Technical Interest

Does earlier technology education influence the choice to further studies in technical subjects?

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Intresse för teknik: Påverkar högstadiets teknik valet till vidare studier inom teknikområdet?

EXAMENSARBETE INOM TEKNIK OCH LÄRANDE PÅ PROGRAMMET KOMPLETTERNADA PEDAGOGISK UTBILDNING

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Abstract

This thesis investigates if a student’s interest in technology at lower secondary school can influence their choice to attend an upper secondary school technical program (Teknikprogrammet). Factors like the choice of course book, teacher, practical and theoretical technology were investigated. For example, the frequency of course book use during the education and how many students that used a course book. The differences between female and male students was specially investigated. The study was performed by a web form that was sent out to 145 students at first year Teknikprogrammet. Quantitative analysis was done on all the questions except the open-ended questions, where a qualitative analysis was used.

Results show that approximately half of the students did not think technology in lower secondary school had much effect on their choice to select Teknikprogrammet in upper secondary school. Male and female students did not like technology much in lower secondary school, and there was no difference between genders. Approximately half of the students said that lower secondary school effected their choice of Teknikprogrammet, at least a little. None of the things specifically looked at had any special effect, like the book used and more than half of the students did not have a course book at all.

When looking at the open-ended questions the students’ interest seemed to lie in the technique that they were going to study, like computers, programming and games. The lower secondary school technology did not have much influence. That the students did not seem to like the Technology education was not correlated to the amount of theoretical versus practical education they have had.

**Keywords:** Technical interest, Teknikprogrammet, Higher education, Secondary school.
Sammanfattning


Resultaten visar att ungefär hälften av eleverna inte tyckte att tekniken i högstadiet hade stor inverkan på valet till gymnasieskolan, Teknikprogrammet. Ingen skillnad mellan könen sågs när det gällde vad äsикter om teknikundervisningen på högstadiet. Cirka hälften av eleverna som genomförde studien tyckte högstadiet påverkade åtminstone lite, men ingen av de specifika sakerna som studerades var speciellt betydelsefulla. Läroboken hade ingen stor effekt och mer än hälften av eleverna hade inte haft någon lärobok alls.

Sammantaget så tyckte studenterna inte om teknikundervisningen på högstadiet särskilt mycket, inga könsskillnader sågs här. Intresset hos eleverna tycks snarare ligga i tekniken som de skulle studera mer om på Teknikprogrammet som datorer, programmering och spel än Tekniken som de pluggade på högstadiet. Att studenterna inte verkade gilla undervisningen var inte korrelerat till mängden praktisk versus teoretisk undervisning de haft.

Nyckelord: Teknik, Teknikprogrammet, Gymnasieval, Högstadiet
Preface

As an engineer, technology has always been a strong personal interest. I have always studied with much more male than female students beginning already in upper secondary school. I have always wondered why this is the case. Does the technology education in primary and secondary school influence students later choices? For me a physics teacher is what influenced my decision to pursue a technical education.

I want to thank my supervisor Sandra for the help during this thesis and also all the students for providing answers in the survey. Also would also like to thank my family for their support and love. Especially to my two children that I hope will find that technology is for everyone.
Abbreviations and definitions used in this thesis

**CETIS** - Centrum för tekniken i skolan

**Lower secondary school** - Swedish högstadium - second stage of basic education

**Lgr80** - Läroplan för grundskolan - curriculum for primary school in Sweden


**PISA** - Program for International Student Assessment

**Primary school** - Swedish grundskola - first stage of basic education.

**TIMSS** - Trends in International Mathematics and Science Study

**Upper secondary school** - Swedish gymnasium - high school
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1 Introduction and background

1.1 What is Technology?

There are many definitions of Technology. According to Lindqvist, the eight most common are:

- Technology is the use of machines and tools
- Technology is applied science
- Technology is man’s methods of mastery of nature
- Technology is human methods to master the physical environment
- Technology is human methods to satisfy their needs by using physical objects
- Technology is the methods used to process raw materials in order to increase their usefulness
- Technology is human methods to satisfy their desires by using physical purposes
- Technology is all rational, efficient business” (Lindqvist, 1987)

Of these eight definitions four are directly related to humans and what humans do with technology. Two of the definitions describe technology as a method to do something. There are only two definitions where technology is not directly or indirectly related to humans. Lindqvist defines technology as—“Man’s methods of satisfying his desires by using physical objects or other actions that have a purpose and which change the material world.” This is a combination of most of the eight most common definitions (Lindqvist, 1987). This definition will be used in this thesis.

1.2 Technology versus nature of science

Looking at the difference between nature of science and technology; in Nature of science the knowledge is the goal. In technology, on the other hand, knowledge is a medium and it is the artifact or the process that is the goal. Nature of science use Technology and Technology uses Nature of science to develop. None of the disciplines would have been the same without each other and they go hand in hand (Norström, 2015).

When you talk about nature of science it is usually physics, chemistry, biology, and sometimes geography. But it is also hard to define the division between nature of science and technology. In the Swedish curriculum, primary school, Läroplan för grundskolan 1980(Lgr-80), nature oriented subjects are biology, physics, chemistry and technology. Until the curriculum that came 1994, 1994 års läroplan för det obligatoriska skolväsendet, förskoleklassen och fritidshemmet. (Lpo94) biology, physics and chemistry was included in nature of science and technology was its own subject but the hours were included in nature of science. After the year 2000, nature oriented subjects were biology, physics and chemistry(Lindahl, 2003). In gymnasium Teknikprogrammet Technology, is its own subject. In England nature of science also includes a bit of design like the Swedish subject Bild –(Art). I assume that the students in upper secondary school had nature of science on their schedules and that these included biology, physics, chemistry and technology. Since there is a close relation between the subjects for the pupils. I have chosen to talk about the importance of all the subjects together in the beginning and then go more specific into technology.
1.3 Why is Technology and nature of science important in school?

1.3.1 Society looking at nature of science

There is no international test comparing the skills in different countries in technology, like there are for science, science literacy, and critical thinking. International tests like “Trends in International Mathematics and Science Study” (TIMSS) (TIMSS & PIRLS, 2016) and “Program for International Student Assessment” (PISA) (PISA, 2015), are performed in many different countries and in different subjects, such as nature of science. Bad results give the Swedish school system a bad reputation, especially in the Swedish media. There are many efforts in Sweden to raise interest for nature of science and technical subjects. For example: Kungliga Vetenskaps Akademin has a project called ”Science meetup” trying to raise the interest for nature of science and research (Tyskeng, 2018).

1.3.2 Research point of view; on why nature of science is important

Roberts came up with seven reasons why pupils would like to learn nature of science. Roberts created his emphasis to give the possibility for teachers and politicians to discuss what was important for students to learn in nature of science (Roberts, 1988).

Roberts believed that nature of science is important because it can provide pupils with the following:

1. Everyday Coping – Use help of nature of science to understand things around us.
2. Structure of Science – This is about model thinking and the connection between reality and theory. It is about how to understand nature of science as an intellectual operation.
3. Science, Technology and Decisions - This is to be able to be a part of the democracy. To learn important things needed for making decisions and to be an active part of society.
4. Scientific Skill Development – To be able to formulate hypotheses and develop tests to explore the validity of the hypotheses.
5. Correct Explanations – To be able to understand and solve the right answered or/and the end product of the question.
6. Self as Explainer – To be able understand one own problems and to explain them
7. Solid Foundation – This is to be able to have a strong foundation of knowledge for further education

Certain groups are more interested in certain emphases and focus on different emphases have changed over time. For example, in academia correct explanations, having a solid foundation, and structure of science are the most important aspects of scientific education (Roberts, 1988).

1.3.3 Society and technology
In technology, there is a lot of different companies and groups trying to raise the interest for technology. For example, Swedish Industry (Svenskt Näringsliv) have a stipendium to raise interest for Technology in upper secondary school (Carlsson, 2017). There is also Center for tekniken I skolan (CETIS) that investigate the Technology education in Swedish schools and have education for teachers (CETIS, 2016). Swedish schools are influenced by society industry etc. Liljequist says that the Swedish schools are not only ruled by government and the parliament through the course plans and the curriculum. Liljequist believes that in reality the education is influenced by many other factors such as media, teachers education, political parties, university unions, and the labor market (Liljequist, 1994).

1.3.4 Research in technology’s explanation

Sjøberg writes about four more arguments for the technical subjects in school.

**Economical reason** -- it is important for society that school educates pupils in nature of science and technical subjects. Education will make it easier for the pupils to get an employment in the future since it is needed in the society

**Need argument** -- we use technology in everyday life and must be knowledgeable enough to make informed decisions on issues that can greatly affect use, for example decisions regarding health.

**Democratic argument** -- knowledge in nature of science is important to be a part of the democratic process and to be able to make good decisions for society

**The cultural argument** -- Technology is one of society’s most important products and the values and ethics surrounding it have a great cultural value (Sjøberg, 2010).

1.4 Technology education and the Swedish school system

Technology is taught in Swedish primary and lower secondary school. The school system is divided into year 1-3, 4-6, 7-9, where lower secondary school is year 7-9 (högstadiet). The students have 47, 65 and 88 hours respectively in Technology. In total, they have 200 hours technology the first 9 years in school. These hours could be compared to the total amount of hours they have; 6890 (Skolverket, 2018).

The education in primary and lower secondary school technology is supposed to give knowledge to be able to take on technical challenges and to develop an interest for technology. The education is aiming at giving the students a chance to develop knowledge about technology in daily life and to provide subject specific expressions and concepts about the subject (Skolverket, 2017e).

The main goal with the education in primary and lower secondary school Technology is that the students should develop the ability to:

- Identify and analyze technical solutions based on purposefulness and function,
- Identify problems and needs that can be solved with technology and draft solutions,
- Use the concepts and forms of expression of the technology area,
- Evaluate the consequences of different technology choices for individuals, society and the environment,
Analyze the driving forces behind technology development and how technology has changed over time (Skolverket, 2017e).

Technology is included in some way in all upper secondary school programs. Maybe not with a specific course but most practical programs use technical artifacts in some way, like for example all health care staff or the carpenter. Especially there is Teknikprogrammet that prepare for higher educational studies in the technical field (Skolverket, 2015).

1.5 About upper secondary school program: Teknikprogrammet

Teknikprogrammet is a training program for students that want to learn about technical development and problem solving. Through this program students develop a base for university studies in technical subjects and nature of science. Teknikprogrammet have five different tracks:

1. Design och produktutveckling - Design and product development
2. Informations- och medieteknik - Information and media technology
3. Produktionsteknik - Production
4. Samhällsbyggnad och miljö - Community building and environment
5. Teknikvetenskap - Engineering Sciences (Skolverket, 2017b)

In this study students were enrolled in the track named: information and media technology. This track covers web design, communication technology, programming, and digital media. (Skolverket, 2017b)

1.6 Who were the students are enrolled in Teknikprogrammet

Of all the students in Sweden, there were 26 848 students attending Teknikprogrammet where 83.6% were males and 16.4% were females (see table 185, Bilaga 3). Of those students 10 203 pupils were in their first year of 2016/17 (see table 184, Bilaga 3) (Skolverket, 2017b).

For 10 713 students (see table 182, Bilaga 3), Teknikprogrammet 2016/17 was their first choice when choosing in lower secondary school, 9.7% of the whole student population eligible for application that year. If you look at all programs, first year, that are preparing for higher education’s 15.3% of these students are going to Teknikprogrammet (see table 183, Bilaga 3) (Skolverket, 2017b).

Merit value is the sum of the grades in the student’s 16 best subjects with a maximum of 320 points. The mean merit score for the students that chose teknikprogrammet this year was 240 points (see table 182, Bilaga 3) (Skolverket, 2017c). Beginning in application year 2014/2015, students can calculate their merit value on 17 subjects using the 16 best courses as before, but with an additional modern languages course for the 17th subject for a maximum merit value of 340 points. For the statistics above maximum merit value is 320 points. For the statistics above maximum merit value is 320 points. Mean value are calculated for students that have at least E in one subject. The grade letter A, B, C, D and E is transformed to the points 20, 17.5, 15, 12.5 and 10, respectively. Grades F were given 0 points. See Appendix 3 for graphs of the statistics above (Skolverket, 2016).
1.7 What can influence attitudes about gender and Technology?

Education in Technology during primary and lower secondary school provides an important opportunity for the Swedish school to raise interest for technology for everyone independent of biological gender. It also gives an opportunity, to work against gender patterns (Skolverket, 2017a). However, statistics on the applications to Teknikprogrammet show that education preceding upper secondary school have not succeeded creating a gender equal distribution of students.

Researchers show that society gives different knowledge about technology to female and male children in their early years of development, according to traditional gender patterns (Skolverket, 2017a). For a long time, women had no opportunity for higher education at university. Due to the profession engineer, technology and the nature of science came together and men got theoretical education to do practical work. It was not until 1920 that women were allowed to attend higher technical education. In the 1970s women raised to over 10% of students enrolled in engineering education (Skolverket, 2017a).

The "Hack the World Challenge" is an initiative to increase the number of young women applying for a technical education. In this program influential YouTube channels solve daily problems with technology that are supposed to be of extra interest to young women. This is a collaboration with technology companies in Sweden, and it was released in relation to the period when year 9 lower secondary school students where choosing to upper secondary school, to specifically target them (Teknikföretagen, 2017). Vetenskapens hus also has summer schools for girls in lower secondary school and primary school to raise the interest for nature of science and technology (Andersson, 2018).

1.8 Earlier research on the influence of early education and gender differences

Lindahl studied a group of pupils (80) from the age of twelve to sixteen, when they leave for upper secondary school (Lindahl, 2003). The study investigated the student’s attitudes and interest towards technology and science. It was found that family background and gender influenced student’s choice to upper secondary school. In Lindahl’s study the students that continued the education in Teknikprogrammet showed a big interest for technology. All the students in Lindahl’s study also had fathers with a Master of Engineering. Students that regarded themselves as good in nature of science, and that showed an interest in nature of science, generally chose to study nature of science or Teknikprogrammet, according to Lindahl (Lindahl, 2003). The students felt that getting an interesting work was a top priority, after having a safe work environment, and time for family friends and own interests (Lindahl, 2003).

A study in UK has shown that most young people like technology, but that they do not see themselves with a profession in the technological field in the future (ASPIRES, 2013).

Mattson has shown that the teachers education and competence highly influenced the interest of their students in technology (Mattsson, 2005). There has been studies from the US that discuss the importance of family and social capital. Social capital is a form of cultural and economic capital where social networks are the main important content. When choosing a higher education in the technical field, social capital could be from parents, for example, sharing their own experiences and connections with technology (Martin, Simmons, & Yu, 2014). Applications to The Royal Institute of Technology, Stockholm have shown that the
second biggest reason for applying was an interest in nature of science and technology after the good reputation of the school that was the first reason. Where the second reason is the only related to way chose the school and not way they chose to further study technology (Östling, 2015).

Regarding the differences between male and female students, research has been investigating similarities and differences between male and female engineering students. Some research (Engström, 2018) has reported that female and male students were homogenous groups. In the study all students in Sweden studying in their seventh semester of engineering were provided a questionnaire (year 2012). The results showed that there exists five male profiles and four female profiles. These profiles described background, what they liked etc. According to this study, the females were not inspired by compulsory school courses or teachers, rather family and parental education. Well educated parents, had a positive attitude toward engineering traditions and to the profession as an engineer and this was shown a to be an important factor to inspire women. The students in the study seem to prefer the traditional way of teaching. The male and female groups where very similar and the main difference was that female students wanted to make something good for the society and that in the male group there was one of the four profiles that had practical technical capital but lack of scientific capital. (Engström, 2018).

It has also been shown that when studying the students’ interest in technology there is a large spread of answers. This shows the technology subjects’ big variability and opportunities according to Mattsson (Mattsson, 2005).

2 Aim

The Aim of this study is to investigate what makes a student choose a technical program (Teknikprogrammet) in upper secondary school education. What proportion of pupils attending Teknikprogrammet do so because of interest created during lower education technology?

2.1 Research questions

2.1.1 Main question

How important is Technology during the lower secondary school years of education for further choice of technical education?

2.1.2 Questions

How does the lower secondary school influence the choice to pursue upper secondary school, Teknikprogrammet? Is the decision to pursue education in Teknikprogrammet influenced by:

- The amount of theoretical or practical work, the students had during the lower secondary education technology?
- If the pupil had a course book or not?
- What teacher the students had?
- How much technology they had learned in school that could be used in daily life?

This thesis investigates if there exist a difference between the influence of the subject Technology for male and female students that chose to pursue Teknikprogrammet? Are there
differences between female and male students that have chosen Teknikprogrammet, for example; if they liked Technology or not during lower secondary school?

It was also investigated if the like of Technology is correlated to the amount of practice versus theoretical education the students have had.

Additional questions were if the presence of a course book, and how much a pupil utilized their course book in lower secondary education influenced the choice of Teknikprogrammet.

3 Method
3.1 Study population

A school in a major city in Sweden, Stockholm, was used in this study. At this school, all of the first-year students enrolled in Teknikprogrammet were asked to fill in a questionnaire, in total 161 students were asked and 145 pupils completing the form. All of the students were attending the Information and media technology track. It was clearly declared that participation was not compulsory and the purpose of the study was explained to the students beforehand.

3.2 Data collection and choice of data collection

3.2.1 Why forms

Forms were given directly to students to determine their personal interest and attitude towards technology. Forms are a good choice when investigating attitudes and to collect as much information as possible for the analyses. (Denscombe, 2016). The form was composed of a short information and relatively simple questions in an easy language. It was assumed that the students understood the questions and were able to answer. According to Denscombe, the social climate has to be open enough to get honest answers and this assumption was made for this study (Denscombe, 2016).

The success of an investigation based on forms can be measured by the number of responses, the completeness of the responses, and if the respondent answered honestly. According to Descombe, it is important to provide information to respondents to motivate them to respond. The sensitivity of the questions is also important. (Denscombe, 2016). In this case the information was not considered sensitive.

It was important that the form should be written in a concise manner with a simple language so that it would not require a lot of time and it should not be hard to understand. This is to get as many of the respondents as possible to complete the form. (Denscombe, 2016)

Web forms are good for societal research, such as this study. The questions in the form where mostly multiple answers with some open-ended questions.

However, questions with multiple answers can potentially frustrate the respondent, leading to incomplete forms. Also, multiple answer questions make the answers forced to a certain structure. Determining the honesty with which a respondent completes the form is also very difficult, in particular with web forms. It may be easier to judge a respondents honesty during
a face to face interview (Denscombe, 2016). In this study, it was chosen due to do the increased amount of answers it can provide, as interviews are very time consuming.

Webenkäter (Webenkäter, 2007) was used for the data collection. The forms were sent out with a link and the pupils answered with their computers or phones anonymously. The selection of Webenkäter was carefully considered so that the collected results from the forms would not belong to Webenkäter, the results could not be used by Webenkäter, and the results could not be given to a third party. The results collected from the web forms could be erased at any time, by the author of the form (Webenkäter, 2007). The form was also first given to one of the classes as a pilot study. The answers were controlled in order to see if the students had understood the questions. Nothing was changed.

3.3 Data process and statistical analysis

The goal of this study was to survey a representative population of the whole group that apply to Teknikprogrammet. (Denscombe, 2016).

Students attending this school come from a diverse set of lower secondary schools. It was assumed that the respondents represent the whole population of students that enter Teknikprogrammet. All the students in this study are coming from the same school, but the school is also representative for the whole population. If you look at the mean grade of the students attending this school it is just above median. This if you look at all the schools having Teknikprogrammet in the city (Skolverket, 2017d). Information about the group used for the study is provided to give the reader the possibility to apply the result in a different social context. This information can also give the reader the ability to decide the finding in this study’s possible generalizability (Denscombe, 2016).

A quantitative analysis was used to base the analysis on objective laws rather than the researchers’ values. Significance tests are also provided to give confidence in the results and analysis. The results are more based on quantitative measurement than the researchers beliefs (Denscombe, 2016).

All analyses was performed using the software MATLAB (MATLAB, 7.4.0, MathWorks, Natick, MA, USA).

Three questions were statistically investigated:

1. Are male and female students influenced by technology education in lower secondary school in their choice to attend Teknikprogrammet and are there any differences between genders?

2. Is there any difference between female and male students in their opinions about technology in lower secondary school?

3. Is the like or dislike of the Technology education correlated to the amount of practical or theoretical education the students had during lower secondary school?

Normal distribution was controlled using a Lilliefors test. Lilliefors test is used to test if the distribution is from a normally distributed population using the null hypothesis that the data does come from such a distribution. (Lilliefors, 1969). In this case the answers form the female group and male group where controlled and the distributions were not normalized.
Due to skewed data distribution (no normalized data) a Mann–Whitney–Wilcoxon test were used, to control differences between males and females. The Mann-Whitney-Wilcoxon test can be used even if the population is not normalized. The test is used to control if two independent samples are from populations, having the same distribution. Significance was set to $p<0.05$. This means that a $p$ value greater than 0.05 will show that there are no significant difference between the two populations and a value smaller than 0.05 will show that there is a significant difference.

For the open ended questions a qualitative analysis was used. More specifically, a condensed analysis was used where the values of the student's answers were analyzed. It was first analyzed how many students that gave a positive answer when asked if they learned anything in technology in lower secondary school. Specific keywords words were searched for and the frequency at which they occurred were used (Denscombe, 2016).

A qualitative analyze complements the results of a quantitative analysis. When doing a qualitative analysis there can be many different explanations as you investigate the details of data. Due to this uncertainty, there is a tolerance for differences. Since qualitative analyses often are based on small data sets it is harder to generalize the results to other populations. The qualitative analysis often also takes more time than a quantitative analysis. (Denscombe, 2016).

4 Result

145 students answered the questionnaire of 161, so 90% answered. The gender distribution of the group was; 107 males, 30 females and 5 others, 3 students choose not to answer the questions.

4.1 Quantitative analysis

On the figures below the result of the quantitative analyzes can be seen.

The students were asked if they liked technology during lower secondary school. It can be seen, among other things, in figure 1 that 20 students did not like technology in lower secondary school at all and most felt that technology is ok but not more. Not many students thought technology was great during lower secondary school.
Figure 1. How many of the students liked Technology as a subject in lower secondary school.

![Figure 1](image1.png)

Figure 2. How much does the subject technology in lower secondary school influence the student’s choice to upper secondary school, Teknikprogrammet.

It can be seen that around half of the students did not think technology in lower secondary school had a strong influence on their choice to enroll in Teknikprogrammet. The remaining half though that technology in lower secondary school mattered 10-100%.

In the figures below the students that though technology in lower secondary school affected more than 10% are investigated. In figure 3 it can be seen how different characteristics in their technology education influenced their choice.

![Figure 3](image2.png)

Figure 3. If Technology in lower secondary school affected more than 10% for the choice to enroll in Teknikprogrammet. It can be seen in these figures how various potential influences affected the student’s choice covering a) The Teacher b) Technology every day connection c)
The course book, d) The practice part of Technology e) The theoretical part of technology. Regarding the course book it is only taking to account the students that answered that they had a course book during the Technology lessons.

During technology lessons the students have had both theory and practical education. Below it can be seen how much theory versus practical education they had in the subject Technology during later part of lower secondary school. It was also asked if they had a practical task, if they had some kind of theory education before starting the practical task.

![Figure 4a](image)
![Figure 4b](image)

*Figure 4a)* How much practical versus theoretical tasks in Technology the students have had in lower secondary school b) If the students had theory before a practical task.

In Figure 4a) a big variation can be seen between respondents. The amount of practical tasks during Technology lessons could be everything from almost all theory to almost all practical tasks. Most students seem to have some kind in between.
Figure 5. a) If the students had a course book in lower secondary school technology. b) If they had a course book how much did they use it. c) What course book did they have.

As seen in Figure 5a) more than half of the students did not have a course book at all during lower secondary school Technology lessons. The students that had a course book did not use it much. When asked what course book they had, a lot of the students did not know which course book they had but “Puls Teknik” and “Spectrum” were two of the most commonly used.
More than half of the students thought that they had more than 10% use of the technology lessons, in everyday life.

Table 1 show that there were no significance differences between males and females. A value $P<0.05$ would mean a significant difference.

Table 1. Differences between males and females in the questions if Technology in lower secondary school effected the choice to study Teknikprogrammet and if they liked Technology in lower secondary school or not. P value is calculated with Mann-Whitney-Wilcoxon (Mann & Whitney, 1947) and a significant value is $P<0.05$.

<table>
<thead>
<tr>
<th>Different between males and females</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did Technology in upper secondary school effect your choice to Teknikprogrammet</td>
<td>0.74</td>
</tr>
<tr>
<td>Did you like technology in upper secondary school</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Table 2. shows that there was no significant correlation between how much practice or theoretical education you have got and how much you liked technology in lower secondary school.

Table 2. Correlation between how much practical education versus theoretical education and how much you liked technology in lower secondary school. P value is calculated with Mann-Whitney-Wilcoxon test(Mann & Whitney, 1947) and a significant value is $P<0.05$.

<table>
<thead>
<tr>
<th>Correlation in how much the students liked technology and how much practical or theoretical education</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>If you liked not at all little or though it was ok versus if you thought it was good or great</td>
<td>0.19</td>
</tr>
</tbody>
</table>

4.2 Qualitative analysis

4.2.1 On the open ended question: daily life

Question: if the students learned anything that they could use in daily life from technology If you look at the attitude towards this question: 45 students had some kind of positive view that they learned anything, 36 answered no or very little and the rest of the students did not answer at all.
Of all students that said they learned something, the most mentioned answer was programming (7 students), drawings (5 students), and building something (4 students). Five students talked about something bigger than a specific area, for example critical thinking, but for the rest it was more specific things they have learned.

4.2.2 On the open ended question: what mattered

**Question: If lower secondary school technology did not matter, what did?** In these answers the attitude of the students were studied: In the question if they liked technology during lower secondary school: most of them had something they liked and showed a positive attitude towards something that they would learn at Teknikprogrammet. Of these students few talked about how bad the technology education had been at lower secondary school (7 students).

45 students answered this question. The most common answers were computer programming or some interest in games (17 students). If you look at the track the students are taking, this response fit very well in what the students will read more about mostly in year 2 and 3. Some students mentioned interest in subjects like mathematics of physics (3 students), 6 said they just liked technology overall and 3 discussed future work possibilities. Some said friends of family played some kind of role in their choice (4 students). Other answers were for example that the students had chosen Teknikprogrammet because they did not need to study language, or that they did not need to work and an interest for Internet or Computer Aided Design (CAD).

5 Discussion/ Conclusion

The results in this study show that that around half of the students did not think Technology education in lower secondary school had much effect on their choice to pursue Teknikprogrammet in upper secondary school. According to earlier studies this result fits well for the female students, in particular that they were not inspired by compulsory school teaching or teachers (Engström, 2018). No difference between males and females was found in this study when it came to whether they liked technology at lower secondary school.

Around half of the students were affected by the lower secondary school technology education at least a little and when looking at specific things, the course book was one factor that did not matter. More than half of the students in this study did not have a course book during technical education in lower secondary school and many of the students that had a course book did not use it frequently. Practical or theoretical exercises in technology education seemed to have the same influence on the decision to continue technology education. Neither the teacher, nor the everyday life connection seemed to stand out in importance for the choice to study Teknikprogrammet. Earlier studies have shown that the teachers education and competence highly influence the interest of the student in technology (Mattsson, 2005), however, this could not be seen in this study. The teacher seems not to be so important for the future choice of technology education in upper secondary school.

Earlier research has shown that students that continue at Teknikprogrammet show a strong interest for technology in lower secondary education. (Lindahl, 2003) (Östling, 2015). This contradicts with the finding in this study that students did not like technology in lower secondary school so much, only that it was “mostly ok”. On the other hand, the students do not necessarily have a low interest in technology just because they did not like it in lower
secondary school. When looking at the qualitative analysis of the results, the students interest seems to rather lie in a particular technology that they were going to study more in Teknikprogrammet, like computers, programming and games, rather than what was the focus in lower secondary school technology teaching. We do not know the social capital of these students and Martins shows that the social capital is of high importance of (Martin, et al., 2014). There was no correlation on how much the students liked technology and how much practical versus theoretical technology education they had. When it comes to gender differences, this study did not find any differences between male and female students with respect to the influence of the education from lower secondary school. Earlier studies have found that gender and background influence the choice to upper secondary school (Lindahl, 2003). In this study on the other hand it was just the students that attended Teknikprogrammet and thereby already had chosen to study more technology. If you look at the group I have studied you already have a gender difference due to that it is so much fewer females than males in Teknikprogrammet. Obviously, there must have been a difference in gender since there was much more male than female students at Teknikprogrammet.

In conclusion, it can be said that lower secondary school technology education does not play a major role in the students’ choice to attend Teknikprogrammet and that no statistically significant differences were found between female and male students, enrolled in Teknikprogrammet.

It would be interesting to do a continuation of the study with maybe some deeper interviews on some of the students to understand what the main reason was for their choice to attend Teknikprogrammet. Was it something outside school? It would also be interesting to investigate if there was any big difference in the female and male group.

It came up in this study that not so many like technology in lower secondary school. Because of that it would be interesting to look at everyone all the students choosing to lower secondary school. To see if there was students that liked technology and did not apply to Teknikprogrammet.
6 References

27. TIMSS., & PIRLS. (2016). Retrieved 29/1, 2018
Vi vill undersöka undervisningen i teknik, i högstadiet och hur den påverkat dig och ditt val av teknisk insiktning.
Teknik_1

 Vilket kön tillhör du?

- Kvinna
- Man
- Annat

Påverkade undervisningen i teknik på högstadiet ditt val att gå teknikprogrammet?

Nej inte alls [ ] Ja helt och fullt [ ]

Påverkade något av denna ditt val till teknikprogrammet (Dessa frågor gäller i teknikaämnat)?

<table>
<thead>
<tr>
<th>Läroboken i tekniken</th>
<th>inte alls</th>
<th>lite</th>
<th>mellan</th>
<th>mycket</th>
<th>jätte mycket</th>
<th>Vet ej</th>
</tr>
</thead>
<tbody>
<tr>
<td>Läraren i tekniken</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kopplingen i tekniken till verkligheten</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Den praktiska delen i tekniken</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Den teoretiska delen i tekniken</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Om det inte var något av ovanstående som påverkade ditt val till teknikprogrammet - vad var det då?


Tyckte du om tekniken i högstadiet?

- Blir
- Sådär
- Hell och
- Bra
- Toppen

Hur mycket teknik respektive praktik hade ni i tekniken, på högstadiet?

basa praktik [ ] bara teori [ ]

Om ni gjorde praktiska arbeten hade ni teoriundervisning innan?

[ ]

Hade ni en kursbok i teknik?

- ja
- nej
<table>
<thead>
<tr>
<th>Svarside</th>
<th>Resume-Code</th>
<th>Start Datum och Tid</th>
<th>Datum och Tid</th>
<th>Bilaga 2- Answeres</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tabell 182. Sökande och nybörjare på teknikprogrammet

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Antal förslahandssökande</td>
<td>9 393</td>
<td>9 429</td>
<td>9 533</td>
<td>9 299</td>
<td>9 788</td>
<td>10 713</td>
</tr>
<tr>
<td>Antal förslahandssökande alla nationella program</td>
<td>7,9</td>
<td>8,4</td>
<td>8,7</td>
<td>8,8</td>
<td>9,2</td>
<td>9,7</td>
</tr>
<tr>
<td>Antal nybörjarelever i år 1*</td>
<td>8 620</td>
<td>8 558</td>
<td>8 391</td>
<td>8 502</td>
<td>8 809</td>
<td>9 708</td>
</tr>
<tr>
<td>Antal (%)*</td>
<td>96,3</td>
<td>95,2</td>
<td>95,4</td>
<td>95,7</td>
<td>95,8</td>
<td>95,6</td>
</tr>
<tr>
<td>Genomsnittligt meritvärde från grundskolan**</td>
<td>227,3</td>
<td>226,0</td>
<td>232,3</td>
<td>233,7</td>
<td>237,0</td>
<td>240,4</td>
</tr>
</tbody>
</table>

*Elever med tillfälliga personnummer är exkluderade  
** Meritvärdet är genomsnittlig beräknat på 16 ämnen. Från och med läsåret 2012/13 ändrades betygsskalan i grundskolan.

Tabell 183. Andel (%) elever i år 1 på teknikprogrammet...

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>... av hela elevkullen</td>
<td>6,7</td>
<td>7,2</td>
<td>7,3</td>
<td>7,4</td>
<td>7,3</td>
<td>7,3</td>
</tr>
<tr>
<td>... av elever på nationella program</td>
<td>8,2</td>
<td>8,8</td>
<td>9,0</td>
<td>9,2</td>
<td>9,7</td>
<td>10,2</td>
</tr>
<tr>
<td>... av elever på högskoletförberedande program</td>
<td>13,2</td>
<td>13,7</td>
<td>13,9</td>
<td>14,0</td>
<td>14,5</td>
<td>15,3</td>
</tr>
</tbody>
</table>

Tabell 184. Antal elever på teknikprogrammet per år

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Antal elever i år 1</td>
<td>8 349</td>
<td>9 013</td>
<td>8 802</td>
<td>8 900</td>
<td>9 279</td>
<td>10 203</td>
</tr>
<tr>
<td>Antal elever i år 2</td>
<td>-</td>
<td>8 007</td>
<td>8 114</td>
<td>8 134</td>
<td>8 139</td>
<td>8 540</td>
</tr>
<tr>
<td>Antal elever i år 3</td>
<td>-</td>
<td>-</td>
<td>7 769</td>
<td>8 084</td>
<td>8 027</td>
<td>8 105</td>
</tr>
<tr>
<td>Totalt antal elever</td>
<td>24 685</td>
<td>25 118</td>
<td>25 445</td>
<td>26 448</td>
<td>26 848</td>
<td></td>
</tr>
</tbody>
</table>
Tabell 185. Eleverna på teknikprogrammet, alla år*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Andel (%) kvinnor</td>
<td>15.9</td>
<td>16.3</td>
<td>16.3</td>
<td>16.1</td>
<td>16.3</td>
<td>16.4</td>
</tr>
<tr>
<td>Andel (%) män</td>
<td>84.1</td>
<td>83.7</td>
<td>83.7</td>
<td>83.9</td>
<td>83.7</td>
<td>83.6</td>
</tr>
<tr>
<td>Andel (%) svensk bakgrund</td>
<td>85.4</td>
<td>85.4</td>
<td>84.9</td>
<td>83.8</td>
<td>82.8</td>
<td>81.7</td>
</tr>
<tr>
<td>Andel (%) utländsk bakgrund</td>
<td>14.6</td>
<td>14.6</td>
<td>15.1</td>
<td>16.2</td>
<td>17.2</td>
<td>18.3</td>
</tr>
<tr>
<td>Andel (%) offentlig huvudman</td>
<td>71.4</td>
<td>72.1</td>
<td>73.3</td>
<td>73.0</td>
<td>73.2</td>
<td>72.8</td>
</tr>
<tr>
<td>Andel (%) enskild huvudman</td>
<td>28.6</td>
<td>27.9</td>
<td>26.7</td>
<td>26.5</td>
<td>26.8</td>
<td>27.4</td>
</tr>
</tbody>
</table>

Fördelning av eleverna med högsta utbildningsnivå:
- eftergymnasial (%) | 63.5 | 64.9 | 65.8 | 66.8 | 67.4 | 68.3 |
- gymnasial (%)** | 36.5 | 35.1 | 34.2 | 33.2 | 32.6 | 31.7 |

* Läsåret 2011/12 omfattar år 1, läsåret 2012/13 år 1 och 2. Från och med läsåret 2013/14 omfattas samtliga år.
** Gymnasial utbildningsnivå inkluderar även de som endast har grundskoleutbildning.

(Skolverket, 2017c)