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Social science students' perceptions of motivational methods and approaches in science class

Gymnasielever på samhällsvetenskapligt programs uppfattningar om motiverande metoder och strategier inom naturvetenskap

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Preface

This is an undergraduate thesis completed during the fall of 2016 for the pedagogy teacher training program (kompletterande pedagogisk utbildning) at Malmö University. I would like to thank all of the 23 participants in this study and the host school, with a special thank you to my practicum supervisor Anna for her cooperation in making the study possible, and for her support and encouragement throughout my five practicum placements. I would also like to thank Kerstin Sonesson, my supervisor at Malmö University, for her feedback and always-quick responses.

I would like to give my mother Kelly Olsson extra thanks for her editorial assistance during my (seemingly) never-ending university studies over the last 10 years! And last, but not least, I thank my fiancé Martin Pettersson for his patience and for being there every step of the way during this teaching program.

Abstract

How to motivate students effectively is a question teachers have asked for thousands of years. In my teaching program at Malmö University, a variety of teaching methods and approaches, that also increase motivation, have come into focus. These include: teaching at the right level, using a variety of teaching methods, seeing every student, being enthusiastic about the material, using formative evaluation, connecting lessons to students' everyday life, and adapting classes to students' interests. The aim of this study is to find out how secondary students in a social science program perceive teaching methods and approaches aimed at increasing motivation, and determine which methods they perceive as most/least effective. The study used both qualitative and quantitative methods. 23 upper-secondary students from a class at a school in southern Sweden were interviewed in four focus groups, where participants were purposefully sampled. 10 of these students were also asked to complete a questionnaire ranking the teaching methods and approaches on a scale of 1-7 (where 1 was most effective at increasing motivation and 7 least effective), and the mean values of these scores were used in the analysis. A phenomenological approach and content analysis were used to code and analyze the data. Students perceived all of the motivational methods to be effective, the most effective being teaching lessons at the right level, followed by using a variety of teaching methods, with mean values of 1.9 and 3.2, respectively. Adapting lessons to students' interests and connecting them to everyday life were the least effective, with mean values of 5.6 and 5.7, respectively. The categories of teachers having a positive attitude towards the material and the students, and seeing every student, had the same mean value, 3.8, while formative evaluation had a mean value of 3.9. When trying to motivate students, it would thus appear more effective to make sure that lessons are taught at the right level and that teachers vary the lessons, than to adapt lessons to students' interests or connect the material to everyday life. While this was a small study and the findings cannot be generalized to school populations, they are of high interest for the researcher.

Keywords: Content analysis, motivation, motivational approaches, motivational methods, phenomenology, science class, secondary school, social science students, self-determination theory.

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1. Introduction

The most common explanation to why students have difficulty in school is a lack of interest and motivation (Sjöberg, 2009). Illeris (2007) explains that students who are motivated develop knowledge faster, and that the knowledge developed is longer lasting compared to students who are not motivated. Wery and Thomson (2013) explain that, after solid teaching methods, "improving students' motivation is the key to academic and behavioral success."

How students can be motivated to complete their schoolwork and learn has been a question that teachers have struggled with since the beginning of school. Lundgren et al. (2012) describe how a school in Mesopotamia 4000-5000 years ago had trouble motivating students. Students came late, forgot material, disrupted the learning environment, and had difficulty learning and developing knowledge. Over 4000 years later, how to motivate students is a question I, too, ask myself, especially when teaching secondary science to students studying a social science program.

In Sweden, all secondary students not studying a science program take a mandatory general science course, with students in programs that prepare for higher education required to complete a 100-credit course in general science (called *Naturkunskap 1b*) (Skolverket, 2011). The aim of this course is for students to gain knowledge and critical evaluation skills, enabling them to form informed opinions on issues containing scientific content. According to Sweden's National Agency for Education (Skolverket, 2016), it should also lead to students having an understanding of how science can be used in the workplace, in everyday life, and in making choices and forming opinions.

The national secondary school curriculum states that the secondary school has the responsibility of "promoting the students' development and learning as well as lifelong desire to learn" (Skolverket, 2011), and teachers are responsible for "strengthening every student's self-confidence and desire and ability to learn" as well as "stimulating, supervising and [providing] assistance to the student and giving special assistance to students experiencing difficulty" (ibid.).

My experience during my practicum (*verksamhetsförlagd utbildning* in Swedish), however, was that, as a teacher, it was extremely hard for me to fulfill these

requirements, and contribute to meeting the school's responsibility. I experienced that many of social science program students came to science class with the preconception that science was hard, uninteresting, and that they did not see the importance of it in their daily lives. This finding is in line with Lyons (2006), who reports a decline in interest and perceived value of science among secondary school students. I felt there was so much work to do in order to strengthen every student's self-confidence and desire and ability to learn, and found myself wondering how I could motivate these students. The desire to learn, self-confidence and stimulation are all of importance when talking about motivation (Koballa & Glynn, 2007).

I was surprised at the contrast in motivation between, on one hand, students studying science and humanitarian programs, and on the other, students in the social science program. I learned, through speaking with other teachers at the school, that there was general agreement that the social science students were generally the least motivated when comparing student groups studying a program that prepares them for higher education. This was the case not just in science class, but also for these students' other subjects as well, and it had been this way for as long as the teachers at the school could remember.

However, over the year that I had practicum periods with the social science program students, I did notice a change in many of them. I experienced that some of their preconceived ideas and barriers to science came down, and that some of the students became more motivated to learn and achieve better grades. Even some of the most unmotivated students managed to complete the course successfully. It was my impression that, while their desire to learn may not have changed, their ability to learn had increased. I was interested in what, if anything, my supervisor (their science teacher) and I (their student teacher) had done to effect such a change.

In the teaching program at Malmö University, I have come across a variety of concrete teaching methods and approaches that seem to increase motivation in students. These include: teaching lessons at the right level, adapting lessons to students' interests, being enthusiastic about the material, seeing every student, connecting knowledge to students' everyday life and using a variety of teaching methods. I wondered how the social science program students themselves perceived these methods, and if they had impacted the students' motivation.

2. Purpose and research question

The purpose of this study is to understand how students studying a social science program at secondary school experience teaching methods and approaches aimed at motivating students in science class.

The research questions are:

In what ways do students studying a social science program perceive teaching methods and approaches aimed at increasing motivation?

Which methods and approaches are perceived as most/least effective at increasing motivation?

3. Theoretical perspectives and previous research

3.1 Motivation – definition and models

The Merriam-Webster dictionary gives three definitions for *motivation*. The first is "the act or process of giving someone a reason for doing something"; the second "the condition of being eager to act or work"; and the third "a force or influence that causes someone to do something" (Merriam-Webster, 2016). While other definitions of motivation can be found, they are all very similar. Motivation is commonly defined as an act, condition, force or influence that leads to a certain behavior. It is internal and individual.

For the purposes of this thesis, *motivation* will be viewed as an interactive and dynamic process using Dörnyei's (2000) process model and the hierarchical model of extrinsic and intrinsic motivation (Vallerand, 1997). According to the process model, motivation can be impacted before, during and/or after an activity. This thesis will examine the effects of motivation during an activity, constituted by the various teaching methods and approaches, and how students perceive their impact.

The hierarchical model of extrinsic and intrinsic motivation (Vallerand, 1997) describes extrinsic and intrinsic motivation. Extrinsic motivation comes from outside the student, for example, students wanting to get good marks or to raise their social status. Extrinsic motivation can be increased by breaking assignments into smaller components that are evaluated formatively (Eriksson-Bergestig et al., 2010). Intrinsic motivation comes from within the student, for example, the student receives joy from the knowledge they develop during their studies, or sees the importance of the information (Dev, 1997; Ehdin, 2010). Intrinsic motivation can increase by connecting knowledge to students' everyday lives (ibid.). Intrinsic motivation has a much longer-lasting effect on students, and is correlated with academic achievement and confidence (Dev, 1997; Wery & Thomson, 2013), but it is also much harder for a teacher to increase intrinsic motivation among students (Ehdin, 2010).

3.2 Self-determination theory

The self-determination theory (SDT) is a humanistic approach to motivation and personality addressing the role played by a person's internal resources in behavioral and development self-regulation (Ryan & Deci, 2000). SDT explains how different facets of motivation and personality impact motivation, as well as explaining how humans have three psychological needs: competence, autonomy and relatedness (ibid.). *Competence* is the ability to do something successfully, *autonomy* is our ability to make choices free from external control, and *relatedness* is our connection with other people.

SDT includes extrinsic and intrinsic motivation from the hierarchical model of extrinsic and intrinsic motivation, and assumes that motivation is interactive and dynamic similar to the process model.

3.3 Teaching methods and approaches that increase motivation

Motivational theories and teaching theories are hard to separate as they are often interconnected (Eriksson-Bergestig et al., 2010). The seven teaching methods below have also been shown to increase motivation. The teaching methods were chosen, because the researcher had learned about them through coursework in the teaching program at Malmö Högskola. While there are many motivational methods in the literature, the researcher wanted to understand how students perceived the teaching methods and approaches that she had been taught throughout the teaching program. There is support in the literature for each of the methods used, and this section will explain the noted teaching methods and approaches considered in this thesis.

3.3.1 Teaching at the right level

Teaching lessons at the right level to students involves first knowing what level the class is at, and adapting the lessons taught to the students' levels. This means that teachers must have both the ability and the means to be able to test students, and then adapt lessons to fit the needs of the students (Banerjee, 2012). Hajer and Meestringa (2014) discuss the importance of adapting lessons so that they are at the right level in relation to language use. When lessons are taught at the right level, students feel that

they are succeeding (ibid.) and, when students succeed, their motivation increases (Eriksson-Bergestig et al., 2010; Ryan and Deci, 2000).

3.3.2 Using a variety of teaching methods

Hajer and Meestringa (2014) and Gentry et al. (2013) discuss the importance of using a variety of different teaching methods. Students have different learning styles, and using a combination of different teaching methods, a teacher can be sure that all students' needs will be met. Using a variety of teaching methods also makes lessons more dynamic and interesting (Gentry et al., 2013) and, when students are interested in the material, their motivation increases (Hellgren, 2016; Hajer & Meestringa, 2014).

3.3.3 Being an enthusiastic teacher

In motivating students, teachers have to be enthusiastic about both their subject and the material, and positive to the students (Mikesell, 2012; Kullberg, 2004). When teachers are positive towards the subject, the material and the students, students feel more engaged and learn more (Kullberg, 2004; Ehdin, 2010). In addition, positive energy is contagious and students feel more connected to the teacher and their classmates (Eriksson-Bergstig, 2010).

3.3.4 Seeing every student

Aspelin (2010) describes the importance of a teacher seeing, acknowledging and relating to every student. When students feel seen, it increases their sense of belonging. According to a government report (SOU) on sustainable teacher education, nothing is more important than the teacher developing "a close and warm relationship with the students" (SOU, 2008:109 p. 210).

3.3.5 Using formative evaluation

Formative evaluation is a teaching method in which assignments or projects are broken down, and students receive feedback and evaluation along the way (Skolverket, 2014). It is used to make goals more visible, and to let the student know how they are doing and how they can improve. There are various forms of formative evaluation where students can evaluate their own work, classmates can evaluate each other's work, or teachers can evaluate students. Nolen (2011) and William (2014) suggest that formative evaluation can be used to positively impact motivation, as students will find out how they are doing and will have something to strive for, which improves their success rate.

3.3.6 Connecting material to everyday lives

Connecting teaching materials to everyday life greatly increases motivation (Dev, 1997; Ehdin, 2010). When students are able to relate to the material and apply it to their lives, they are able to understand its value (Hellgren, 2016). Once it has been related to daily life, science is no longer abstract and students are more likely to comprehend the new concepts (Hidi & Harackiewicz, 2000).

3.3.7 Adapting lessons to student's interests

Hidi and Harackiewicz (2000) explain that interests and goals are variables that contribute greatly to students' motivation levels. If lessons are adapted to these interests and goals, motivation improves (Sjöberg, 2000; Mikesell, 2012). During the learning process – values, attitudes and interest are more sustainable than facts (Sjöberg, 2008).

3.4 Motivation research in a larger context

The literature on motivation is wide and varied. A search of Malmö University's library database (*libsearch*) using "motivation" as a search word in the title gave over 100,000 hits of peer-reviewed articles.

There is also research available concerning students' attitudes toward learning science. Koballa and Glynn (2007), for example, examine motivational and attitudinal constructs associated with learning science. Their findings indicate that attitudes and motivation, especially intrinsic motivation, are important, and that it is important for science teachers to know what these attitudes and motivational starting points are, as they can differ greatly between individuals and classes. In her research on secondary school students from Sweden, England and Australia, Lyons (2006) explains that students from all of these countries experience science as difficult to understand, uninteresting, and unimportant for their daily lives. Tobias (1993) also studied why university students found science difficult. Using results from a collaboration project that looked at 15-year-old students in over 50 countries, Sjöberg (2008) found that the more developed the nation, the less interested students were in science and technology.

Another concern is *how* to motivate students. Hidi and Harackiewicz (2000) and Wery and Thomson (2013) examined how to motivate unmotivated children in school, looking at situational interest, methods to increase intrinsic motivation, and setting and

mastering goals. Glowinski and Bayrhuber (2011) and Itzek-Greulich (2016) explored how science students could be motivated through the use of laboratory experience.

While there is much information available on what motivation is, and how to motivate students through motivational methods and approaches, I was not able to find any research comparing the effectiveness of these methods in the science classroom.

4. Method and Materials

4.1 Qualitative and quantitative research methods

Since the aim of the study was to identify perceptions, a qualitative research method was employed to answer the research question: *In what ways do students studying a social science program perceive teaching methods and approaches aimed at increasing motivation?* Focus groups were used to collect qualitative research data. Focus groups are an interview style where the researcher asks open-ended questions about situations and/or experiences to a group of respondents who then discuss answers with each other (Bryman, 2011). A phenomenological approach was taken because the goal of phenomenological research is to describe a lived experience of a phenomenon (Waters, 2016). In this case, the phenomena were the different teaching methods and approaches that the students had experienced throughout their year-long science course. (Phenomenology is described in more detail under *Data coding and analysis*, below).

Quantitative data was used in the form of a questionnaire using a Likert scale (McLeod, 2008) to gain background information about the students. Quantitative data was also used to rank the teaching methods and approaches in order to answer the research question: *which methods and approaches are perceived as most/least effective at increasing motivation?*

A questionnaire is a set of written questions with given answers that can be used for a survey or statistics (Bryman, 2011). I Likert scale questionnaire is a type of questionnaire where respondents indicate how true statements are (McLeod, 2008). The questionnaire was designed by the researcher to measure the extent to which the respondents agreed or disagreed with a series of statements regarding their level of motivation (see Appendix A). Students had four response options: *strongly agree*, *somewhat agree*, *somewhat disagree*, and *strongly disagree*. An even number of statements was chosen so that students would be forced to express either agreement or disagreement, as no neutral option was given. The Likert scale was used to determine the students' current motivational levels, and to give the researcher a background of the respondents.

Students were also asked to rank the teaching methods discussed (and if necessary explained) in the interview from 1-7, where 1 was the most effective and 7 was the least effective. This ranking system was added after the first two groups, as it was considered necessary to be able to answer the research question. The ranking was therefore completed by ten participants, the members of the last two focus groups.

Both reliability and validity (see explanation below) increase when qualitative and quantitative methods are combined (Bryman, 2011).

4.1.2 Focus groups

According to Bryman (2011), focus groups make it possible for the researcher to understand why participants perceive experiences the way they do and to explore these perceptions in the form of a discussion, which can uncover perceptions and experiences in a different way than an interview study. The focus group enables participants to agree or disagree with other participants on a subject or experience that they may not have thought of by themselves (Larsen, 2009). Focus groups also enables informants to bounce ideas around and discuss topics of important. What is important to students regarding motivation were of particular interest for the researcher. Focus groups can provide information on what the participants think and feel (Bryman, 2011). In addition, focus groups can be used in situations where there is one central theme that is explored, in this study – how teaching methods and approaches influence motivation.

Four focus groups with five to seven participants in each group were held during science class. The groups were held during class time, because it was assumed that more students would be willing to participate if they did not have sacrifice their free time. The group sizes were chosen both for convenience during class time and in following with Morgan (1998), who recommends an average focus group size of between four to ten participants. Therefore, a focus group size of five to eight students was deemed as both convenient and acceptable methodologically. The science class chosen, was chosen because the researcher had experienced a low motivation among many of the students in that particular class.

The focus groups were homogeneous in that all informants were in their second year of secondary school (aged 17-19) and were taking the required general science course (*Naturkunskap 1b*). All had almost completed this final compulsory course in science.

The decision to choose students who were almost done was made because they were still attending science classes and the different teaching methods and approaches would still be fresh in their heads, and as they were close to the end of the course they would also have experienced the majority of these methods and approaches.

In the course, the participants had chosen their own lab partner(s), which consisted of one or two other students. The researcher randomized these laboratory groups into four different focus groups. This was done for practical reasons, so that the students not participating in the focus groups could continue their lab work. The respondents were all in the same class, and knew both each other and the researcher. While Morgan (1998) states that participants who know each other well may not explicitly state many facts, this barrier was overcome by the researcher through asking questions for clarification in situations that were not clear to the researcher. It was considered positive that the students had all experienced the same motivational techniques and practices and would understand what the other participants were talking about.

4.2 Informants' background and sampling methods

Twenty-three social science program students (from a class of twenty-nine students) at a secondary school in southern Sweden were chosen as informants. These social science students were, in the researcher's own experience and that of other teachers at the school, considerably less motivated in comparison to students in the science or humanitarian programs. Because saturation was achieved from the four focus groups (see section 4.5 below) the six students that did not participate due to illness, medical appointments and needing the time to finish their laboratory work would probably not have impacted the results significantly.

Purposive sampling, a non-random sampling method in which perceived experiences within a chosen group can be explored (Given, 2008), was used. The researcher chose students who were one month away from completing secondary school science. This group of students was chosen because they had experienced teaching methods and approaches in science class and would hopefully be able to remember them. It is not possible to generalize to the general population with a homogeneous purpose sampling method (Larsen, 2009), but for this study it was the perceptions that were of interest, not the ability to generalize findings.

4.2.1 Informants' views on science class

Of the students sampled, a number had chosen to the social science program because they thought by doing so they could avoid studying science. 22 of the 23 students who participated in the focus groups did not know that science was a required element of their curriculum until after they started the program. Some of the students were upset that they were required to take science, and might have chosen a different program had they known science was a requirement.

> *I chose the social science program to avoid science… had I known that 100 points of science were required I would've studied construction instead.* (Student from focus group 1 (FG1))

During the focus groups, many respondents stated that they were not at all motivated in science class. This was also shown in their questionnaire responses, where 21 of the 23 students interviewed answered that the statement *I am motivated in science* was *not at all true* or only *a little true*. The Likert scale data (see Figure 1) also showed that students were considerably more motivated at school in general and in the social science program itself than they were in science class. The statement *I am motivated in the social science program* received the highest number of students (18 out of 23) saying that this was either *completely true* or *mostly true*. The statement *I am motivated at secondary school* received the second highest number of students (17 students) saying the statement was *completely true* or *partly true*. 9 students responded that the statement *I am motivated in science* was *completely true* or *mostly true*. Only 2 students responded that the statement *I am more motivated in science than other subjects* was *mostly true*.

However, even if many of the students did not find science class particularly motivating, they were all motivated by grades. They also perceived pressure from society and from their parents to get a secondary school education particularly motivating, as well as the dream of having a good job and money in the future.

> *Take it [science] because we have to and only to get the grade.* (Student from focus group 3 (FG3))

> *[We] need to do this to get a good grade. What we learn about is unimportant, as long as we get a good grade.* (FG3)

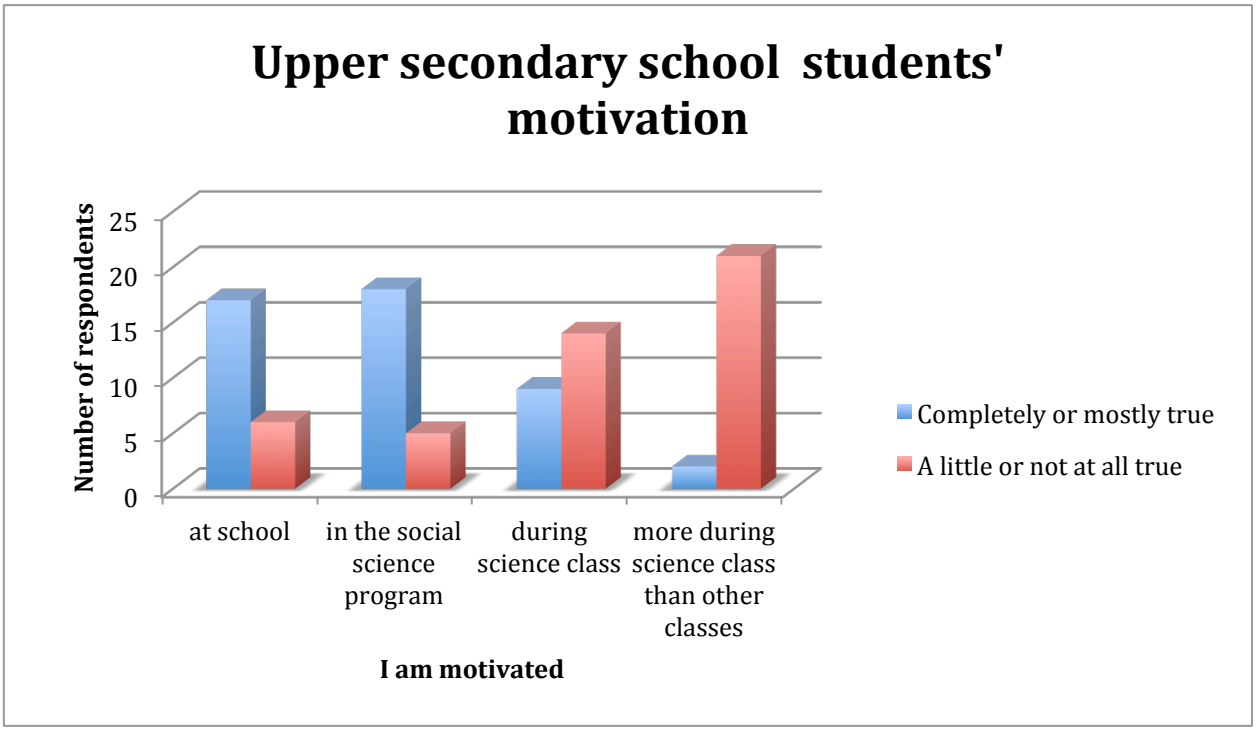

Figure 1. Responses from 23 upper-secondary students studying a social science program regarding how true the statements I am motivated at school, ...in the social science program, ...during science class *and*... more during science class than other classes *were for them. They had 4 answer options to choose from:* completely true, mostly true, a little true *or* not at all true.

4.3 Reliability and validity

Reliability is a measure of precision. The focus groups were recorded, and then transcribed before they were coded and analyzed to ensure that the data was reliable. The same researcher conducted the focus groups, and coded and analyzed the material herself, using the same procedures to ensure consistency. This was done to ensure that the findings would be more reliable and ensure that the aims of the study were actually investigated . Validity is a measure of how accurate the findings are. According to Larsen (2009), interviews generally afford a high-level of validity because the informants are themselves able to bring up subjects that they consider to be important. As discussed above, both reliability and validity increase when a combination of qualitative and quantitative research methods are used.

4.4 Ethical considerations

The study adhered to the principles for research in the humanities and social sciences issued by the Swedish Research Council (*Forskningsetiska principer inom humanistisk-samhällsvetenskaplig forskning*, Vetenskapsrådet, 2002). All participants were informed

about the research project and its aims one week before the focus groups were held. Participants also signed an informed consent form (see Appendix D) before participating in the focus group, and were reminded that they were free to leave at any time. Their participation in the study was completely voluntary and they were not required to answer any questions they did not want to. All 23 participants that started the study completed the whole study. As noted, they were also free to leave at any time, but no one did.

The recordings from the focus groups were transferred onto a USB stick and stored, along with the informed consent forms, in a locked drawer in the researcher's apartment. The data collected was only used for the aim of the research project.

4.5 Data collection

All of the data collection was conducted in Swedish because the students were Swedish and all communication and classes had been held in Swedish. The researcher started the focus group with a brief presentation of the aim and objectives of the research. All of the students signed an informed consent form prior to their participation (see *Ethical considerations* below). A Likert scale questionnaire with four questions was handed out and completed by the students before the focus group interviews took place (see Appendix A). A semi-structured interview guide was used because it gives the researcher a list of specific themes to cover, yet gives the participants a lot of freedom to answer in their own way (Bryman, 2011). Since the aim was to understand how students perceived motivational methods and approaches, the researcher wanted the participants to answer freely, but still talk about every theme. The researcher asked the participants eight open-ended questions, which were discussed among the students (see Appendix B). Students were introduced to the subject and allowed to answer in full, and the researcher was able to ask follow-up questions when applicable before moving on to the next question. *Formative evaluation* was defined as receiving feedback and evaluations before a final assignment or project was handed in. This was explained to all of the focus groups before the students answered how it effected motivation, as none of the students understood what formative evaluation was beforehand. Examples were also given of how this could be achieved with evaluations by teachers, other classmates or through self-evaluation. In two of the focus groups, an example of how science could

be connected to their daily lives was also given, because students did not understand the question.

After the first two focus groups had been conducted, the data collection methods were evaluated and it was decided that students should also rank the motivational methods, from 1-7, at the end of the focus group. The researcher showed the interview guide to the students, and circled the seven teaching methods and approaches (see appendix B). Students wrote the seven teaching methods and approaches down from 1 most important and 7 least important. This was done to enable the researcher to compare the different methods and approaches to one another. The mean score and range were then taken for each teaching method or approach. When students are forced to rank teaching approaches and results in this way, there is the possibility that students have strong opinions about some of the teaching methods and approaches but not necessarily all of them. However, to compare the different approaches the researcher felt that it was necessary of the students to rank the approaches.

The focus groups were recorded on the researcher's mobile phone and transcribed by the researcher. All translations are the researcher's own. Saturation is achieved when no new relevant information or categories emerge, and further data collection yields only variation on already-presented themes (Bryman, 2011). It was felt that saturation was reached, as no new themes or opinions emerged in the last focus group.

4.6 Data coding and analysis

The data was coded using a combination of content analysis and phenomenology. Phenomenology is a qualitative research approach based on the assumption that every individual experiences and perceives his/her reality differently from what others do (Kvale & Brinkmann, 2009). It extracts essential themes without which the lived experience could not be the same (Waters, 2016). Phenomenology is used in this paper to understand how students perceive their own reality. Theories formed from phenomenology can be verified or falsified with future research (Kvale & Brinkmann, 2009).

Content analysis is used to identify patterns, connections and commonalities or differences (Larsen, 2009). The aim of the study was to explore how students perceived

different teaching methods and approaches aimed at increasing motivation. There were therefore seven different categories from which themes were extracted. The combination of research methods allowed the researcher to code and then analyze and extract important themes from the codes.

Before coding the results, all of the focus groups were transcribed verbatim. From the transcriptions, a coding matrix with all four of the focus groups' answers under each question was then created. The researcher coded the transcriptions and translated simultaneously, resulting in codes written in English. This was done according to the process of content analysis that went from the transcribed data's *meaning units* → *condensed meaning units* → *codes* → *categories* (Graneheim & Lundman, 2004) and themes according to phenomenology (see Appendix C for an example). The translating and coding were done simultaneously to minimize the amount of time spent on translation. The coded data (referred to as *meaning unit* in content analysis) was then classified into themes or categories, and sorted according to these categories and themes.

The researcher entered the quantitative data into an Excel document. The respondents' answers to the Likert scale questions were summed up into the four different possible answers for each question (for question 2, students circled that the statement *I am motivated at school* was *completely true*) (see Table 1). The results from *completely true* and *mostly true* were then combined, as were the results from *a little true* and *not at all true* to produce a bar chart (see Figure 1).

4.7 Potential sources of error

Focus groups were chosen in order to understand participant's lived experiences. The choice of using focus groups as a qualitative research method had many benefits, as the researcher was able to extract lived experiences and respondents spoke openly and freely and bounced ideas off each other; however, there are also drawbacks in using focus groups. One potential problem with using focus groups is that respondents may not be entirely honest in the presence of others, and are affected by others' opinions (Larsen, 2009). The researcher felt this was true in the third focus group, where there were three students with negative views of science who seemed to bring down the other participants. The researcher tried to allow all of the participants to answer and

participate, and asked for clarification from the students who were not negative from the beginning, but nevertheless felt that the answers given in this group were not entirely honest. In the other groups, however, the students did not seem to be afraid to voice their opinions. It was seen as positive that they affected each other's opinions by discussing and bouncing ideas off of one another, and describing their reality more fully.

Another potential problem was that the researcher knew the students in the groups. Bias is when the results found in a study are not true due to a systematic error that encourages one or more outcomes over others (Pannucci & Wilkins, 2010). This could lead to bias in that the students answered and talked about what they thought the researcher wanted to hear. The researcher tried to avoid this bias by holding the focus groups after she had completed her practicum and would not teach the students again. The researcher also explained, before the focus groups began, that she really wanted the students to be honest and to understand their thoughts and feelings, and confirmed that she would have nothing to do with any grading of the students after the focus groups were completed.

For the first focus group, the researcher relied on handwritten notes for the last few minutes, because the recording of the session had accidently stopped five minutes from the end. However, there were not any topics or themes that emerged that were not also talked about in later focus groups.

There were only ten students that ranked the different teaching methods and approaches. This is not a large enough number to determine statistical significance. However, the aim of the study was to understand the perceptions of the students in one particular class, not to be able to determine statistical significance.

5. Results

The research questions were designed to elicit how secondary students studying a social science program could perceive teaching methods and approaches aimed at increasing motivation, and which methods were perceived as most/least effective at increasing motivation.

5.1 Quantitative analysis

Quantitative results were gained from students ranking the seven teaching methods and approaches. Teaching lessons at the right level was rated the most effective when trying to increase motivation, followed by using a variety of teaching methods with means of 1.9 and 3.2 and ranges of 1-3 and 1-6 respectively (see Table 1). Connecting the material to everyday life and adapting lessons to students interests were rated as being the least effective, with means of 5.6 and 5.7, respectively. Both connecting the material to everyday life and adapting lessons to students interests had a range of 2-7. The importance of being a positive teacher, seeing every student and using formative evaluation were ranked similarly in the ratings, with the means of 3.8, 3.8 and 3.9, respectively. Being a positive teacher had a range of 1-7 and both seeing every student and formative evaluation had a range of 1-6. While the ranges were quite broad, the mean scores give a representation of how the rankings were clustered. While students had different opinions on the approaches, it was clear that most students ranked teaching lessons at the right level and using a variety of teaching methods with low numbers (great importance), and connecting material to their everyday lives and adapting lessons to interests with high numbers (least important), and with positive teacher, formative evaluation and connection to everyday life being in the middle.

Table 1. Mean ratings and ranges of the 7 teaching methods and approaches used to motivate students during science class, as assessed by 10 upper-secondary students studying a social science program, on a scale of 1-7, where 1 was most effective for motivation, and 7 least effective.

Motivational method/technique	Range	Mean score
Teaching lessons at the right level	1-3	1.9
Using a variety of teaching methods	1-6	3.2
Positive teacher	1-7	3.8
Seeing every student	1-6	3.8
Formative evaluation	1-6	3.9
Connection to everyday life	2-7	5.6
Adapting lessons to student's interests	2-7	5.7

5.2 Qualitative analysis

Qualitative results were gained from the four focus groups. The seven teaching methods and techniques investigated were all viewed as positive and helpful at increasing motivation among students.

5.2.1 Lessons at the right level

All of the informants expressed that it was important that lessons were at the right level for them. In all four focus groups, students brought up the importance of starting at a lower level, and building both the language and the concepts. Students also expressed that they liked to be challenged, but that help should be available when needed. They also stated that regaining motivation after failure was difficult.

> *If it [the lesson] is at too high a level, then I'm, like, I'm not going to be able to do this… If you go in with that type of attitude, then you don't want to even try.* (FG2)

> *If lessons are at the right level you feel… that you can do better, understand more and reach a higher level.* (FG4)

> *If you do badly on a test, it's hard to recover. Then I'm not motivated at all anymore* (FG1)

5.2.2 Using a variety of teaching methods

Students thought that using a variety of teaching styles was the key to increasing motivation in science. They felt that it was important to have both practical and

theoretical components. This topic came up in all of the focus groups when talking about the different methods, and when talking about general motivation. It was the method that students talked about most when describing how to motivate them in science. Students perceived the large practical component, in the form of labs to be positive.

> *[Varying the teaching method] impacts motivation a lot. [We] get to experience the subject instead of just reading it.* (FG2)

> *I think it's fun when we, ourselves, become involved. Then our interest increases.* (FG3)

5.2.3 Being an enthusiastic teacher

The students all found having a positive teacher important for their motivation. They found that positive teachers could change the mood of students and the classroom and provide an environment for learning. However, they also found too much positivity irritating, though this did not decrease motivation.

> *Of course a teacher should always be positive, because if a really boring teacher comes in with a bad attitude then you don't become motivated at all.* (FG2)

> *Happiness is contagious.* (FG4)

> *If one is too positive it's irritating (FG2)*

5.2.4 Teacher seeing every student

Some students believed that it was really important for their motivation that the teacher saw them, while others felt that it was impossible for the teacher to see and get to know every student in big classes.

> *It's a lot easier if you feel seen. It's like – yes, she sees me now – and then I can really show that I know this.* (FG2)

> *It's impossible to see everyone in big classes.* (FG3)

> *It's important to give all the students attention so that everyone feels that they're being seen and heard and like, to show their knowledge… Supporting students increases motivation.* (FG4)

5.2.5 Formative evaluation

Once it was explained to them, all of the students were very positive to formative evaluation; however, only formative evaluation where the teachers did the evaluating (as opposed to classmate- or self-evaluation). They expressed that it raised all the students in the class, regardless of what level they were at. Students also expressed that

it was very seldom that teachers used formative evaluation in their courses, and that they wanted it to be used more.

> *It would increase motivation, because otherwise we just guess, and don't care how it turns out, because I can't do anything anyway… It's also easier to strive for a better mark because you can improve your work.* (FG2)

> *It gives you something to work towards.* (FG4)

> *But it's not good when classmates do the evaluating, because they aren't teachers and don't know either.* (FG2)

5.2.6 Lessons adapted to daily lives

Most students expressed being more motivated when lessons were connected to their daily lives. However, in one focus group the students described the method as inefficient, boring, and not adding to their motivation.

> *It automatically becomes more fun to learn something if you can benefit from it in your everyday life.* (FG4)

> *Don't think it [relating science to daily life] would make a very big difference.* (FG3)

> *We have the section about the environment in the back of our minds when making choices… Everything connected to our individual lives is important when we make decisions.* (FG2)

5.2.7 Lessons adapted to students' interests

Students were positive to lessons being adapted to their interests, and found it to be motivating. However, it was brought up in all of the focus groups that it was impossible to adapt lessons to all 30 students in the class.

> *If you think it's fun, then you want to learn more about it.* (FG2)

> *It's impossible if the teacher is to follow the curriculum.* (FG1)

> *Even if we study the same program and want to have the same job, we have very different interests… Teachers can't adapt everything to us, but they can do a little.* (FG4)

6. Discussion and conclusions

The results from the focus groups showed that all teaching methods and techniques were viewed as positive and helpful at increasing students' motivation. The results from ranking the teaching lessons showed that teaching lessons at the right level and using a variety of teaching styles were most effective at increasing motivation, and connecting material to everyday life and adapting lessons to students' interests were least effective.

Even though all of the students interviewed had taken the same science course, they had very different experiences and perceptions about the course. Considering the large body of research indicating that motivation in science among secondary students is not very high (Glowinski and Bayrhuber, 2011; Tobias, 1993; Koballa & Glynn, 2007; Itzek-Greulich, 2016; Lyons, 2006), particularly if individuals have not chosen the subject (Sjöberg, 2000; Dev, 1997; Ahl, 2004; Hellgren, 2016; Ryan & Deci, 2000), it was expected that many of the students in this study would not be particularly motivated in science. In addition, the researcher and other teachers at the school had personally experienced that in the social science program students they had taught there were many individuals who were unmotivated during science. It was therefore not a surprise that the students in the study were considerably less motivated during science class than they were in their social science- or other school subjects.

It was, however, surprising that almost none of the students knew that they were required to study science in secondary school. This was surprising because all of the websites with information about secondary programs, the school's own website, and the pamphlet issued by the school on the specific program, all clearly state that 100 credit points in science is a requirement (Utbildninginfo, 2016; Skolverket, 2016). When these students chose the social science program, it was likely that they felt they were choosing freely and their personal need for autonomy was fulfilled. However, when they realized that they were required to take science, they no longer experienced autonomy. The realization that they had missed this important piece of knowledge likely contributed even more to their lack of motivation in that they were angry and viewed science as pointless before they even entered the science classroom.

Receiving a grade is a very effective extrinsic motivation technique (Itzek-Greulich et al., 2016) so ingrained in school that it isn't even considered a teaching method or approach. While extrinsic motivation is not as effective or long lasting as internal motivation (Dev, 1997; Nagy et al., 2006; Wery & Thomson; Hidi & Harackiewicz, 2000), it does motivate students to complete their assignments. It was therefore not surprising that students mentioned that grades as being important. However, since the aim was to evaluate the actual teaching methods and approaches information about grades where only used to get a background perspective on the students.

That all of the teaching methods and techniques in the study were viewed as positive and helpful with increasing students' motivation was expected. These teaching methods and techniques were used in the literature of the teaching program at Malmö University and are supported by science.

6.1 The different motivational methods and approaches

6.1.1 Teaching at the right level and varying the teaching methods

That students rated teaching at the right level as the most effective motivational method is understandable because it is a method that allows students to feel success as they acquire new knowledge and understanding and move on to the next level. As Hajer and Meestringa (2014) explained, success increases motivation. Success is also required to fulfill one of the basic needs according to self-determination theory (Ryan & Deci, 2000). Intrinsic motivation and success are also linked (ibid.). If lessons are too difficult, which many of the students found science lessons to be, then there is no feeling of success. This, in turn, could render the other motivational methods and techniques ineffective as well, because the students neither understand nor feel that they are learning. Further research is needed to explore why students rated teaching at the right level as the most effective teaching method.

Learning is more effective when a variety of teaching styles are applied (Hajer & Meestringa, 2014; Gentry et al., 2013; Dörnyei, 2000; Eriksson-Bergestic et al., 2010) and students therefore achieve greater success and gain motivation for the same reasons as when lessons are taught at the right level. Varying the teaching methods allows students to become engaged in the material, to participate in laboratory work and to be active in their learning, and compensates for different learning styles. There is much

research evidence that laboratory work increases students' interest and motivation levels (Glowinski and Bayrhuber, 2011; Itzek-Greulich et al., 2016; Hellgren, 2016). It was therefore also expected that students would rate variation of teaching methods high as well. Teaching at the right level was perhaps higher because even practical work has to be at the correct level for students to understand.

6.1.2 Seeing every student and being a positive teacher

After teaching methods, it was the teacher's personal traits and relationships that the students rated as next in effectiveness. The teacher seeing, acknowledging and relating to every student can increase students' sense of belonging (Aspelin, 2010) and fulfills the relatedness need, which is connected to intrinsic motivation (Ryan & Devi, 2000). What was interesting in this study was that this category was not rated higher. Many of the lecturers at Malmö University have talked about the importance of relationships. Aspelin (2010) argues that the relationship between teacher and student is the most important aspect of the student being able to learn, as did the Swedish government report on sustainable teacher education (SOU, 2008:109). According to the students in this class, however, this was not the most effective motivating factor. The results showed that, while the students were very positive to being seen, teaching at the right level and using a variety of teaching methods were actually viewed as more effective. In this sample, perhaps the need for success outweighed the need for relatedness.

Also, the students rated having an enthusiastic teacher the same as the teacher seeing every student. Kullberg (2004) and Ehdin (2010) explain how teachers' being positive towards their subject, the material and the students, made the students feel more engaged. It was therefore expected that students would rate having a positive teacher relatively high. A lot of the students during the focus groups did relate how they had found classes interesting because of a teacher who was enthusiastic about the subject and friendly toward the students.

6.1.3 Using formative evaluation, connecting lessons to everyday life and adapting lessons to students' interests

The participants in the focus groups viewed formative evaluation as very positive, and as increasing both their chances of success and their motivation. This should also increase one's personal need for success as well as intrinsic motivation. However, the students only viewed formative evaluation from the teacher as positive. Evaluation by

their classmates or their own self-evaluations were actually viewed as negative. Researchers such as Nolen (2011) confirm this finding. She suggests that formative evaluation can be used to positively impact motivation, though it can also have the opposite effect if used incorrectly. Different students may very well take the same feedback differently.

That connection to daily lives received such a low rating was surprising because the research shows that connecting teaching material to everyday life increases student motivation (Dev, 1997; Ehdin, 2010). However, in three of the four focus groups, the researcher had to explain what was meant by "everyday life", and in one of the focus groups the participants did not perceive connecting science to their everyday lives as motivating. This finding could be explained by the students not understanding how the material could connect to their everyday lives, or by their low intrinsic motivation, so even if the teacher made connections for them, they did not make them themselves. Because of the small sample size, the impact of students in one focus group weighed heavy on the quantitative results, and could drastically bring down the score for a particular category.

Course literature such as Sjöberg (2000) and other research such as Mikesell (2012) describe the importance of adapting lessons to match the students' interests. However, according to the students, it was very positive and would increase motivation substantially to have lessons adapted to their interests, but they were not convinced it is possible. The fact that many insisted it was not possible to do this meant that students did not view it as a particularly effective motivational method or technique. The low scores in this category may also be due to students not seeing a connection between their interests and science.

6.1.4 Summary of the teaching methods

Both teaching lessons at the right level and varying lessons are more about how the teacher teaches. Seeing every student and being enthusiastic are more about what the teacher is like as a person. Perhaps students feel that motivation increases most when they themselves have the tools to learn, rather than when the teacher is a nice person. And finally – formative evaluation, connection to daily lives and adaption of lessons to student interests are more about teaching methods again.

6.2 Limitations and further research

While the researcher held the focus groups, transcribed and analyzed the data herself to increase reliability, this leaves the study subject to human error. However, the researching working alone can also be a drawback, as all analyzed data was subject to the researchers own interpretations. And, as discussed above in the methods, a study such as this may be subject to bias due to the researcher knowing the students being interviewed in the focus groups. It is possible that the students were not entirely honest, which would decrease validity.

This was a small study done on one secondary class at one school in southern Sweden. It is therefore not possible to generalize the findings from this study to a broader population. Further research is needed on more and different classes in order to confirm the results found, and determine whether they can be generalized. This was a study done to find out whether students perceived certain methods as more effective than others and, as such, contributes by shedding some light on a previously unstudied field. Further research is needed to explore why students rated these methods and approaches the way they did.

6.3 Implications for the researcher

Studying motivation from the student's perspective has been both useful and exciting. I often asked myself: *How can I motivate these students?* It was comforting to know that I am not the only teacher who has struggled with this question, and that motivating students is something teachers have had to face for over 4000 years. Through this study I have learned a lot about motivation, about methods and approaches that increase motivation, and about the students who were in my classroom. The fact that students viewed lessons being at the right level for them and a variety of teaching methods being used as so much more effective than adapting the teaching material to their interests is a finding that I will take with me into the classroom when I teach.

I also learned a great deal about the students that participated in the focus groups, knowledge that could have helped me when I was teaching them in the classroom. I

knew that many of the students were negative towards science when I met them the first time; however, I was surprised to learn just how negative many of them were, and that they had not known that they were required to study science. Knowing the students' attitudes and perceptions would have made me better able to connect with them when I was teaching them, and that is also knowledge I will take with me into the workplace.

6.4 Conclusions

While the social science program students in this study were not very motivated in science class, they did believe that all the methods and approaches discussed increased motivation. Students perceived that teaching lessons at the right level and varying the teaching style were the most effective at increasing motivation, while connecting the material taught to everyday life and adapting it to the students' interests were the least effective. While teachers may not be able to impact individual students' interests, they can increase motivation through their choice of teaching methods and approaches.

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Appendix A

Questionnaire (with Likert scale questions)

Fokus grupp # _____

Hur sanna är följande påståenden (ringa in)

1. Jag är motiverad på gymnasiet

   Instämmer inte alls Instämmer lite Instämmer mycket Instämmer helt

2. Jag är motiverad på samhällsprogrammet

   Instämmer inte alls Instämmer lite Instämmer mycket Instämmer helt

3. Jag är motiverad inom naturkunskap

   Instämmer inte alls Instämmer lite Instämmer mycket Instämmer helt

4. Jag är mer motiverad inom naturkunskap än andra ämnen

   Instämmer inte alls Instämmer lite Instämmer mycket Instämmer helt

Appendix B

Focus group interview questions

1. Varför går ni på gymnasiet?
2. Varför går ni på samhällsvetenskapliga programmet?
3. Hur tänker ni kring att läsa naturkunskap?
4. Hur viktigt är naturkunskap är i era liv? Förklara.
5. Hur skiljer sig naturkunskapsämnet ifrån andra ämnen?
6. Hur motiverad är ni i naturkunskap?
7. Skiljer det sig jämfört med andra ämnen?
8. Följande metoder och förhållandesätt har er kursledare och jag använt under era naturkunskapslektioner. Beskriv era tankar/åsikter kring hur dessa påverkar eller inte påverkar er motivation.
    a. Lektioner på rätt nivå för er
    b. Lektionsinnehåll anpassat efter era intressen
    c. Lektionsinnehåll kopplat till er vardag
    d. Formativ bedömning
    e. Varierad undervisning
    f. Läraren ser och uppmärksammar varje elev
    g. Positiv lärare
9. Finns det något mer som skulle kunna få dig mer motiverad inom naturkunskap?

Appendix C

Example of data analysis, distilling categories and themes from meaning units

Meaning unit	When we do experiments, we do something practical. And, like, when we were going to have the test on a bunch of birds and stuff. We, like, instead of looking at a picture in a book, we got to see them in real life. We got to point [at the birds], and do the assignment on this foot, and then we were to find out which one it was and find it in the book. It became, like, much more fun, and the motivation is there. Then it isn't just that we have to sit and listen, but it's, like, today we're going to look at birds
Condensed meaning unit	Through labs, lessons become more fun, thereby increasing motivation
Codes	Practical teaching method, fun, motivation improves
Category/Theme	Varying teaching methods increases motivation

Appendix D

Informed consent

Enkäten och fokus gruppen utgör underlag för en studie om samhällsvetenskapliga elevers upplevelser av motivationsmetoder och förhållningssätt som används i mitt examensarbete på Malmö Högskola.

Deltagandet är frivilligt, och det är möjligt att avstå från att delta eller avbryta under studiens gång. Det kommer inte vara möjligt utifrån den färdiga rapporten att identifiera individer eller klassen. Fokusgrupperna kommer att spelas in. Inga andra utom Terese och Kerstin (handledare på Malmö högskola) kommer att få tillgång till inspelningarna.

För mer information kontakta mig gärna på: AF6604@student.mah.se

Tack för din medverkan!

Terese

Jag förstår att det jag pratar om idag kommer användas i ett examensarbete på Malmö Högskola och att deltagandet är frivilligt

_____ _____

Namnförteckning Ort/Datum

_____

Namnförtydligande