research on differences in opinion based on education background and if the teachers are newly graduated or have been in the profession for a long time could be an interesting continuation of this project. Another perspective that needs more research is the implementation of interdisciplinary teaching from the perspective of the school leadership. How are schools implementing interdisciplinary teaching? This question could be answered by collecting data from different parts of the education system. Research with a more centered focus on the different subjects, such as English and Social Studies, in an interdisciplinary context could also further the development of interdisciplinary teaching.

We understand that Norwegian schools are not required to practice interdisciplinarity, though it is encouraged by the new curriculum. That being said, if schools want to develop a shared interdisciplinary practice, we believe our findings may be relevant and we wish they can

inspire teachers to implement interdisciplinary teaching into their practice through the support of school management. We can with confidence say that this is something we ourselves wish to develop in our own professional careers. Our newly acquired knowledge on how English and Social Studies are viewed in schools and how they are used in interdisciplinary practice will help us become more reflected in our approach to the subjects as teachers. Interdisciplinary teaching can be challenging and requires both time and effort. Still, regardless if you succeed or not, it is not a wasted effort.

7 List of References

Alpetekin, C., Erçetin, G., & Bayyur, Y. (2008, December 22). The Effectiveness of a Theme-based Syllabus for Young L2 Learners. *Journal of Multilingual and Multicultural Development*, pp. 1-17. Retrieved from https://www.tandfonline.com/doi/abs/10.2167/jmmd470.1

Bolstad, B. (2020). *Dybdelæring og tverrfaglighet*. Oslo: Pedlex.

Brevik, L. M., & Rindal, U. (2020). *Teaching English in Norwegian classrooms: From research to practice*. Oslo: Universitetsforlaget.

Campbell, C., & Henning, M. B. (2010). Planning, Teaching, and Assessing Elementary Education Interdisciplinary Curriculum. *International Journal of Teaching and Learning in Higher Education*, 179-186. Retrieved from: https://files.eric.ed.gov/fulltext/EJ930151.pdf

Costley, K. C. (2015, February 1). Research Supporting Integrated Curriculum: Evidence for using this Method. Retrieved from eric.ed.gov: https://files.eric.ed.gov/fulltext/ED552916.pdf

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches.* Los Angeles: SAGE.

Dewey, J. (1997). *How We Think*. Mineola, New York: Dover Publications. Retrieved from: https://books.google.no/books?id=3V3pUE1yApwC&printsec=frontcover&hl=no&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Dypedahl, M. (2007). *Fokus på språk 2*. Halden: Fremmedspråksenteret. Retrieved from: https://hiof.brage.unit.no/hiof-xmlui/bitstream/handle/11250/147916/Fokus_online_2_2007.pdf?sequence=1

Feldman, D. B. (2013). Senge's Fifth Discipline: A Model for School Leadership. *Journal of The Mofet Institute*, 21-25. Retrieved from: https://www.chuh.org/Downloads/feldman_senges_fifth_discipline.pdf

Ferrer, M., Wetlesen, A., Jøsok, E., Ryen, E. & Aas, P. (2019). Hva er kritisk tenkning i samfunnsfag? In M. Ferrer, & A. Wetlesen, *Kritisk tenkning i samfunsfag* (pp. 11-26). Oslo: Universitetsforlaget.

Kvale, S., & Brinkmann, S. (2009). *Det kvalitative forskningsintervju*. Oslo: Gyldendal Akademisk.

Lederman, L. G. & Niess, M. L. (1997). Integrated, Interdisciplinary, or Thematic instruction? Is This a Question or Is It Questionable Semantics? *School Science and Mathematics*, 57-58. Retrieved from: https://www.proquest.com/docview/195208506?pq-origsite=gscholar&fromopenview=true

Lund, E. (2016). *Historiedidaktikk - en håndbok for studenter og lærere*. Oslo: Universitetsforlaget.

Ministry of Education and Research. (2016, 04. 15.). Meld. St. 28 (2015-2016) Fag – Fordypning – Forståelse — En fornyelse av Kunnskapsløftet. Retrieved from regjeringen.no: https://www.regjeringen.no/no/dokumenter/meld.-st.-28-20152016/id2483955/

Ministry of Education and Research. (2019, 11 15). Engelsk Læreplan (ENG01-04). Retrieved from udir.no: https://www.udir.no/lk20/eng01-04/om-faget/fagets-relevans-og-verdier?lang=nob

Ministry of Education and Research. (2021, 03. 26.). Meld. St. 21 (2020–2021) Fullføringsreformen – med åpne dører til verden og fremtiden. Retrieved from regjeringen.no: https://www.regjeringen.no/no/dokumenter/meld.-st.-21-20202021/id2840771/?ch=1

Norwegian Directorate for Education and Training. (2020, 08. 01.). Samfunnsfag (SAF01-04) Kjerneelementer. Retrieved from utdanningsdirektoratet.no: https://www.udir.no/lk20/saf01-04/om-faget/kjerneelementer

Norwegian Directorate for Education and Training. (2020). Samfunnsfag: Fagrelevanse og sentrale verdiar. Retrieved from udir.no/lk20: https://www.udir.no/lk20/saf01-04/om-faget/fagets-relevans-og-verdier

Norwegian Directorate for Education and Training. (2017, 09. 01.). Overordnet del-verdier og prinsipper for grunnopplæringen. Retrieved from udir.no: https://www.udir.no/lk20/overordnet-del/formalet-med-opplaringen/?lang=eng

Nutting, M. M. (2001). The Linked Course: A viable option for teaching and learning History. *Teaching History: A Journal of Methods* (Vol. 26, Issue 1), pp. 3-12.

O'Neal, G. H. (1998, December). Integrated Thematic Instruction: A Descriptive Case Study of Students' Attitudes Toward School and Learning. Retrieved from digitalcommons.andrews.edu: https://digitalcommons.andrews.edu/cgi/viewcontent.cgi?article=1613&context=dissertations

Postholm, M., & Jacobsen, D. (2018). *Forskningsmetode for masterstudenter i lærererutdanningen.* Oslo: Cappelen Damm.

Tessier, L., & Tessier, J. (2015). Theme-based courses foster student learning and promote comfort with learning new material. *Journal for Learning through the Art*, 11 (1) Retrieved from: https://doi.org/10.21977/D911121722

The Ludvigsen Committee. (2015, 07. 15.). NOU 2015:8 - Fornyelse av fag og kompetanser. Retrieved from Regjeringen.no: https://www.regjeringen.no/no/dokumenter/nou-2015-8/id2417001/?ch=1

The National Committees of Ethical Research. (2016, April). Forskningsetiske retningslinjer for samfunnsvitenskap, humaniora, juss og teologi. Retrieved from etikkom.no: https://www.etikkom.no/globalassets/documents/publikasjoner-som-pdf/60125_fek_retningslinjer_nesh_digital.pdf

The Norwegian Directorate of Education and Training. (2017, 09. 01.). Core curriculum - values and principles for primary and secondary education. Retrieved from udir.no: https://www.udir.no/lk20/overordnet-del/opplaringens-verdigrunnlag/1.3-kritisk-tenkning-og-etisk-bevissthet/?kode=eng01-04&lang=eng

The Norwegian Directorate of Education and Training. (2017, 09. 01.). Core Curriculum: Core values of the education and training. Retrieved from udir.no: https://www.udir.no/lk20/overordnet-del/opplaringens-verdigrunnlag/?lang=eng

The Norwegian Directorate of Education and Training. (2019, 03. 13.). Dybdelæring. Retrieved from udir.no: https://www.udir.no/laring-og-trivsel/dybdelaring/

Attachment 1: E-mail to the Principals

Hei,

Vi er to studenter på Lærer 5-10 ved ILP, UiT som skal skrive en tverrfaglig master mellom samfunnsfag og engelsk nå til våren. Fokuset vårt vil være på dybdelæring og hvordan man kan tilrettelegge for dette gjennom tverrfaglig arbeid på tvers av fagene. Derfor søker vi engasjerte lærere som har erfaring med tverrfaglig/tema-basert undervisning og som vil dele disse erfaringene. Vi tenker å gjennomføre intervju der vi vil spørre om hvordan slik undervisning kan gjennomføres på en tilfredsstillende måte og hvordan man kan organisere denne typen undervisning.

Vi setter stor pris på om noen melder seg frivillig til å la seg intervjue og håper på et godt samarbeid med deres skole.

Mvh, Anniina Riekki og Kjerstin Annie Åseng

Attachment 2: Facebook post

Hei! Vi er to masterstudenter på lærerutdanning 5-10 ved UiT, som skal skrive masteroppgaven vår om dybdelæring gjennom tverrfaglig, temabasert undervisning. I den forbindelse søker vi lærer på ungdomstrinnet som har erfaringer med denne tematikken og som har gjennomført slike opplegg i klasserommet, som kan være villig til å stille til et intervju for å dele disse erfaringene. Bakgrunn for fokuset i oppgaven stammer fra den nye læreplan og hvor aktuell denne tematikken vil være i forbindelse med den. Det er snakk om et semi-strukturert intervju hvor du vil få en intervjuguide på forhånd.
Har du mulighet til å stille til intervju i løpet februar måned? Da ønsker vi å høre fra deg!
Ta gjerne kontakt på PM.

-Kjerstin Åseng og Anniina Riekki

Attachment 3: Information document from NSD

Vil du delta i forskningsprosjektet
Tverrfaglig masteroppgave med fokus på tverrfaglig undervisning

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å finn ut hvordan man som lærer kan gjennomføre tverrfaglig undervisning som fremmer dybdelæring i norsk skole. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

Formål
Problemstilling: *Hvordan tilpasse for dybdelæring gjennom tverrfaglig, temabasert undervisning i skolen?*

Gjennom intervjuer av lærere som er engasjert i tematikken og har tidligere erfaringer innenfor området vil vi fokusere på å finne hvordan man kan bruke tverrfaglig, temabasert undervisning for å fremme dybdelæring hos elevene. Her er vi interessert i finne mulige løsninger for å gjennomføre et slikt type opplegg.
Prosjektet er i forbindelse med en masteroppgave for 5. års lærerstudenter ved Universitet i Tromsø.

Hvem er ansvarlig for forskningsprosjektet?
UIT Norges arktiske universitet – Fakultet for Humaniora, Samfunnsvitenskap og Lærerutdanning

Hvorfor får du spørsmål om å delta?
Du har fått spørsmål om å delta i dette forskningsprosjektet fordi du sitter på erfaringer og kunnskaper om aktuelt tema som vi er svært interessert i.
Utvalget består av ungdomsskole lærere i den norske skolen som har gjennomført tverrfaglig temabasert undervisning.

Hva innebærer det for deg å delta?

Metoden som brukes er et semistrukturert intervju over digital plattform hvor deltakerne har fått utsendt en intervjuguide på forhånd. Intervjuet blir registrert i form av et lydopptak som lagres på en ekstern enhet utlevert av den ansvarlige institusjonen, UiT. Disse opplysningene vil slettes etter prosjektets slutt, den 15.05.21. Intervjuet vil vare mellom 30-45 minutter. Spørsmålene vil sentrere seg rundt lærernes egne erfaringer og tanker rundt tverrfaglig, temabasert undervisning.

Det er frivillig å delta

Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Alle dine personopplysninger vil da bli slettet. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger

Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket.

De som vil har tilgang til opplysningen er forskere, Anniina Riekki og Kjerstin Åseng, og veiledere.

Alle personvernsopplysninger anonymiseres og oppbevares på en ekstern enhet som bare forskerne har tilgang til.

Deltakere vil ikke kunne gjenkjennes i publikasjonen, ettersom vi verken vil inkludere deltakernes navn, kjønn, alder eller arbeidsplass.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?

Opplysningene anonymiseres når prosjektet avsluttes/oppgaven er godkjent, noe som etter planen er 15.05.21. Ved prosjektslutt slettes alt av lydopptak.

Dine rettigheter

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg, og å få utlevert en kopi av opplysningene,
- å få rettet personopplysninger om deg,
- å få slettet personopplysninger om deg, og
- å sende klage til Datatilsynet om behandlingen av dine personopplysninger.
-

Hva gir oss rett til å behandle personopplysninger om deg?

Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra Universitet i Tromsø har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

Hvor kan jeg finne ut mer?

Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:

Universitet i Tromsø ved:

Prosjektansvarlig Hilde Brox, hilde.brox@uit.no

Prosjektansvarlig Lisbeth Bergum Johanson, lisbeth.b.johanson@uit.no

Forsker Kjerstin Åseng, kas018@uit.no

Forsker Anniina Riekki, ari030@uit.no

Vårt personvernombud: Joakim Bakkevold, personverombud@uit.no

Hvis du har spørsmål knyttet til NSD sin vurdering av prosjektet, kan du ta kontakt med:

NSD – Norsk senter for forskningsdata AS på epost (personverntjenester@nsd.no) eller på telefon: 55 58 21 17.

Med vennlig hilsen

Hilde Brox Lisbeth Bergum Johanson

Anniina Riekki Kjerstin Åseng

Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet *Tverrfaglig masteroppgave med fokus på dybdelæring*, og har fått anledning til å stille spørsmål. Jeg samtykker til:

- ☐ å delta i intervju

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet

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(Signert av prosjektdeltaker, dato)

Attachment 4: Interview guide

1. **Innledning**
    a. Hvor mange år har du jobbet som lærer?
    b. Hvilke aldersgrupper har du undervist/underviser du for?
    c. Hvilke fag underviser du i?
    d. Hvilke fag har du gjennomført tverrfaglig opplegg med?

2. **Utgreiing om begrepene dybdelæring og temabasert undervisning**
    a. Hva legger du i begrepene?

3. **Egne erfaringer**
    a. Hvilke fag var innblandet?
    b. Hva var prosessene rundt undervisningsprosjektet/opplegget? (Planlegging, gjennomføring, refleksjon)
    c. Oppsto det utfordringer i arbeidet, hvordan ble disse løst?

4. **Hva mener du må ligge til grunne for at denne typen arbeidsmetode skal være mulig?**

5. **Har du sett nytten av denne typen undervisning, og i så fall på hvilken måte?**
    a. Nytte for deg selv som lærer
    b. Nytte for elevene
    c. Nytte for kollegiet