

A two-fold analysis of Value Creating Learning

An investigation of the upper secondary school project of "Attefallshuset", and Value Creating Learning's theoretical and philosophical roots

Master's thesis in Learning and Leadership (MPLOL)

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Cover: A treehouse, symbolising "Attefallshuset" and the theoretical perspectives.

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Abstract

Value Creating Learning (VCL) is a pedagogical method, based in entrepreneurial learning, that aims to spark the intrinsic motivation in students by making them participate in real missions towards external recipients outside their own group, class, or school. In the mission of "Attfallshuset" the teachers at an upper secondary school in the Gothenburg region wanted to evaluate a progression of VCL missions. The progression lies in the level of foreignness that the external recipient had to the students, and thus how arduous the students experienced, and perceived, it to make and have contact with the external recipient. Through empirical research, the aim of this thesis was to see if a progression would ease the students' feelings and attitudes towards working with more foreign external recipients. Another aim of this thesis was to theoretically, and critically, analyse VCL in order to better understand its educational implications and students' perception of it and their learning.

Results from the quantitative data showed no statistically significant difference made by the progression. However, the results from the qualitative data showed that the progression seemed to change the students' attitude of the external recipients, as well as to improve student-to-student feedback. Two critical investigations of VCL were also carried out, one about the educational functions of VCL in relation to the concept of Bildung. The other one investigates if VCL fits all students and VCL's relational capacity, analysed through resonance theory. There were three main conclusions. The first was that progression in VCL seemed to ease the interaction with external recipients and generate a better climate for student-to-student feedback. The second was that the students generally overcame a feeling of being nervous when they interacted with external recipients, which led to that the students felt more self-secure and acquired a higher degree of self-efficacy. The third was that the teacher have to put careful attention to the group dynamics and the personality of the class when deciding the level of external interaction in a VCL mission.

Keywords: Värdeskapande lärande, Value Creation, Bildung, Resonance, Educational purpose, progression

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Furthermore, I would like to thank Anders Johansson who has been a co-supervisor of the critical analyses and who introduced me to the works of Hartmut Rosa and Gert Biesta. Especially for the fun and interesting discussions, as well as presenting new perspectives on the thesis' topics to me.

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Edvin Meijer, Gothenburg, May 2024

List of Acronyms

Below is the list of acronyms that have been used throughout this thesis listed in alphabetical order:

ADHD	Attention-Deficit / Hyperactivity Disorder
NDD	Neurodevelopmental Disorder
VCL	Value Creating Learning

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1

Introduction

1.1 Background

There are innumerable challenges that a teacher faces every day, and some of the most challenging are the ones concerning student motivation and creating that spark which makes students want to learn what you teach. The want to learn, or the motivation, that students have (or do not have) can be both intrinsic and extrinsic - but it is intrinsic motivation that has the greatest learning effect (Zaccone and Pedrini, 2019).

In an attempt to develop a pedagogy based on getting students to attain that intrinsic motivation Value Creating Learning (VCL for short) has been developed by researchers at Chalmers University of Technology (Lackéus, 2016; Lackéus, 2022). VCL's core foundation is in entrepreneurial education and with an aim of letting students conduct real missions that should create value for someone else outside their own group, class or school (Lackéus, 2022).

As a part of a practice-centred research project, at an upper secondary school in the Gothenburg region, the teachers at the school wanted to evaluate their VCL-based mission "Attefallshuset" in the course "Teknik 1" through a case study. An Attefallshus is a small house (max size of 30 m²) that any house owner can build on their property without a special permission from the municipality (Boverket, 2024). "Attefallshuset" was a mission where the student made contact with house owners that were interested in building an Attefallshus, then the student interviewed a house owner about their requirements and wishes concerning the Attefallshus. After the interview the students designed a 2D floor plan of the house which they got feedback on from within the class, and finally the students presented the floor plan to their house owner and received final feedback. The aim of the practice-centred research project was to find a general model of progression in VCL that could sharpen the focus of course content learning in VCL missions, by making students having less focus on VCL competences and hindrances - such as managing contact with unknown people, professional interaction and working tightly in a team.

Although Value Creating Learning is a rather new player in the field of education, its philosophy and its educational implications have been criticised: as being an antithesis to Bildung (Bruér, 2019), as being imposed on teachers (Carlsson et al., 2018), and as possibly contributing to more neoliberalism in education (Lackéus, 2017). Therefore

this thesis, beside the practice-centred research, also critically examined VCL theoretically in order to investigate and discuss some possibly problematic aspects - as a way of deepening and broadening the understanding of VCL in a wider educational context.

1.2 Aim

The aim of this master thesis is two-fold:

One: To analyse if progression in VCL can make students focus on learning course content, and to determine if the progression is effective. Further, if a general model of progression can be created.

Two: In order to initiate and continue a discussion of what VCL is and can be, viewed from a broader pedagogical perspective, the second aim of this thesis is to critically examine VCL. By analysing its education philosophical roots and theories as a way to investigate VCL's implications on the students and their learning.

1.3 Research questions

Since the thesis has two separate aims, two types of research questions will be investigated. *Empirical* questions which are related to the practice-centred case study, and the *theoretical* questions which act as a basis for the critical examinations of VCL.

Empirical questions:

- Can progression in VCL projects have any effects on the students, in terms of: feelings, attitudes or course content learning of the project during the mission?
- Can a basic/general model of progression in VCL be created based on the case study of "Attefallshuset"?

Theoretical questions:

- Does VCL tend to only value knowledge that is "useful" or "meaningful" to others? What are the educational functions of VCL? And, in VCL is the concept of Bildung forgotten or devitalised?
- Considering Hartmut Rosa's resonance theory, how well is VCL able to accommodate resonant spaces? Which aspects of VCL amplify or dampen the relationship to the world, leading to resonance or alienation? And do students with neurodevelopmental disorders (NDDs) such as ADHD and autism experience VCL as a resonant, or an alienating experience?

1.4 Limitations

The practice-centred research which this thesis is a part of will only be conducted at a single upper secondary school. In the context of one value creating project with two classes from the program "Teknikprogrammet", one from 2023 and the other from 2024. The population of students, which is the lone source of the data, is limited to about 50 students - who all belong to the same context. This implies that the results can not be compared directly to other schools and settings, and all conclusions have to be interpreted and evaluated in relation to this specific context.

When analysing the data collected through "LoopMe" the general feeling as a smiley, symbolising a value from -2 to 2, and choosable tags defined by the teachers will not be analysed. In the end-of-mission forms, questions where students answer in free-text will not be analysed.

The theoretical analysis is rather strict in being a literary study and does not consider empirical perspectives of how students might perceive and experience VCL.

2

Theory

This chapter will introduce the theoretical basis which the thesis will rely upon. It will focus on Value Creating Learning (VCL) and its roots in entrepreneurial learning. Theories and frameworks which are only used in the theoretical analyses will be presented later in chapter 4, in order to make the presentation more coherent.

2.1 Value Creating Learning (VCL)

Value creation as a guideline in education is an entrepreneurial approach to teaching which has been developed and researched in Sweden in recent years (since about 2011). It aims at making the learning experience more joyful and motivational for the students and letting them participate in real missions, with real stakeholders called *external recipients*. Another aim is to blend the teaching of social skills useful for the students in the real life (and in their work life) with traditional school knowledge and course content. The basic principle of VCL is that learning is sparked by an *emotional* response in the student; which can be joy, anger, curiosity, distress, and so on, that acts as a driving force for continuous and deeper learning. Usually feelings lead to a deeper immersion into something (if handled correctly) and can act a strong source of intrinsic motivation (Lackéus, 2022). Martin Lackéus, the main authority on VCL, defines it as:

"Let students learn by using their current and new competences to try to create something, preferably new, of value for at least one external recipient outside their own group, class or school." - (Lackéus, 2022)

The definition is then broken down into smaller fragments to be nuanced and described in more detail by Lackéus, see table 2.1.

One of the key elements in VCL is that the student are supposed to provide *value to someone else*. Value is an ambiguous word that can have many different interpretations, depending on which context the value is associated with (Lackéus, 2022). In order to establish a coherent understanding of what value means in VCL, Lackéus makes a definition where the word "value" includes: harmony, social, enjoyment, economic and influence value (represented as a 5-star model, see figure 2.1). The different types of values are described as:

Value Creating Learning:

Let students learn	The main purpose is learning, even if students often perceive it to be the creation of value for others.
by using their current and new competences	Students may apply both existing and newly acquired competences.
to try to	The exercise aims to develop both knowledge, abilities and attitudes. The term competences is used as an umbrella concept.
create something, preferably new,	It is the attempt that counts. Even if there is no resulting value there can still be lessons learnt from the process or failure.
of value for	This is a creative exercise. The student is expected to create something previously not existing.
at least one external recipient	The result being some physical (hands on), intellectual (recorded ideas) or cultural (social) artefact.
outside their own group, class or school.	New is desirable but not mandatory. New for the student or new to the world. The newer, the more emotional impact.
	The result needs to have some appraisable value and is preferably also appreciated by the recipient.
	At least one external that can give feedback about the value contributed for them. Can also be animals/plants.
	The more external the recipient or stakeholder, the more impact of the exercise, but also the higher emotional stakes and complexity.
	A first step is often to create value for other students within the class.
	The next step is outside the own class, but still within the safe boundaries of the school.
	The most impact comes from involving recipients outside of school, but it also increases stakes and complexity.

Table 2.1: The detailed definition of VCL with explanations, a translation by Söderberg (2022) from Lackéus (2022).

Social value: Is a value associated with making other people happy and reduce pain an suffering for others. Its roots are, among others, in: social entrepreneurship, teamwork and interpersonal relationships (Lackéus, 2018).

Harmony value: Is associated with the value of a harmonious whole. it could be cultural, ecological, equality or societal harmony. It prerequisites the conditions of the collective and that the value is situated in a specific context. A concrete example is the value of the UN's 17 Sustainable Development Goals (Lackéus, 2022).

Enjoyment value: Is a value of joy and having fun when doing the activity that

is at hand. Sometimes the person experiencing enjoyment value is engaged in a so called flow-state where they experiences inspiration and total absorption into the task. (Lackéus, 2018, 2022).

Economic value: Is a value associated with monetary values and it functions, centre around the individual ((Lackéus, 2018, 2022)). It is based on transactions and the rules of the market economy. (Lackéus, 2022). Among others, its foundation is in: hedonistic self-focus and economic entrepreneurship (Lackéus, 2018).

Influence value: Is a value connected to influence, power or an ability to affect things in society. These may at first seem to be authoritarian traits, but influence value can for example be: a parent that raises a child, or a teacher helping its students (Lackéus, 2022). Influence value can also represent the value of building a legacy (Lackéus, 2018). Its theoretical roots are, among others, in: personal achievement and goal-prediction and control (Lackéus, 2018).

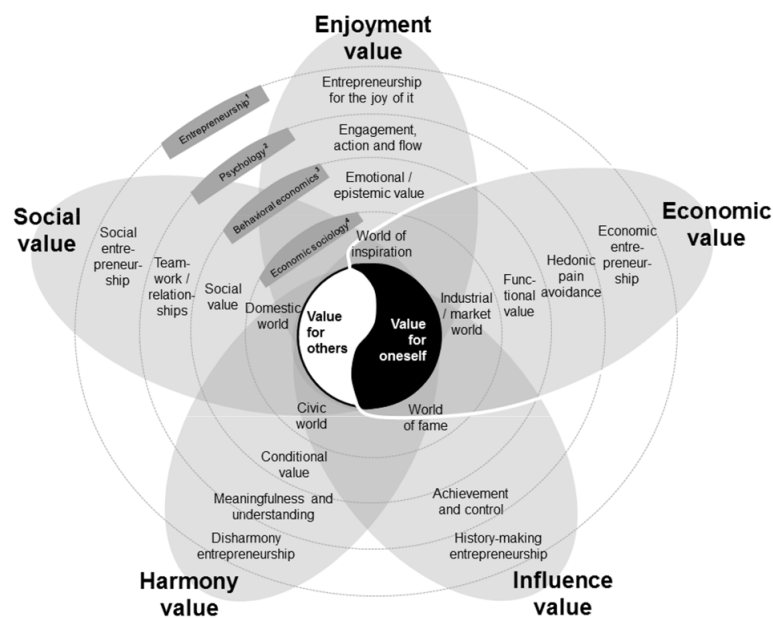


Figure 2.1: The five different types of values included in Lackéus' definition. (Lackéus, 2022)

According to Lackéus an effect on motivation can be seen when students *create value for someone else*, as it is seen as joyful, exiting and meaningful to them. When the students interact with external recipients the *emotional spark* is triggered. Recipients that receive the value that student create can in return provide the students with feedback on their performance and their results - a concept which is crucial in VCL. The feedback from a real external recipient is what makes the VCL missions feel like they matter to the students, and according to Lackéus both positive and negative feedback from the external recipient gives a positive effect on students motivation and learning. (Lackéus, 2022). In order to obtain a good effect on motivation as well as learning Lackéus presents a model of progression for VCL missions (see figure 2.2). In order to help the teacher adapt the VCL mission, depending on the group and what level they seem to be on. Three steps are included in the model of progression called: "1.

Get started”, “2. Take the next step” and “3. Maximal effect” (Lackéus, 2022) and for every step up in the model of progression the mission becomes more centred around creating value for a more external recipient, larger student groups and more complex tasks including more of the 5 values.

	1. Get started	2. Take the next step	3. Maximal effect
Type of value	Enjoyment and social value	Also including harmony and influence value	All five types of value
Recipient	Create value within the class	Create value within the school	Create value outside of school
Feedback	Praise from the recipient	Articulated concrete difference from the recipient	Large concrete difference for many
Group size	Small groups 2-4 students	Groups with 3-6 students	Large and complex groups, half/whole class. 15-30 students
Timespan	Days to weeks	Weeks to months	Months to years
Planning	Teachers tries it with students	Value creation as part of the planning	Value creation permeates all planning
IT-support	No IT-support	Simple IT-support for dialogue	Tailored IT-support for dialogue and assessment

Figure 2.2: Model of progression for VCL-missions (Lackéus, 2022). Adapted and translated from Swedish to English

As “entrepreneurship” and being “entrepreneurial” are words that are looked upon with ambivalence among Swedish teachers (Christensen, 2016; Lackéus, 2022) the meaning of it in Value Creating Learning deserves to be clarified. Therefore Lackéus et al. (2020) defined what *entrepreneurial* means in VCL by creating the so called “Diamond model” (see figure 2.3). The model is later adapted to a student centred perspective by Lackéus (2022) and includes the four steps; 1. to act from the heart, 2. imagine something new, 3. create concrete value for others and 4. learning through the process. The first (1) step is about acting upon what makes you frustrated, interested, wanting to put an effort into it and that you genuinely care about it. The second (2) step is about imagining something new and is supposed to be a collective process in constant dialogue with colleagues, friends, stakeholders, supervisors etc. This process should be allowed its time. The third (3) step is to help someone else by creating something of value for them, preferably in a relational way. This often requires a dialogue with the recipient and the creation of a tangible prototype. In the dialogue an empathetic approach, listening to their needs and the feedback from the recipient are key. The fourth (4) step is about the learning that happens during the process. Learning occurs through three means; thoughts, actions and emotions. Learning through thoughts is mainly what happens in the classroom during VCL activities, whilst learning through action takes it place when students conduct their VCL activities with the external recipient. Learning through emotions is seen as ubiquitous

and could happen any time during crucial moments of the VCI activity (the emotional learning is more elaborated on in chapter 4.1.2.3) (Lackéus, 2022).



Figure 2.3: The “Diamond model” of what it means to be *entrepreneurial* (Lackéus et al., 2020).

A concept that is a foundational ideological element of VCL is what Lackéus calls the “*ultrasocial*” nature of humans. The concept is based on the altruistic essence of humans, that we strive for helping one another and act with genuine care towards each other. It is used to point out that even though we live in an individualistic society, a basic human instinct, and need, is to help others. Therefore the ultrasocial student collaborates with both their fellow students and people outside of their comfortable group of peers. A pedagogical consideration of why the ultrasocial nature is important relies upon prosocial motivational theories, which through Lackéus research have shown to function well in reality, as the students motivation and engagement have been higher when creating value for *someone else*. (Lackéus, 2022)

VCL attempts to combine so called traditional pedagogy with contemporary pedagogy and active learning, with the aim of creating varied lessons (Lackéus, 2022). The process starts in the classroom with gathering of mission/context specific information and continues with students acting as the driving force of the missions, which are either given to them by the teacher or initiated by themselves. Therefore VCL can be viewed as a pedagogy that is both teacher centred, and student centred. The process of how the character of the lessons vary during phases of a VCL mission is illustrated in figure 2.4.

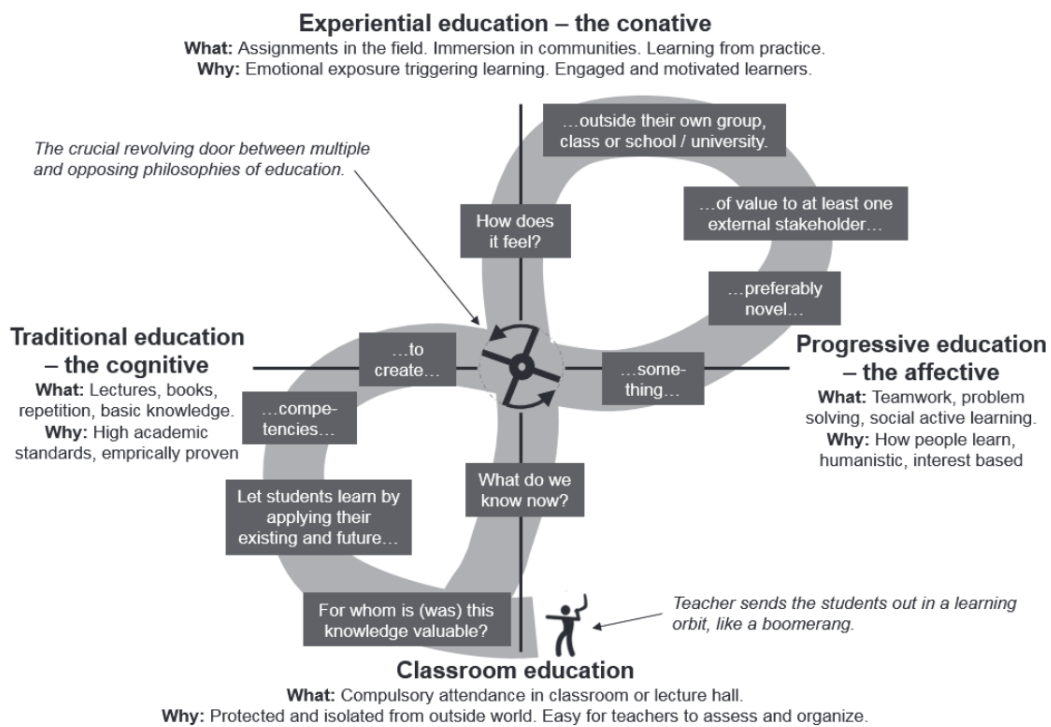


Figure 2.4: Variation in VCL in the "educational philosophical plane" (Lackéus, 2016).

2.2 Entrepreneurial learning

Entrepreneurial learning is the basis of VCL and its roots, therefore some understanding of entrepreneurial learning is needed in order to grasp what VCL is, and where it comes from. The study of entrepreneurial learning comes from analysing how, and by which methods, entrepreneurs obtain new knowledge. Since learning is a cornerstone in entrepreneurship and a basis of problem solving, this is an important task (Lackéus, 2017; Nogueira, 2019). What "entrepreneurial learning" is, is not clearly defined - but can for example be seen as (Nogueira, 2019):

- The undertaking of (exploratory and exploitative) learning behaviours.
- An experiential learning process involving:
 - entrepreneurs' learning styles.
 - learning from failure.
 - vicarious learning.

An important thing to note is that entrepreneurial learning often is linked with capitalism and starting a venture (Lackéus, 2017). This is typically the goal of an entrepreneur, but not always that of a student utilising entrepreneurial learning, whereas in entrepreneurial learning the competences and problem solving skills deriving from using real problems as a basis for learning rather is the centre of attention (Nogueira, 2019). However, to be aware that the connotation of the entrepreneur as a (probably) white male capitalist wealth seeker exists (Lackéus, 2017) is needed to better understand the semantics of "entrepreneur" and possible teacher attitudes towards it in a school context.

3

Methods

Based on the two-fold aim and workflow of the thesis the difference between the methods of approaching the theoretical or empirical research questions are vast, and will be described separately. I will start by describing the methods used for the theoretical analysis, then continue with describing the methods of data collection and ending with describing the methods of analysing the data.

3.1 Theoretical analysis

The theoretical analysis of VCL started by deep and shallow reading of most of the collected works by Martin Lackéus concerning VCL and its development. These included (among others): his doctoral thesis *"Value creation as an educational practice"* (Lackéus, 2016), the books *"Den vetenskapande läraren"* (Lackéus, 2021) and *"Den värdeskapande eleven"* (Lackéus, 2022), and articles such as; *"Does Entrepreneurial Education Trigger More or Less Neoliberalism in Education?"* (Lackéus, 2017) and *"What is Value? - A Framework for Analyzing and Facilitating Entrepreneurial Value Creation"* (Lackéus, 2018) and *"Work-learn balance - a new concept that could help bridge the divide between education and working life?"* (Lackéus, 2024).

The analysis then proceeded by comparing the educational philosophy of VCL, and its related literature, to three main theories (or frameworks) and discussing, arguing and investigating VCL through inductive reasoning (Hayes et al., 2010). The three main theories at hand were: Gert Biesta's framework of educational functions and purpose (Biesta, 2009), the concept of Bildung (defined later in Chapter 4.1.1) and Hartmut Rosa's theory of resonance (Rosa, 2019).

3.2 Data collection

All data collection was managed by the teachers at the school where the research was conducted. The data was collected with the same methods, once in 2023, and once in 2024. There were five collection points each year giving a total of ten collection points, whereof eight of these gave qualitative data (forms during the mission) and two gave quantitative data (end-of-mission forms).

3.2.1 Qualitative data collection through "LoopMe"

For each year there were four collection points during the project of "Attefallshuset" where the teachers collected data through a platform called "LoopMe", developed partially by Martin Lackéus. LoopMe is a data collection tool designed for teachers, school developers and researchers (LoopMe, 2024) and aimed especially at Value Creating Learning. Forms in LoopMe were designed to record the feelings of the respondent (Lackéus, 2022) as well as reflections, thoughts, attitudes and learning outcomes. The LoopMe-forms that were used in "Attefallshuset" included:

- The general feeling that each student felt about the respective value creating part of the project. Represented by a scale consisting of a *sad*, *less sad*, *neutral*, *happy* and *more happy* smiley, which was translated into a integer ranging from -2 to 2 (quantitative data).
- An open-ended question where the student answered to two reflective questions about the value creating part of the mission. The questions were usually if the students had acquired a new attitude or feeling, and what they had learned during that part of the mission. (qualitative data).
- Predetermined tags (defined by teachers) where students could choose what matched their feelings and attitudes towards that part of the mission (quantitative data).

Only the answers from the open-ended questions were used in the qualitative analysis. The four collection points were chosen to reflect the four parts of "Attefallshuset" that had the strongest connection to VCL competences and VCL elements that are not strictly related to traditional learning. The four collection points were:

1. **Contact house owners:** The data collection point occurred right after the students had tried to make contact with house owners that potentially wanted an Attefallshus. The students were marketing their service through flyers, knocking on doors and speaking to house-owners and through social media and a website they had designed.
2. **Interview house owners:** This data point was right after the students had met their assigned house owner that was interested in an Attefallshus. The students were supposed to make contact with the house owners by themselves and then interview them about their vision and requirements for the Attefallshus. Preferably the interview would be in person, but in some cases the interviews have been carried out through Microsoft Meet or through Zoom.
3. **Give and receive feedback:** This data collection point was after the students had made their first finer pen and paper sketch of the Attefallshus. The students were supposed to first give another group within the class feedback on their sketch, then switch to another group and receive feedback from that other group.
4. **Final presentation:** This data collection point was right after the students had met with their house owner and showed them a final design of their Attefallshus. Preferably the final presentation would be in person, but in some cases this occurred through Microsoft Meet or Zoom.

3.2.2 Quantitative data collection through end-of-mission forms

At the end of the entire mission each student answered a longer form with both open and closed questions about what they felt and what they had learned during the mission. In this form the emphasis was on preparation, practise on certain abilities and what they had learned during the mission. The questions in the end-of-mission form were as followed (with both question and the answer alternatives translated into English from Swedish, the original form can be found in Appendix A):

1. **Personal code (that your teacher gave you):**
free-text answer
2. **To what extent did you feel that you were motivated to perform the mission?**
To a very small extent - 1 2 3 4 - to a very large extent
3. **To what degree did you perceive that you had enough prior knowledge in engineering to perform the mission?**
To a very small degree - 1 2 3 4 - to a very large degree
4. **Were there any concrete prior knowledge that you felt that you missed?**
free-text answer
5. **To what extent did you feel that you were prepared to perform the mission?**
To a very small extent - 1 2 3 4 - to a very large extent
6. **Which part of the mission did you experience as most challenging?**
 - Contact house owners
 - Interview house owners
 - Give and receive feedback
 - Final presentation
7. **To what degree did you perceive the mission as educational?**
To a very small degree - 1 2 3 4 - to a very large degree
8. **Describe concretely what you have learned:**
free-text answer
9. **To what extent did you feel that the mission prepared you for performing missions with an external recipient in the future?**
To a very small extent - 1 2 3 4 - to a very large extent
10. **What experiences did you take with you after the mission was finished?**
free-text answer

All students were pseudonymised by the teachers by giving each student an individual ID which could be used to track answers through the data, while making the students' names independent and separated from it. This technique was applied to both the LoopMe data and the end-of-mission form data.

3.2.3 Preparatory assignments for the class of 2024 - "progression"

When the project was run in 2024, in order to analyse the "progression of VCL", the students had been prepared for Value Creating Learning and "Attefallshuset" in an earlier project called "The Water bottle". The preparation consisted of four activities and lectures that had the purpose of easing the leap of working with an external recipient. The four preparatory activities were:

1. How to interview someone about their needs.
2. How to make contact with potential external recipients.
3. How to give and receive feedback.
4. How to show a student made product to a potential customer, and then request feedback about it.

3.3 Data analysis

The data was subject to either qualitative or quantitative analysis depending on its source. The free-text data from the LoopMe forms was analysed as qualitative data, whereas the data from the end-of-mission forms was analysed as quantitative data.

3.3.1 Qualitative analysis

The analysis of the free-text answers from the LoopMe forms was performed by using a thematic analysis, which is a method to identify patterns or themes within a qualitative dataset (Maguire and Delahunt, 2017). According to "Metodpraktikan: konsten att studera samhälle, individ och marknad" (Esaiasson et al., 2017), a thematic analysis is an adequate method for analysing data where categories or "themes" in the data can not be known in beforehand. Therefore it was suitable as a method of exploring the data.

The thematic analysis in this thesis was carried out by placing the free-text answers from each collection point in LoopMe in a column in a Microsoft Excel spreadsheet, with a column to the left being the pseudonymised ID relating to each student so that each respective answer was connected to the same student through a row. The answers were then read through, and depending on what the student had mentioned in them, were given a tag belonging to a certain theme. Tags were represented by colouring a cell in the same row as the answer with a colour that belonged to the given theme. The themes were defined during the analysis, and with the aim of exhaustively

covering themes which occurred in the data, as is the convention (Esaiasson et al., 2017). An example of how the spreadsheets look like after a thematic analysis had been completed can be seen in Appendix B. All eight collection points in LoopMe were analysed and a spreadsheet was created for each collection point. Each spreadsheet was individually analysed in order to find effects that the students experienced or, perceived, during that part of the mission, by comparing tags and student answers.

3.3.2 Quantitative analysis

The end-of-mission data that was analysed was in the form of quantitative data given by closed questions. From the list of end-of-mission form questions in section 3.2 the questions which were analysed were: 2. 3. 5. 7. and 9. .

The quantitative data was analysed by using a Python-script (see Appendix C), which utilised the external libraries: "Numpy", "Scipy" and "Matplotlib".

There were two main tracks of how the data was analysed:

First, we compared if there was a statistical significant difference between the answers provided by the students from the two classes included in this study - by comparing the answers from one question from the class of 2023 to the same question from the class of 2024. Turning each set of answers from each class into their own population, we wanted to determine if the answers provided by the students were significantly different. This was achieved by testing the hypothesis that the answers were drawn from two distinct populations. For this we used the *Mann-Whitney U-test*, which did not require that the populations were normally distributed (McKnight and Najab, 2010). A hypothesis test generates a so called *p-value* (a number between 0 and 1) which was compared to a predefined threshold of acceptance called significance level and denoted by α (Larsen and Marx, 2001). Usually the standard α is set to 0,05 and it was the significance level that was used in this thesis. It means that if the *p-value* generated by the *Mann-Whitney U-test* was below 0,05 then the null hypothesis (that a difference does not exist between the two populations) was rejected - thus stating that there in fact was a statistically significant difference between them. However, as we performed many independent hypothesis tests on the same populations the significance level needed to be corrected. In this thesis it was done by using *Bonferroni correction*, which states that if we want to keep the significance level of α intact at the end we need to set the alpha of the individual tests, called α' , to:

$$\alpha' = \frac{\alpha}{k}$$

Where k : was the number of performed individual hypothesis tests on the populations. (Napierala, 2012)

Second, we wanted to investigate if there were any statistical correlations between the answers provided by the individual students. All questions' answers was compared to each other question's answers by calculating the correlation coefficient between them

(Larsen and Marx, 2001) (for example, calculating the correlation coefficient between question 2. and question 3., 5., 7. ..., then calculating it for question 3. and question 5., 7. etc.). In this case the classes did not have to be separated since the interest was not of comparing the difference between them, but rather so see if there were correlation effects between the outcomes of the respective questions. As such, the population that was used in the correlation calculations consisted of students from both classes. In order to verify if the correlation coefficients were trustworthy they were examined by hypothesis testing through a permutation test (Good, 2013). The permutation test was carried out by:

1. The original data pairs were shuffled separately to create new randomised data.
2. A new correlation coefficient was calculated from the randomised data.
3. The new correlation coefficient was compared to the original correlation coefficient from the original data pairs. (Wikipedia, 2024)

To calculate a p-value from the permutation test, step 1, 2, 3 was repeated a large number of times. Then the p-value for the permutation test was the *proportion* of new correlation coefficients (c_n) that were greater than the original correlation coefficient (c_o) (Wikipedia, 2024):

$$p - value = \frac{c_n}{c_o}$$

4

Theoretical analysis of Value Creating Learning

This chapter includes two distinct theoretical analyses of VCL, with an aim of critically analysing the pedagogy in order to hopefully present new perspectives of VCL and broaden its horizons. All quotes throughout this chapter by Martin Lackéus or Sven-Eric Liedman have been translated from Swedish into English.

4.1 Bildung and intrinsic knowledge in VCL, an analysis of educational functions and purpose

When reading the manifesto of Value Creating Learning (VCL for short) "*Den värdeskapande eleven*" ("*The value creating student*") (Lackéus, 2022), the image portrayed is nearly that of an "utopia of education". Students will be active and motivated, teachers will have more cooperative and harmonious classes. Overall the effects of VCL will be positive and all obstacles on the road to VCL as practice can be overcome. In the book a chapter called "7. *Challenges with Value Creating Learning*" addresses the critique that has risen during the deployment of VCL as an educational philosophy. As for the chapter, a main concern is that the author brushes off the critique of VCL quite fast, often by a play of words and references, turning the focus from the critique itself to how the phenomenon can be interpreted, and ending on a positive or optimistic note. A proper in depth discussion about the possible implications of VCL is not fully addressed in the chapter and the optimistic viewpoint weighs heavy. This becomes evident in the section "*What happened to Bildung and the intrinsic value of knowledge?*" where the critique by Martin Bruér that the existence of VCL as being the antithesis of Bildung (Bruér, 2019) is met by a remark about the logical sense behind the critique, but that it is exaggerated (Lackéus, 2022). This can certainly be agreed upon. Bruér's reasoning is a bit categorical, but it sheds light on a blindspot of VCL that should be brought into view - namely:

Does VCL tend to only value knowledge that is "useful" or "meaningful" to others? What are the educational functions and purposes of VCL? And, in VCL is the concept of Bildung forgotten or devitalised?

Answers to these questions can not be short and simple, but need to be understood in a wider context of the current curricular paradigm and of what purpose educa-

tion should (or could) have. Therefore the focal point of this section is not to give final answers, but to investigate the questions, in order to better understand VCL in a broader perspective. Since VCL is developed and mainly practised in Sweden the investigation will use Sweden as the frame of reference, and will act as a limitation of the investigation.

The disposition of this section is as follows: A theoretical overview of: utilitarianism, Gert Biesta's framework of educational functions and purpose, and the concept of Bildung. This is followed by an application of Biesta's analytical framework on VCL, and finally a discussion of the findings of the analysis in relation to the question about the role of Bildung in VCL.

4.1.1 Theoretical overview

Utilitarianism

When looking at the definition of VCL it states "... *creating value for others*" (Lackéus, 2022), which by itself has a strong utilitarian connotation. That VCL can be labelled as utilitarian is an interpretation that Martin Lackéus also makes of the critique of Bruér (Lackéus, 2022; Bruér, 2019), and can be found again in his doctoral thesis as a possible source of critique (Lackéus, 2016). Utilitarianism is an 18th century ethic which is strongly connected to Jeremy Bentham and John Stuart Mill. Its essence can be summarised as: the *morally right* action is the one that produces "*the greatest amount of good for the greatest number*" (Driver, 2022). It has influenced many modern ideologies, but it is especially prevalent in neoliberalism (Tucker, 1994), where the "utilitarian good" is associated with economic and monetary values. Since neoliberalism has had an impact on contemporary Swedish education (Smith, 2014; Dahlstedt and Fejes, 2019), a modern view of utilitarianism in an educational context can be described as education with the goal of making students a part of the workforce or focus on knowledge that can be utilised to generate profit or contribute to economic growth (Liedman, 2011) - a type of vocational training. A deeper discussion of utilitarianism and its role in relation to VCL is not the focus of this section, but it is an important concept to be aware of. Especially since the modern view of utilitarianism is prevalent, though not at all times consciously, in the actions and thinking of many school politicians (Liedman, 2011; Christensen, 2016; Lövheim, 2016).

Gert Biesta's framework of educational functions and purpose

To know what type of knowledge that VCL values, the question of what educational purpose VCL strives for is vital. As the river flows to the sea, a preferred type of knowledge in education always follows a purpose. An adequate framework for discussing the purpose of education can be found in Gert Biesta's article "*Good education in an age of measurement: on the need to reconnect with the question of purpose in education*" (2009) where he asks the reader to reflect on what actually constitutes "good education". By Argyris-style double-loop thinking (2002) he advocates that in the current educational paradigm we are focused on valuing what *can* be measured in education, instead of measuring what we *actually value* in education (Biesta, 2009).

The problem with measurement is that it relates to the effectiveness of learning outcomes, which assigns an instrumental value to how well the outcomes have been met by learning processes. What is often forgotten is to ask whether the learning outcome is even desired at all? Or if effective education is desirable at all? Sometimes non-effective education, which opens up for exploring a subject with curiosity as the guiding star, may be even more *efficient* - given the context of the subject at hand. He discusses the concept of "*learning*" as being the dominant force in schools and education, not at all bad, but with - above all - two problematic aspects (Biesta, 2009).

The first aspect is that *learning* is individualistic and centred around the individual learner, whereas education is a relational activity where an educator has a particular purpose in mind. The second aspect is that learning is a process concept - therefore having no inherent direction or proposed content. To save learning from merely becoming an empty concept, Biesta points out that students need to learn: *something, for particular reasons and from someone* (Biesta, 2015). It can be boiled down altogether to questions of *content, purpose, and relationships* - where the question of *purpose* is seen as the most important and notable question. In order to find out what constitutes good education, the purpose of it needs to be explored and, to some extent, determined. Biesta suggests that to discuss the purpose of education, the functions that an educational system performs should act as the starting point. His framework suggests three distinct (but in a sense related) functions: *qualification, socialisation and subjectification*.

Qualification is the function of an educational system that prepares the learners with skills and knowledge that prepares them to "*do something*" - which often refers to specific activities such as preparation for a job and becoming a part of the workforce, but can also refer to general knowledge such as cultural, political and democratic literacy. Qualification has strong connections to national interest and the economic value of education, and by preparing learners for work contributing to welfare and economic growth. (Biesta, 2009). In qualification connections to utilitarianism and its modern interpretation (see "*Utilitarianism*") are evident.

Socialisation is the function of an educational system that makes a learner a member of - for instance - a cultural, social, political or professional group. In socialisation educational systems transmit norms and values to the learner and assimilate them into an already existing order, tradition or culture. Therefore reproducing both their desirable and undesirable elements (Biesta, 2009). In the context of the Swedish educational system, the document "*Skolans Värdegrund*" (Skolverket, 2018) is a clear example of socialisation as a function in education to socialise students into Swedish democratic norms and values (Nilsson, 2019; Liedman, 2011).

Subjectification is the function of an educational system to make the learner more autonomous and independent in relation to existing societal orders. It can be interpreted as an "opposite" to socialisation, where the learner instead sees herself as a self-determining subject and therefore is able to reflect upon her relation to the world around her (Biesta, 2009). An interpretation of subjectification is that it is closely

related to the concept of *Bildung* (Rømer, 2021), which will be discussed more below.

The concept of *Bildung*

The concept of *Bildung* is multifaceted and without a single definition (Liedman, 2001) and should be seen as an ideal. Like a hydra: one definition can be discarded, and two new be found. To bring an understanding of what *Bildung* can be, and how it will be used in this investigation, an attempt at a composite definition will be made - that hopefully will be able to contain the heads of the hydra. However, I would like to start by stating what *Bildung* is *not*, as a way to expel the colloquial definition (for examples of it see: Andersson, 2023; Helmerson, 2017; Fjelkner et al., 2012). There is a common misconception of *Bildung* as a set of competences and knowledge in specific subjects, presumably deriving from William Humboldts definition of *Bildung* as training in language, mathematics and history (Liedman, 2001). What is often wrongly referred to as *Bildung* is pure knowledge of (or information about) literature, theatre, humanities, philosophy and so on (Liedman, 2001; Biesta, 2017).

Now the act of Heracles. The core of *Bildung* should be seen as a continuous process of liberation of oneself (Rousseau can be seen as a source of inspiration (Ruin, 2007)), where the subject going through the process of *Bildung* is becoming more autonomous and independent in relation to the surrounding world (Ruin, 2007; Biesta, 2017) - thus letting them distance themselves and looking at their surrounding world through alternative perspectives (Liedman, 2001). The subject's liberation is partially through knowledge, which is not only "carried" by the subject, but in the process of *Bildung* also becomes a part of the subject itself (Liedman, 2001; Ruin, 2007) - as knowledge that the subject obtains will inexorably affect the subject and influence both their thinking and acting. In *Bildung* there are no sharp lines between different types of knowledge, all types are deemed important and variety is encouraged, as is curiosity and an open attitude towards knowledge (Liedman, 2001, 2011).

In *Bildung*, a crucial ability is to distance oneself in relation to the world and reflect upon the connections with it. In the process of distancing, and in extension the process of liberation, the capacity to be - self-reflective, critical questioning and as a subject see your relations to the surrounding world - are all a part of the *Bildung* experience. The subject's principal attitude towards the world should have its roots in Socratic questioning, a way of living often referred to as an examined life (Liedman, 2011), a mode of living where the subject is constantly critically inquiring of its surroundings (Nails and Monoson, 2022). Albeit also applying it to themselves as a means of self-reflection - and in the words of Hanna Arendt: "*The mode of existence present in this silent dialogue of myself with myself...*" (Arendt, 2003). The last aspect of the concept of *Bildung* that will be included in this composite definition is what Tomas Wedin calls the *spatial and temporal dimensions* (Wedin, 2021). The experience of *Bildung* can be seen as both individual and collective (Liedman, 2001; Ruin, 2007; Wedin, 2021). Thus, the *spatial dimension* can be explained as the understanding that the subject is shaped by their relations to others - and the identities belonging to these relations - while simultaneously shaping those same relations (Wedin, 2021). For example, the subject can be a teacher, a student, a parent and so on, where the subject clearly influences others belonging to the same context - but is at the same

time itself influenced by being a part of that same context. It uses a similar “circular” reasoning as that of what constitutes knowledge in *Bildung* (see above). The *temporal dimension* is concerned with the subject’s understanding of their relation to the world by taking into account both how history has shaped the present, and how ideas about the future shape the present. Liberation can only ensue when the subject can reason about how the past shapes what is now, and how present actions will change the future – but at the same time how the future and its premonitions change the actions of the present. The experience of *Bildung* becomes in the temporal dimension a practice where the subject is in a constant state of Arendt’s “*dialogue of myself with myself...*” (Wedin, 2021) reasoning about its actions in relation to the past, present and the future.

4.1.2 Analysis of educational functions of VCL

As mentioned before, the starting point of the investigation will be to use Biesta’s framework of educational purpose and its functions: *qualification*, *socialisation* and *subjectification* and applying them to VCL. In the spirit of how Biesta wants the framework to be applied (2009) all of the functions will be discussed in relation to VCL.

Function of qualification in VCL

The function of qualification has a comparatively strong connection to VCL, both explicitly and implicitly. It is more or less omnipresent in the works of Lackéus (examples include: Lackéus, 2017, 2018, 2021, 2022, 2024) To start with an obvious case: Lackéus proposed the concept of “*work-learn balance*” (Lackéus, 2024), which in “*Den värdeskapande eleven*” also has a utilitarian connotation (Lackéus, 2022 p.110). A concept which combines engagement in a meaningful activity (derived from *working*), simultaneously as individual growth and development (derived from *learning*). The “*balance*” can be seen as the frequency of these kinds of activities (Lackéus, 2024). He describes the current situation between education and work life as a *divide*, which can be bridged by VCL (Lackéus, 2024), clearly stating the function of qualification in VCL. This is evident in the following statement:

“*Students strengthen their ability to choose a for them suitable path towards work life and at the same time become more engaged in the school-work here and now*” - (Lackéus, 2022 p.111).

Lackéus definition of value (see chapter 2.1 and Lackéus, 2018) includes five types of value that students can create for themselves, or others: *Social*, *Enjoyment*, *Economic*, *Influence* and *Harmony* value (figure 2.1). Though he states that economic value is of lesser interest when students engage in value creating activities (Lackéus, 2022), it is still a part of the value definition and as an effect, qualification becomes present. However, at a closer examination of the different values it becomes apparent that more of them fulfil a function of qualification. For example, *Social value* includes by Lackéus definition “*Social entrepreneurship*” and “*Teamwork*”. At first glance teamwork may seem neutral, but working as a team symbolises an effective group in the pursuit of

reaching a (usually business) goal (Berber et al., 2020) - which in turn can be viewed as a function of qualification. The function of qualification is also present in *Influence value* through its components "History-making entrepreneurship" and "Achievement and control" as these are oriented towards personal success related to growth. Furthermore in *Enjoyment value* through its components "Entrepreneurship for the joy of it" and "Engagement, action and flow" (Lackéus, 2018) as the entrepreneurial has connotations towards a modern vocational training. In VCL a three-step model of progression of value creation is proposed (Lackéus, 2022 p.65, see figure 2.2). In it, the third level where students should create value for an external recipient outside of school is what ties together the "work-learn balance" with the five types of values - as the students carry out activities that resembles consultant work.

Not just in the open, and in what is expressed through Lackéus collected publications, is VCL connected to the function of qualification. It has an implicit - or subtle - connection which comes from its legitimation by the current Swedish national curricular paradigm. In 2011 the new curriculum *LGR11* was implemented in the Swedish educational system, and a notable difference was that for the first time "entrepreneurship" was mentioned as something that schools were supposed to promote (Christensen, 2016). The motivation to include entrepreneurship in the new curriculum launched in 2011 was motivated by the (conservative/liberal/neoliberal) government of that time, as a measure to secure the future of Swedish industrialisation and the creation of new enterprises (Liedman, 2011; Christensen, 2016). Therefore the sole function of entrepreneurship in Swedish education is qualification. As can be seen in "Value creation as educational practice" (Lackéus, 2016) Value Creating Learning is an attempt at the challenge of infusing entrepreneurship and education in a manner that will not "upset" teachers of the economic connotations of entrepreneurship (Lackéus, 2016, 2017) - which it often does (Christensen, 2016). Therefore an obvious legitimation of why teachers should apply VCL rests upon the current curricular paradigm where "entrepreneurship" is expected to be a part of the education - therefore VCL inherits this rather implicit function of qualification.

Function of socialisation in VCL

Conscious socialisation has typically been a purpose of education in general, especially in educational institutions. But in education, socialisation is always present whether it is intentional or not (Biesta, 2009). When analysing VCL, there are three types of socialisation that become evident: Socialisation into the core values of the Swedish educational system (Skolverket, 2018), socialisation into the role of an entrepreneur and socialisation into the role of an employee.

Socialisation into the core values of the Swedish educational system is a common goal explicit for all Swedish educational practices. Some of its main components are human rights, democratic values, the right of being seen as an individual, respect for nature, work against discrimination etc. (Skolverket, 2018). VCL fulfils the core values by its many shared intentions. A foundation of VCL is that students are seen as free agents and capable individuals (Lackéus, 2022), which illuminates the aspect of socialisation into democratic values in two ways (apart from the fact that this

makes a connection with the core values' ideal of each individual's inherent value). The first is that VCL presumes participation of students where they are seen more as equals to the teacher and external recipients, thus making participation in VCL a democratic activity by its construction. The second is that a goal of VCL is to make students take action in relation to the world around them, seeing opportunities and deficiencies (Lackéus, 2022), which in the long run can create a feeling of capacity to accomplish societal change in the students - and that feeling corresponds to the cornerstone of an ideal that constitutes modern democracy. From examples given in "Den värdeskapande eleven" and from the site "vardeskapande.se" many VCL-activities are perspicuously connected to the core values of the Swedish educational system, such as VCL-projects concerning: inclusion, sustainable development and individual rights (Värdeskapande Lärande, 2019; Lackéus, 2022). Therefore in reality students are also working with a content that is connected to the shared values, leading to further socialisation.

With VCL's base in entrepreneurial education and focus on students development of entrepreneurial competences (Lackéus, 2016, 2022) it becomes inevitable that VCL possess a function of socialisation into the role of an entrepreneur. The case that Lackéus makes is that the entrepreneurial role in VCL is not the same as the stereotypical white male capitalist entrepreneur (Lackéus, 2017) where venture creation and making profit is what is in sight (Lackéus, 2022). In VCL the role of being entrepreneurial is explained in the so called "Diamond model" (Lackéus, 2022) and includes: finding a problem that you care about, imagine something new (not by yourself, but together with others), create concrete value for someone else and learn through the journey of value creation (Lackéus, 2022). There are also some entrepreneurial traits that are part of the role which can be found implicitly, or mentioned in short passages - some of them include: working as a team, social competence and high intrinsic motivation (Lackéus, 2022).

It is especially in the later stages of VCL where the student projects will act as an example of socialisation into the role of an employee and the work life. If a student takes on the role as an employee, apprentice or as a consultant in the third step of VCL activities, which often is the goal, (Lackéus, 2022 p. 65) then the student will need to some extent become a part of the company/organisation that it works within/for. In the process of learning the work environment and the skills needed to achieve the goals of the VCL-project the students will be socialised into the work context and into the culture of working life (Sandor, 2014). Furthermore the concept of "work-learn balance" further stresses the need for students to participate in the work life and the benefits of it (Lackéus, 2024). Therefore "work-learn balance" acts as another example of the intended socialisation into working life by VCL. Concrete examples of traits that are valued in working life that VCL encourages are: personal responsibility, teamwork, interpersonal communication and the ability to take initiatives (Lackéus, 2022).

Function of subjectification in VCL

Here we close in on the heart of the matter and a potential subset of the answers of the role of Bildung in VCL. The function of subjectification is not as obvious or explicit in VCL as the other two functions, but there are certainly aspects of it. One of the main components of VCL is that it involves a shift of power and responsibility from the teacher to the students, where the students become the active agents of education whilst the teachers act as facilitators constructing the bounds of the educational environment (Lackéus, 2022 p. 82). If changing the perspective from *students* to *student* it becomes apparent that in this shift of power, the ideal student will become more self-conscious and aware of their own responsibility towards the project and towards each respective group member. In a sense, the student “grows up” and is expected to act more like an adult. The key element which determines if this shifting of power and responsibility contributes to the function of subjectification is if the student stops and reflects upon the shift and begins to view themselves in contrast to their relations to the group and project. However, if the student only follows instructions without reflecting upon the new role, the shift in responsibility and power rather serves as a function of qualification, or of socialisation into the orders of work life.

In the “Diamond model” (Lackéus, 2022 p. 135-139) the fourth step “*learning through the journey of value creation*” includes three types of learning, through: thoughts, actions and feelings. It is in the description of learning *through feelings* that a function of subjectification is present. It is described in “Den värdeskapande eleven” as:

“Learning through feelings can occur at any time, and concerns the crucial moments of presenting in front of others, receiving critique, being affected by decisions, getting deep insights in a sleepless night. ... The learning concerns both the process, the offered value, and the self. The feelings develop our ability to manage uncertainty, persist, manage setbacks, build relations and understand ourselves a bit better.” - (Lackéus, 2022 p.138)

Learning through feelings seems to be a partially introspective activity with the individual student at the centre of it. In a reflective process, insights of the self and the student’s relations to both other people, and the world, acts as a function of subjectification.

4.1.3 Discussion

Now, when the necessary pieces of the puzzle are up on the table it is time to commence with its assembly. Which educational functions are most present in VCL? And how is it connected to the concept of Bildung?

In the analysis of educational functions in VCL there is a pattern, much like the one that Gert Biesta suggests (2009). Namely that the functions of qualification and socialisation are closely linked together. Most apparently in the socialisation of students into the role of an entrepreneur and that of an employee. In these cases qualification and socialisation can be seen as inseparable and it is just a matter of which aspects

of the concepts that are illuminated that creates a distinction. Quite logical, since the basis of VCL is in entrepreneurship and entrepreneurial education (Lackéus, 2016, 2022) the foundation of VCL is not based on the principles and ideas of the school system at all, but on the principles and ideas of the labour market. Therefore, as the act of creating value for others is a vital element, and it is persistently referred to what an employee does (Lackéus et al., 2020; Lackéus, 2024), the students are socialised into a fundamental principle of work life and thereby it also becomes a function of qualification. Because of the strong will of VCL to mix work life and school activities into one fine-grained solution (Lackéus, 2024) it becomes apparent that one of the main educational purposes of VCL is to strive for the so-called "work-learn balance" and it seems that in the eyes of the authors of VCL it is probably what constitutes "good education" (Biesta, 2009). As an effect, knowledge and competences valuable to the labour market will always be an integral part of VCL activities and the utilitarian critique of VCL can not be rightfully discarded.

In the previous analysis of the function of subjectification in VCL, its relation to Bildung was expelled in order to not smudge the outlines of Biesta's framework. But at this stage the concepts will be intertwined by utilising the argumentation of Aastrup Römer's article (2021).

As can be seen in the analysis above: the function of subjectification exists in VCL, but is weaker than the other two functions. Can the same be said about the concept of Bildung in VCL? The answer, it turns out, will be both yes and no.

Subjectification is a concept that is more narrowly defined than that of Bildung and stems from a sociological tradition rather than a philosophical tradition (Biesta, 2009; Römer, 2021). Aspects that Biesta includes in the concept of subjectification (Biesta, 2009) I consider are included in the concept of Bildung, but Bildung also includes further aspects. Therefore, I will consider aspects of VCL that can be labelled as subjectification to also be labelled as a concept of Bildung - but aspects of VCL which could be labelled as the concept of Bildung will not necessarily be labelled as subjectification.

First off is the strong emphasis on sparking the individual student's curiosity that is one of many cornerstones in VCL. It is almost an understatement to say that curiosity and an open-minded view of knowledge is *only a part* of the Bildung-experience (Liedman, 2001; Lindholm, 2018). In VCL; theoretical, practical, relational and social knowledge are all treated equally (Lackéus, 2022) and blend together into one of the immanent qualities of VCL, namely its perspective of knowledge as more than a mere matter of thought. As the two concepts of curiosity and open-mindedness to knowledge are inherent in VCL it can be seen as an element of Bildung in VCL.

Because of the relational focus and the so called *ultrasocial* behaviour in students (Lackéus, 2022 p.47), it poses a question if VCL has the ability to facilitate the spatial dimension (Wedin, 2021) of Bildung in a student? It could be possible - at least to some extent - for students to distance themselves and develop the ability to see themselves in relation to the new roles which they receive in a VCL-project. When they realise that they can be something more than only students, and have a chance to reflect on the new role which they have (something that is implied by the use of the reflective data collection tool "LoopMe" (Lackéus, 2021)), there is a possibility that

it will contribute to students' awareness of their own relations and so promote the spatial dimension of Bildung.

When comparing the philosophy of VCL to that of the concept of Bildung, a question about a fundamental view of the student's outward focus has been unveiled. Can an educational philosophy based on collectivism (2022 p.176) ever promote subjectification and the concept of Bildung, which is an individualistic endeavour (though, in relation to the world, that includes other people)? This can be illustrated by borrowing the VCL-favourable metaphor of an emulsion of oil and water – where VCL is the water and Bildung and subjectification are the drops of oil (which I have shown to be somewhat present). Is it ever possible to create a fine-grained mix? Or will it continue to be two concepts too fundamentally separate? The main concern is that the focus in VCL will never be on the individual student's development, and that the teacher's role will not be that of a supporter of the individual, but of the *team/group/class*. The students on the other hand always put their focus on either the team or the external recipient, and most individual effects that the students will gain should be seen as a byproduct of the collective work.

Another possibly problematic aspect of the capacity of Bildung in VCL is that VCL has ties to a capitalistic worldview, through its base in entrepreneurship. The question becomes: can Bildung exist in a context that presumes commerce? If there is an ever-present goal of selling a product, or focusing on a market, can the liberating components and introspective elements of Bildung ever be accommodated? Lackéus' interesting argument of viewing *students-as-givers*, instead of *student-as-takers* is a possible way out of this dilemma (Lackéus, 2017), as it tries to disentangle the notion of the student entrepreneur from the self-opportunistic and capitalist-centred, to one who engages in meaningful activities with others and tries to create a better world (Lackéus, 2017). In this more relational and outwards facing view of entrepreneurship the students might experience more of the spatial dimension, the possibility to perceive knowledge as something affecting the student, not only carried by it, and also presents the student with an opportunity to reflect upon its surrounding world – thus presenting a possible space for a Bildung experience.

Nevertheless, there is a problem of entrepreneurship and the temporal dimension of Bildung. In entrepreneurship the sight is set on the future (Christensen, 2016 p.79; Lackéus, 2017) with innovation and creating something new as its beacon of light. The same applies to VCL (Lackéus, 2016, 2022). As an effect, the focus will be on the future, and the past is easily forgotten (or overlooked), as often happens in the invention of new artefacts (Basalla, 1988; Nye, 2007). Therefore the duality of the temporal dimension of Bildung becomes lost in VCL as it inherently does not recognise the historical perspective and is exclusively interested in looking from a point of future development. History's role in the formation of the liberated student is quintessential, and in the words of Sven-Eric Liedman:

"But we can not pay the price for making the past uninteresting. As It strictly speaking contains the collected experience of mankind. People who are unknowing of history usually say that – right now – is the starting point of a new era, an era unlike any other. ... Everything around us has

changed again and again, mainly through human activity. But history is the story of the exciting meeting between a (rather) hairless monkey and a changeable world where her own creating or destroying contributions has become increasingly crucial.” - (Liedman, 2011 p.244)

And even as students-as-givers includes qualities that can make way for Bildung, it does not mention the past at all, and explicitly directs the student to have a focal point of future endeavours and new artefacts (Lackéus, 2017).

Lastly, in the critical vein of the Bildung tradition, the examination and questioning of what is taken for granted and surrounding the subject should be a crucial task. But what happens when the subject - which in the case of VCL is the student - is primarily focusing on value creation towards an external recipient? When trying to create value for someone else, therefore trying to help them (as referring to the altruistic basis of VCL (Lackéus, 2016, 2022)), is it of any interest to think and act critically? The student's main focus would rather be on good communication, being service-minded and helpful (Lackéus, 2022). Critical thinking, critical questioning and what could be interpreted as a negative attitude could possibly be seen as a disruptive behaviour (Kemelgor et al., 2007) and a reason for the processes the student is involved in to slow down. As this may be the case it could tend to be another example of how coarse the mix of VCL-water and Bildung-oil may be.

4.1.4 Closing

To guard this chapter from apparent future critique, two active limitations need to be addressed. The first is that this analysis is based upon an theoretical isolation of VCL and its educational philosophy, and by strictly interpreting the literature that is available from an educational philosophical point of view. Therefore, the implementation of VCL has not been of concern and as an effect an important point that Lackéus makes has not been discussed or widely considered - *that education should always strive for balance* (Lackéus, 2022). He clearly states that VCL is only a subset of the answer to what constitutes good education and that a mix of educational activities deriving from a plethora of educational philosophies probably results in the best student experience (Lackéus, 2022). The second limitation is that the students' point of view has not been considered. Again, the reason is that the intention of the questions is to discuss the value of knowledge, the functions of VCL and the concept of Bildung from a theoretical point of view. If the students' perspective of what makes knowledge useful, meaningful or adding to the experience of Bildung had been a focus of the investigation, it would have changed the nature of it from theoretical to empirical and would have required another method of analysis.

Hopefully this investigation has been able to shed light on the matter of what type of knowledge that VCL promotes by the analysis of its educational functions and purpose by applying Gert Biesta's framework from "*Good education in an age of measurement*" and in comparing or relating VCL to the concept of Bildung.

However, to catch the end of the thread thrown in the introduction, namely the critique of Brauér. It should be possible to *disregard*, after this analysis, *that VCL is the antithesis of Bildung* - as it presumably has elements of it. At least when Bildung is analysed from our composite definition and when its relational or spatial element is taken into account. However, the questions of the full role of Bildung in VCL and what type of knowledge it conveys is still not completely answered, and continues as a leviathan in the depths.

4.2 Value Creating Learning, its relational capacity and resonance or alienation. Does VCL fit all students?

Once again, I will use the critique of VCL (and its response) given in chapter 7 of “*Den värdeskapande eleven*” as the starting point of a theoretical investigation. This time the focus is on the section: “*It does not fit all of my students*” (Lackéus, 2022 p. 162-164). In this section of the book it is mentioned that Lackéus has received feedback from teachers working with VCL, reporting that students who have an introverted character, and do not fit the so-called “*ultrasocial*” behaviour of VCL, feel that VCL is arduous and too challenging for them. Lackéus follows with a comparison to “*traditional education*” (focus on lectures by teachers and students following the teacher’s plan (Apt, 2022)) stating that some knowledge is necessary to “*just learn*”, even if it is excessively boring and does not fit the learning style of many students (Lackéus, 2022). He proposes that the same logic follows for VCL, our contemporary society is relational, and students *need to learn* social interplay, building relationships, managing uncertainty and to obtain self consciousness. He ends the section by stating that the effects of VCL on students with neurodevelopmental disorders such as ADHD and autism are hard to generalise, since there have been no studies on VCL and ADHD or autism (Lackéus, 2022).

The plan is to investigate and analyse the *relational aspects* of VCL; as some students may enjoy it a lot, and some may feel alienated by the fact that the social skills required to manage a group project towards an external recipient may be too much to handle. As a framework, Hartmut Rosa’s *theory of resonance* (2019) will primarily be used. It was chosen due to its ability to capture the relational nature of VCL and that it presents concepts which opens up for a discussion of why students may enjoy or dislike the pedagogical method. Another aspect of choosing *resonance theory* is that it is an analysis of - and response to - an escalating social acceleration (Rosa, 2017, 2019). And as one of the primary concepts of VCL is to prepare students better for the fast pace of modern contemporary life and its demanding requirements (Lackéus, 2022) - VCL can also be interpreted as a response to social acceleration. This reasoning leads to the following questions to be investigated throughout this chapter:

Considering Hartmut Rosa’s resonance theory, how well is VCL able to accommodate resonant spaces? Which aspects of VCL amplify or dampen the relationship to the world, leading to resonance or alienation? And do students with neurodevelopmental disorders (NDDs) such as ADHD and autism experience VCL as a resonant, or an alienating experience?

4.2.1 Resonance theory: Relationship to the world and the sociology of the “Good life”

In the late stage of modernity (as in which we currently reside) the pace of society is seemingly increasing every year (Koolhaas, 2002; Rosa, 2019), with more and more obligations and expectations added to an already stressful life (Rosa, 2019). The individual “to do lists” seem to become longer and longer, never satisfiable. Many experience this effect as being uncontrollably caught in the so-called “Rat race”, or “Hamster wheel” (Rosa, 2017; Sørensen, 2020). Hartmut Rosa, who is a critical theorist of the Frankfurt school defines this escalation in society as its *social acceleration*, a temporal concept where per every unit of time the quantity of options, social interactions, expectations, obligations and responsibilities increases (Rosa, 2017, 2019). It is caused by the need of the capitalist society to sustain, and thus, paradoxically, stabilise itself through constant growth and development (called *dynamic stabilisation*). In the words of Rosa:

“... the social formation of modernity cannot stabilise itself except dynamically. This means that modern capitalist society, in order to, culturally and structurally reproduce itself, to maintain its formative status quo, must forever be expanding, growing and innovating, increasing production and consumption as well as options and opportunities for connection - in short: it must always be dynamically accelerating.” - (Rosa, 2019, p.1)

Rosa claims that this phenomenon affects how we as subjects are *situated in the world*, thus affecting our *relationship to the world* - which has taken on a character that is almost pathological in its nature. Rosa states that the problematic relationship to the world, which subjects experience, should be viewed as both a *cause* and a *consequence* of acceleration and escalation - and can be observed in three fundamental societal crises: the environmental crisis, the democratic crisis and the psychological crisis (burnouts, increased depression and anxiety, etc.) (Rosa, 2019). Rosa further draws the conclusion that whether subjects’ experience success or failure in life all boils down to how they *relate to the world*, therefore his theories are constructed to elaborate on a *sociology of the good (or successful) life* in relation to the world - in the setting of a relentless, accelerating, escalating modernity. (Rosa, 2019). Rosa’s answer to what can define the *successful* or *good* life is the concept of *resonance* with the world, in relation to its “other”: *alienation* (both which will be more elaborated on below) (Rosa, 2019). Note that Rosa’s perspective is from within the sphere of sociology, therefore implying the importance of interpersonal relationships, social change and analyses based on collective behaviour (American Sociological Association, 2024), and is thus paradigmatically different from psychoanalytic theories and thoughts of what constitutes a “good” or “successful” life that instead emphasises the individual’s sole role in its production (Rosa, 2019). The sociological approach also makes it different from (but still related to) many of the traditional philosophical theories of the *good life*, such as Aristotle’s *eudaimonia* (Kraut, 2022), or religious morality (Hare, 2019).

Before the concept of resonance (and further alienation) can be defined or explained,

a definition of what constitutes the *subject* and the *world* needs to be made. Rosa defines the existence of both subject and world as a mutual relationship whereas the subject is situated in a world that shapes the subject, and at the same time the world (such as: the body, objects, relationships, feelings, language, etc) is what is experienced by the subject – therefore, in a sense constructed by the subject (Rosa, 2019 p.31-33). This representation of how subjects are situated in the world is inspired by phenomenological theories from Maurice Merleau-Ponty and Martin Heidegger among others (Rosa, 2019). Rosa’s subject-world relationship is in contrast to a dualistic approach often used to separate the subject and the world. Clearly exemplified by the mind-body dualism, in which mind and body are interpreted as independent and separate (Kraut, 2022). By viewing the relationship of mind and body from Rosa’s perspective: the mind (or “self”) is a part of the objective body that acts as a membrane to the world. Through the objective body the world will leave its traces on the subject (inscription) and through the objective body the subject’s personality shows through emotional expressions and personal impulses (expression). This makes the objective body a part of the world, as it is a physical object situated in the world, but at the same time a part of the subject. It can be said that the subject and the world have a kind of symbiotic relationship, where one can not exist without the other. (Rosa, 2019).

Resonance & Alienation

Perhaps, in the pedagogical spirit of Rosa, resonance and alienation are best described and illustrated by metaphors and allegories prior to being defined theoretically. To start, with a story of Sarah and Clara.

Sarah is on her way to school, the sun is shining as it is the first day of spring. She stops for a second to linger in the sunlight and contemplate on the beautiful weather. She notices other people doing the same thing, and briefly, when their eyes meet in an instant, they give each other a smile of mutual understanding. As she starts to walk again she thinks of the coming day at school, filled with interesting lectures and exercises, fun small talk and meaningful discussions with her friends. She loves being at school!

Clara is on her way to school, the sun is shining as it is the first day of spring. She puts on her sunglasses to protect her eyes from the sun. As she does so, she bumps into a stranger suddenly appearing in front of her. She reacts with hostile mutter and wonders how someone can be so stupid as to stand still in the middle of the passway? As she continues towards the school a feeling of dread rushes over her as she thinks of the monotonous lectures, the difficult exercises and her friends – which feel more like acquaintances. She is looking forward to the end of the day.

Though obviously exaggerated, it illustrates a *resonant* relationship that Sarah has to the world, and an *alienated* relationship that Clara has to the world. It would not be a stretch to assume that Sarah is generally experiencing her life as successful, and Clara as mediocre at best.

Rosa describes the subject's relationship to the world as a wire, with one end connected to the subject, the other end connected to the world (Rosa, 2019). When the subject and the world (mutually) interact with each other, the wire vibrates. *Resonance* is when the vibrations are *amplified* and the relation between subject and world becomes more and more alive. Making the subject perceive the world as something that *speaks to it*, and act with attraction and desire towards the world. In contrast, when the vibrations are *dampened* the relation between the subject and the world will become *mute*. A mute relationship to the world makes the subject experience repulsion and a fear towards the world, thus letting the subject become *alienated* from it. The epitome of alienation can best be described by apathy, melancholy and depression, whereas the subject is perceiving the whole world as: grotesque, meaningless and empty (Rosa, 2019; Watson et al., 2020).

Now when the concepts of resonance and alienation have been introduced, we move on to a more theoretical definition which hopefully has been made more apprehensible by the illustrations and metaphors.

Resonance is a relationship formed between the subject and the world, where the subject is *affected* by the world and responds to it by *emotions* (the constitutive elements of the "wire" between subject and world), where the subject has *intrinsic interest* (Rosa, 2019) and a perceived *self-efficacy* (Bandura, 1977). In the formation both are mutually transformed by each other (note section above about subject and world). Resonance is a *responsive relationship*, which requires that both subject and world have *their own voice* (Rosa, 2019), requiring "equality" between the two. It cannot be created by the subject, and therefore has an *element of inaccessibility* (Rosa, 2019). This is a crucial constitutive element since otherwise resonance would be nothing but a mere "how to find happiness" ideology. It is not an emotional feeling and is neutral to emotional content, it is rather a *mode* of the relationship between the subject and the world (Rosa, 2019). For example, sad feelings can come from strong resonance.

The "other" mode of relating to the world would be that of *alienation*. Note that it is not dichotomous in relation to resonance, as resonance is found in an interplay with alienation and is not therefore its direct opposite (see below) (Rosa, 2019).

Alienation is a relationship between the subject and the world where there is no inner connection, leading to a confrontation between them through the subject experiencing: indifference, repulsion and hostility towards the world (Rosa, 2019). The relationship could be described as a *relation of relationlessness* (Rahel Jaeggi through Evans, 2022). For the alienated subject the world is perceived as: cold, rigid, repulsive and non-responsive (Rosa, 2019). For example, it can be said that it is this mute relation to the objective world which has led to the capitalist exploitation of nature (Vogel, 1988; Rosa, 2019).

Resonance is described as the antithesis of alienation, but their interplay and relation to each other play an important part in resonance theory. In the words of Rosa:

"Resonance is the momentary appearance, the flash of a connection to a ... predominantly silent and often repulsive world." - (Rosa, 2019, p.185)

Rosa states that in a vivid resonant experience strong feelings of longing for a promise of a different way for the subject to relate to the world are present. It is rooted in an acknowledgement by the subject that the alienated experience is never too far away:

"At the root of resonant experience lies the shout of the unreconciled and the pain of the alienated. At its center is not the denial or repression of that which resists us, but the momentary only vaguely perceptible certainty of a transcending 'nevertheless'." - (Rosa, 2019, p.188)

It is by encountering what is "foreign", "strange" or "incomprehensible" that the subject is able to experience resonance (Rosa, 2019) - as a transformation of a specific mute aspect of the world in a process of making it vibrate, and thus, speak to the subject.

Resonance theory in education

In "Resonance - Chapter VIII Diagonal axes of resonance" Rosa includes an analysis of how schools can be seen as resonating, or alienating, spaces. Explaining the role that schools have on what possibly resonates (or alienates) with the subjects later in life. For example: if the subject had a "good" maths teacher that was liked by the whole class, it is more likely that maths will be something that "speaks to" and resonates well with the subject later in life (Rosa, 2019). We can interpret the purpose of resonance theory in school using Gert Biesta's concepts of qualification and subjectification (Biesta, 2009), as a method to capture Rosa's argumentation in familiar concepts which are created to discuss the purpose of education (see section 4.1). Rosa argues that the aim in schools with a function of qualification is to *cultivate the world* with an instrumental view of knowledge in order to appropriate, and dominate it. Whereas the aim in schools with a function of subjectification is to *cultivate the self*, often through an interpretation of Bildung as a means of individual liberation. But, Rosa's critique is that it makes the subject overlook their relationships to the world (Rosa, 2019). Instead, in resonance theory the school's aim should be to *cultivate the relationship to the world*, and it puts an emphasis on the *relationships* between the central players of education: the teachers, the students and the material. Which leads Rosa to set up a model, drawing on the classical didactic triangle (Heimann, 1947), of a *successful lesson of resonance* (see figure 4.1), and an *unsuccessful lesson of alienation* (see figure 4.2) (Rosa, 2019 p.242-243).

To accentuate the relational importance in education follows a long tradition of educational research with for example John Dewey and *pragmatism*. Which advocates of changing the learning focus of students from given material to what excites them in their surrounding world (Bates, 2023)). The relational aspect is further highlighted in some of Dewey's contemporaries, Lev Vygotsky and Carl Rogers. Lev Vygotsky and his *theory of Scaffolding and More Knowledgeable Others* is about how the relation-

ship between student and teacher is a catalyst of education (Clabaugh, 2010). Carl Rogers states in his *theory of facilitation* that the open, trustful and “safe” relations between students, as well as students and teachers, are the foundation of good education (Cross, 1996). The student teacher relationship is further demonstrated by John Hattie’s statistical findings of the importance of the teacher and student-teacher relationships in education (Hattie, 2012 p.22). The engagement and relationship between the student and material is for example caught in the research of Carol Dweck and her *fixed/growth mindset*, focusing on the student and its relation to the material and the subject’s perception of it (Dweck, 2015; Bates, 2023), as well as by the research of Reece & Walker and their *methods of providing extrinsic motivation* to students through engaging material, praise and feedback (Reece and Walker, 2006 p.76-78).

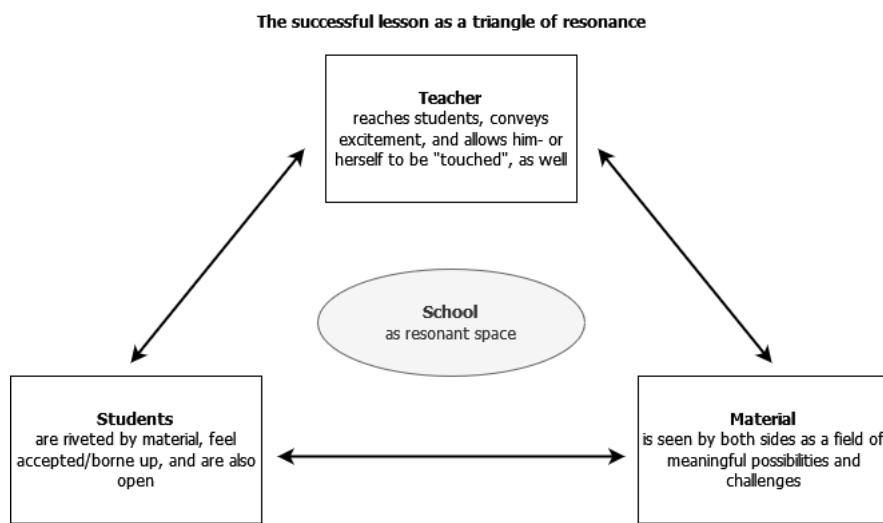


Figure 4.1: Model of a successful lesson of resonance (adapted from Rosa, 2019 p.243).

When we inspect the defining elements of resonance, Albert Bandura’s concept of *self-efficacy* (1977) stands out as especially interesting in the context of education (Rosa, 2019). Since a lot of students’ negative attitude to school, or a particular subject, stem from the experience that it is too hard – an obstacle they cannot overcome, for example see Griffiths (1993), Archer et al.(2020) or Zhao et al. (2021) – thus being perceived as alienating. Self-efficacy can best be defined by how a subject will cope with something that is perceived as threatening, an aversive situation or an obstacle – though they often are of no real harm to the subject. It is linked with the subject’s personal expectations of efficacy – meaning how well the subject is able to initiate behavioural change, how much effort they will put in and how long it will sustain it in the face of the threat or obstacle. Through “mastery” of something the subject’s self-efficacy can be enhanced and defensive behaviour toward the task at hand can be reduced. (Bandura, 1977) *The subject’s personal expectation of their own success is key.* An important aspect of self-efficacy in relation to resonance in education is that self-efficacy also builds on the subject’s perception of the world as threatening, though it presents an analysis of the constitutive elements needed to bridge the threatening

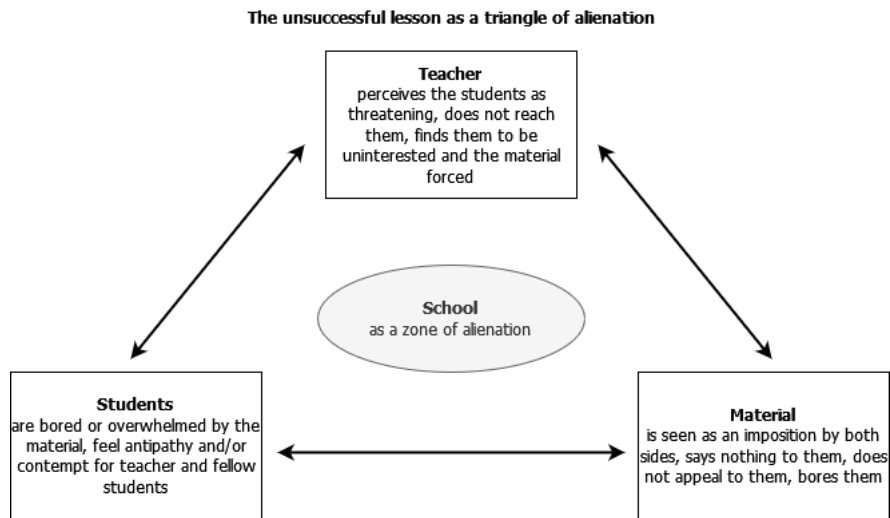


Figure 4.2: Model of an unsuccessful lesson of alienation (adapted from Rosa, 2019 p.242).

experience to one in which the subject has succeeded. It directly relates to turning an alienated experience into a (somewhat) resonant experience and relies on what Rosa calls “*transcending*” (see quote above) (Rosa, 2019).

4.2.2 Investigation and discussion of resonance theory in Value Creating Learning

As the theoretical foundation has been laid out, it is time to approach the questions posed in the introduction. The analysis begins with investigating how VCL can accommodate resonance and alienation, following with certain resonant and alienating aspects of VCL in an educational context, and ends with a discussion of how students with ADHD and autism might perceive VCL as resonant or alienating.

Capacity of resonance and alienation in VCL

As presumably noted by the reader earlier in this thesis, the relational character of VCL is what underpins the whole idea of it. The students are supposed to work in groups, with some kind of external recipient, with their emotional responses to the projects, by creating value for others, and by creating or interacting with a new material or artefact (Lackéus, 2016, 2022). All of these activities show a connecting wire from the student (as the subject) to the *objective, social and subjective* world (Rosa, 2019 p.36). As such, implying that there are at least some wires of affect and emotion between the subject and world (Rosa, 2019). One of the most expressing passages about it is in the statement from Lackéus that the emotional response is a defining element of VCL (Lackéus, 2022, p.14) and the description of his own experience as an exchange student in France when he studied French in upper secondary school. Not only the language, but the food, the host family and the surroundings were in interplay and *affecting* him, sparking an *emotional* response:

4. Theoretical analysis of Value Creating Learning

"I especially remember the dinners in France with his parents. You could tell their happiness when I tried the blue cheese and drank the table wine. ... And think that a little mutual cultural value creation could make me study my vocabulary with a set of new eyes." - (Lackéus, 2022 p.16)

One interpretation is that the resonance he felt during the trip, made his motivation to learn French considerably stronger (Lackéus, 2022), and the story serves as an inspiration to the fundamental emotional element of VCL.

Another foundational part of VCL supporting an argument that it should be possible to accommodate *resonant spaces* is its theoretical roots in well-being theory and motivational psychology. Hence, instinctively, VCL also asks the question of what constitutes "a good life?" (Lackéus, 2015, 2016). However, its theoretical foundation rests more upon individual-centred theories and research, in contrast to Rosa's sociological approach (note second paragraph in section 4.2.1). In an early paper on VCL, Lackéus (2015) refers to a well-being theory called *PERMA* (Seligman, 2011), where "R" stands for Relationships and "M" for Meaning. Seligman states that the individual feels positive, meaningful and purposeful when being relational and that an indispensable element of well-being is the "other people" (2011). Seligman also claims that the individual often pursues tasks that are *meaningful* to them, instead of tasks that only produce simple happiness (2011). In the work of Rosa, this *simple happiness* is mentioned as the *privatisation of the good*. A concept where in late modernity the production of the subject's happiness is solely put on the individual and is expressed by statements such as: "everyone must know for themselves what they want to make of themselves and their lives" (Rosa, 2019 p.18). Rosa's critique lies in this notion of neglecting the relationship to the world when discussing what constitutes the "good life". Therefore meaningful activities which regard the relational character of happiness could be able to distance themselves from modernity's notion of simple happiness and thus support resonance. Lackéus argues that it is this kind of meaningful and relational characteristic that should be present in VCL activities (Lackéus, 2015). But, as Rita Felski mentions in her essay "Resonance and Education" (2020), resonance is a wider concept that could be seen as transcending the concept of meaningfulness - as resonance also captures the corporeal and non-corporeal, extending beyond the self of the subject, letting the concept itself include the moments of *aha* that so often occurs in the classroom (Felski, 2020). As such, I believe that it would be valuable to extend the focus of VCL to include more than only its foundation in well-being theory.

To include another important foundational element of VCL, to aid in expanding the argumentation of VCL's relational capacity, we can look at Lackéus definition of *competences*. This takes a step away from its routine instrumental connotation:

"For me the word competences has come to represent a higher level of learning. A great advantage with value creating activities is particularly that student's learning opens up to embrace the whole of existence that we humans constitute. Body as well as soul." - (Lackéus, 2022 p.33)

Now, the activity is extended to something beyond the individual subject's perception of what is meaningful to them, into embracing wires of resonance with the world as including the corporeal and non-corporeal. This desire to focus on both the individual and the collective is in my opinion one of the most interesting contrasts in VCL. This becomes a duality consisting of striving towards collectivism and altruism, opening up towards the world, the subject always sensing and tuning in – but at the same time having a strong focus on the individual, its search for meaning and focus on the subject's emotional response to activities. Interplay of these two elements is sometimes caught in VCL, for example in Lackéus' reference to Peter Jarvis and his theories, which is the basis for a model called "*learning through dissonance*" (Lackéus, 2022 p.34). In the model the subject is affected by the world leading to a/an "emotional/strong/magical/revolving experience", this is an experience of cognitive dissonance (Festinger, 1957) making the subject analyse themselves and the world and reflect upon relevant action, but where the subject also searches for meaningfulness (and value for others) in the situation – and at the end of the process the subject is ideally transformed by the experience (Lackéus, 2022 p.34) having learned something, or rather acquired a new competence. Learning through dissonance shows the side of VCL which is always a juggling of both the collective and the individual. Following from the model of "*learning through dissonance*" is the notion of harmony, which is seen by Jarvis and Lackéus as a state of non-learning. The dissonance is what breaks the harmony, leading to an opening to learn by the subject (Lackéus, 2022). This compares well with the dialectics of resonance and alienation that Rosa advocates, he even mentions *harmony* and *consonance* as non-resonant modes as they rely on predictability (Rosa, 2019 p.184) – whereas dissonance instead inherits the component of inaccessibility, so crucial to resonance. Citing Rosa:

"Resonance is the momentary appearance, the flash of a connection to a ... predominantly silent and often repulsive world." - (Rosa, 2019, p.185)

This can be compared or equated to the student's feeling of dissonance when they are overwhelmed. Since VCL is a pedagogy trying to accommodate this dissonance, it will facilitate the resonating component of inaccessibility as what lies ahead for the students during the activities can (and should) not always be anticipated.

A primary concern with VCL in reference to resonance theory is VCL's connection to the notion of modernity. As noted before, both VCL and resonance theory can be interpreted as responses to a society that is picking up the pace, but the manner of how they interpret the consequences of modernity is the differing point. Rosa sees social acceleration as the malaise of modernity, a pathological condition; Lackéus on the other hand accepts social acceleration and adopts a sense of "going with the flow", a way of learning to adapt to the new environment. The stance to adapt leans towards a way of acting that in the long run can contribute to social acceleration and is therefore not anti-resonant per se, but reduces the ability to resonate as the subject may be too caught up in the momentum. However this is not surprising, as the basis of VCL in entrepreneurship and especially social entrepreneurship makes its sights set on the future and further innovation (Christensen, 2016; Lackéus, 2016, Hachana

and Gilormini, 2024). And as the future is presumably accelerating, the same goes for the (social) entrepreneur. Hachana and Gilormini (2024) argue that this vision of something new ahead and the ability of the social entrepreneur to commence in societal change can be seen as a resonating possibility, but I would argue otherwise. A focus on invention and creating something new (noted especially in the definition of VCL (see table 2.1)) shows an instrumental view of the world and situates the entrepreneur in the position of someone whose relationship to the world is what Rosa calls *intentionalist* (Rosa, 2019 p.124):

"... the subject moves through a given world in order to explore it, dominate it, control it, etc. World here manifests a field of attractive opportunities ... with all movement proceeding from the subject." - (Rosa, 2019 p.124)

The intentionalist thus manifests a type of mute relationship, mainly to the objective world in this case, as the resonant requirement that the other *speaks with its own voice* is lost. However, social entrepreneurs can be said to have a less intentionalist relationship as interpersonal relationships are of high importance, especially when addressing societal issues. Although the intentionalist relationship may seem like a small detail, it effectively diminishes the possibility for resonance, but also the original purpose of it. Since resonance is a critique of modernity and its imposed relations to the world, if social entrepreneurs, and in extension VCL, still embraces the acceleration of modernity and its subject-world relations then resonance loses its edge. Students who work with VCL may be able to partially resonate as they work with VCL-activities, but for what reason? My belief is that this is an aspect in which VCL and resonance theory will not be forged together - one of them has to let go of a foundational principle. As in the case of Hachana and Gilormini, they choose to disregard the importance of social entrepreneurs' contribution to acceleration, thus stating that resonance and social acceleration is permissible (Hachana and Gilormini, 2024). For VCL the conclusion would rather be that by stepping away from the foundation in entrepreneurship and its intentionalist relationships - transcending into something of its own - would be the only path to make students able to completely establish vibrating, resonating axes with all of the world.

Resonance and alienation in VCL - The school and classroom perspective

Now as the ability of VCL to accommodate resonance has been theoretically investigated, it is time to zoom in on how VCL further supports resonance and alienation in schools and classrooms by applying the models from "*Resonance - Chapter VIII*" and its underlying concepts.

First off, by looking at what constitutes the models of resonant and alienated lessons (figure 4.1 and figure 4.2) there are three components that we need to include in the investigation; the teacher, the students and the material. As well as the relational wires that exist between them.

The teachers: The role of teachers in VCL has been mentioned in the previous section (4.1), namely as more of a facilitator than a constant classroom leader as they in

VCL-activities renounce some of their power. But, in Lackéus' model of how the VCL-process moves through the plane of educational ideology, it starts with "traditional education" when introducing the VCL-activity (Lackéus, 2022 p. 71). This means that in the beginning, the teacher shoulders the responsibility to make the material speak to the students, it has to convey excitement (Rosa, 2019). The natural prerequisite becomes that the material speaks to the teacher as well. In VCL the teacher has to be fully engaged in the material, otherwise the whole concept would fail. It is stressed that the preparation for VCL-activities require more of the teacher, in terms of engagement and time (Lackéus, 2022) - as without external recipients and group projects the whole pedagogy will fall apart. But it is this additional preparation that makes the material speak to the teachers and so makes it possible to convey the vibration between the teacher to the material, to the students.

But, the most important wire in the model is probably the one between the teacher and the students. Rosa argues (2013) that students are very sensitive to recognition, and thus susceptible to both confirmation and rejection. This requires the teacher to have an awareness of how to tackle everyday situations concerning students' need for recognition. As the teacher approaches the facilitating role in VCL, they will step back from being the classroom leader, and so have to provide the recognition more individually than in traditional classroom education, primarily through feedback as it is the only opportunity the teacher has to interact with the students (caused by the amount of groups and the lesson time limitation). Therefore the importance of adequate feedback can not be stressed enough. Feedback should acknowledge not only the task at hand, or how well the students handle the process of VCL (Hattie, 2012), but also their individual effort and their place in the group (Rosa, 2013). However, if this is conducted wrongfully by the teacher, VCL-activities can quickly mute the teacher-student relationship. For example if the teacher gives feedback that may be too harsh and meticulous to some groups, whilst being kind and adequate to others, it can easily turn into a bout of unequal treatment that effectively will alienate the teacher from the groups who feel unjustly treated. On the other hand, if the teacher acts fairly, and with consistent treatment of the groups, it can lead to a strengthened bond between teacher and students leading to a better chance of a resonant relationship.

The students: When it comes to the role of the students in VCL, they are seen as more capable and self-reliant than what is the norm in traditional education (Lackéus, 2022). As a consequence the students can be described as being more *thrown into the world* than during a "normal" lesson, as less of the social and structural safety-net provided in traditional education is present. This puts more emphasis on the students' ability of self-efficacy, as the new endeavour of VCL directly confronts the students with new obstacles and "*threats*". One main concern whether VCL will resonate with students, or make them feel alienated, is the level of self-efficacy that each student has, and is available to master during the VCL-activities. In this aspect the role of the facilitating teacher is crucial. If the mission's bar have been set too high for the students, it might lead to an alienating experience from the start. The key is then that the teacher tunes in with the class and senses their level. Can the students work with an external recipient outside of school as their first project or not? To which extent do

the students have contact with the external recipient? What is the size of the project groups? What is the duration of the project? All of these are factors that the teacher has to ask themselves before entering a VCL-activity and are illustrated in a model of progression of VCL (Lackéus, 2022 p. 65). If the progression of VLC-activities is used tactfully, the teacher may be able to transcend the alienating experience of threat and hostility that a VCL-activity may convey - into an experience of resonance.

The second aspect of a student's self-efficacy in VCL is the perceived threat of the *ultrasocial* nature of VCL (Lackéus, 2022). Namely, what expectations does the student have of coping with the new demands of; working closely in a project group, communicating with an external recipient and overall contributing to sustainable group dynamics? For the extrovert student, this may be of no concern, but rather an exciting break from the conformity of traditional education. But that is not the case for all students. Rosa builds upon the work of Gerhard Schulze and categorises the ways in which students perceive an unknown challenge. Students can either perceive it as; a threat, an opportunity, a "kick" or fun experience, as a quest of self-realisation, or as something that they should adapt to in response to the leaders of the group (Rosa, 2013, 2019). A student that might perceive the social challenge of VCL as a threat has presumably low expectations of overcoming it, and is therefore lacking in self-efficacy, making it harder for the wires between student and world to vibrate. Whereas a student seeking opportunities may be triggered by the social interplay and the entrepreneurial undertone of VCL (where risks and success is connotated (Lackéus, 2017)) and thus amplifying the vibrations between the student and the world. A notable aspect is that the majority of students usually have the perception of a challenge where they adapt in response to the informal leaders of the class (Rosa, 2013) - therefore the class' informal leaders' expected self-efficacy may play a large role in how the whole class will react to a VCL-activity.

The material: Depending on how one interprets "the material" it may play a variable role in VCL. If "the material" is seen as the whole process of VCL; the planning that the teachers put in to create the boundaries of the activity, the lectures, the group work and contact with the external recipient itself - then it is quite a large matter. But this interpretation also leaves me with a strange feeling of describing individuals and their relations as "material". If instead "the material" is seen as topics or knowledge in different fields, then it is hard to generalise in the case of VCL - as it is not specific or context dependent. Also, the material by the latter definition is seen more as a co-player to the VCL-process. As VCL is primarily about the process, Lackéus implies that the learning of the material will be acquired, almost implicitly, by participation in the VCL-activity (Lackéus, 2022, p.30). But there are still resonant or alienating aspects of the material. As proposed earlier: the material (by the latter definition) needs to speak to the teachers in VCL, or else the foundations of the VCL-activity will fall apart. But whether it will speak to the students can never be certain. One possible resonating quality of the material in VCL is that it is seen as beneficial if the students themselves choose what the VCL-activity should be about, or are involved in the planning process (Lackéus, 2022 p.78-83). If the matter at hand is something that is close to the students as individuals or as a group (Reece and Walker, 2006) it is not far-fetched to assume that it will lead to higher participation and greater engage-

ment of the students – and so making the student-material wire vibrations amplify. The alienating qualities of the material in VCL is probably that of most education, it is perceived as boring or meaningless and may convey an instrumental view of the objective world. However VCL is an attempt to tackle the students' sense of meaninglessness, and therefore it probably plays more of a resonant, than an alienating, role.

VCL, alienation and resonance with students that have autism or ADHD:

The last part of the investigation will be dedicated to the case of VCL and students who are not neurotypical. As Lackéus mentions students with ADHD and autism it seems to be an appropriate limitation to investigate their possible experience of VCL in the context of resonance theory. Since there are no studies connecting VCL and ADHD or autism this section becomes more exploratory and will instead rely on research in active learning, as well as best practices, when conducting education for students with ADHD or autism.

When facilitating education for students that have ADHD or autism one common accommodation is that the teacher needs to help with the overall structure of the course, its parts and lessons (Specialpedagogiska skolmyndigheten, 2023a; Specialpedagogiska skolmyndigheten, 2023b). Ideally, the structure of the lesson elements and exercises are always made visible to the students. This aspect is possibly quite hard to achieve in VCL. It is of course of importance that the teacher facilitates the students' projects and sets the boundaries, but a lot of the finer details of the lessons are surrendered to the autonomy and self-regulation of the project groups (Lackéus, 2022). This could lead to a situation where the students perceive the "challenges" as a threat (Rosa, 2013) as it becomes overbearing on them, and so turning it into an alienating experience. On the other hand, for students with ADHD the less strict lesson format may be a breathing hole, as their impulses do not necessarily pose a problem when discipline is not a focus of the lesson. Pfeifer et al. (2023) claim that for students with ADHD, an active learning environment supports a space for distraction which translates well to VCL activities. When distractions are accepted and not seen as disturbances, the students may feel more welcomed into the classroom environment and avoid them feeling afraid or anxious of "doing wrong" because of their ADHD, thus opening up for the students to establish resonant wires during the lessons (Rosa, 2019 p.245). However, Pfeifer et al. also points out that students with ADHD may be easily distracted and space out (Pfeifer et al., 2023), so one problematic aspect of VCL is that all students usually work with group projects in the same classroom, leading to a lot of distractions. In such situations the cognitive load (Sweller, through Bates, 2023 p.76-77) of working with VCL may become too high, leading to a dampening of the resonant wires as the student can not sort what is going on, and so shuts themselves off instead.

For students with ADHD or autism the trait of being able to have high focus on something that is of personal interest is characteristic (Pilotte and Bairaktarova, 2016; Pfeifer et al., 2023). So the element of intrinsic interest in resonance (Rosa, 2019) can seemingly be supported for these students when the "right" subject is at hand. This

would lead to a higher chance of the material speaking to the students, causing an amplified vibration between student and material (Rosa, 2019 p.243). So in the case of VCL, the projects may by chance pique the interest of these students and let them immerse and resonate with the material. This chance may not be higher than that of other education, but the space for immersion, once it has commenced, is much more accommodated as VCL allows more space for students to do what they believe in (Lackéus, 2022).

Another major aspect of VCL and ADHD and autism is that of working tightly together in group projects. Here the perception of the posed threat of working in a group setting differs greatly between the diagnoses. For students with ADHD, group work is not an inherent problem, as the diagnosis does not include social limitations. According to Pfeifer et al. it can act as a source of motivation and a possibility to form better relationships with the other classmates (2023), and so accommodate a resonant relationship. Negative effects for students with ADHD seems mainly to be connected to the looser structure of group work (Pfeifer et al., 2023). For students with autism group work poses a serious problem and a possible zone of alienation. Students with autism often have a hard time understanding social codes, lack the ability of empathy, can not fully grasp group dynamics and often experience anxiety in social settings (Pilotte and Bairaktarova, 2016). As group work and especially the “ultrasocial” nature of VCL explicitly puts high demands on social competence, the level of difficulty for students with autism becomes high. The risk of students perceiving the VCL-activities as threatening (Rosa, 2013) is likely. Also the students’ self-efficacy will be affected by the high social demands and it will ultimately affect the possibility of resonance. If students with autism are self-aware of their struggles, it will affect their expectations of succeeding in a dynamical group setting. For students with autism, extra support will be needed in group projects (Pilotte and Bairaktarova, 2016; Specialpedagogiska skolmyndigheten, 2023b) and again the teacher’s facilitation and implementation of progression in VCL is key to making it an experience *at least not* alienating. In comparison to Rosa’s models of the successful and unsuccessful lessons (Rosa, 2019) the wire of teacher and student needs to vibrate vibrantly in order to even consider VCL to be something other than an alienating experience for students with autism.

4.2.3 Closing

Hopefully by now the reader has been given some insight into possible resonating and alienating qualities of VCL, and its possible implications for students affected by ADHD or autism. I would like to refrain from drawing too many conclusions – since the purpose of this chapter was exploratory. But the overall judgement of VCL seems to be that it has a good chance of allowing the students to experience resonance in school. Still, the interpretation of modernity as “given” and “normal” is the factor that acts as the greatest obstacle. However, the logical question to ask is if it even would be interesting, or meaningful, to pursue an entrepreneurial approach to education that resists the notion of modernity? Is entrepreneurship not a direct expression of modernity?

As modernity rages on, and schools have a large impact on the process of how students will perceive the world when they are thrown out into it (Rosa, 2019), resonance theory can have a critical role in letting students experience something else than a world directed by capitalist, neoliberal and utility-maximising values. Therefore I hope that teachers stop and think about their education, and what purpose it serves, in order to let students experience what a “*good life*” can be.

5

Results

The results in this chapter are a compilation of the findings from the thematic analysis conducted on the LoopMe forms, as well as the findings from the quantitative statistical analysis conducted on the closed-questions in the end-of-mission forms. The results will be presented separately for each analysis.

5.1 Results from the thematic analysis of LoopMe forms

First results related to each one of the four qualitative collection points will be presented. Then results which come from general patterns in all, or most of, the collection points will be presented. The aspects that are chosen as a part of the result are either aspects that are expressed by a substantial amount of students in the analysis, or an aspect that I believe makes an interesting point - that adds more nuance and depth to the analysis. All quotes by students that are presented in this chapter have been translated from Swedish to English.

5.1.1 Contact house owners

About half of the students in the class of 2023 contacted house owners by knocking on potential client's doors or taking contact with unknown adults (14 of 29), whereas only 4 out of 18 students in the class of 2024 contacted potential clients the same way. These students in both classes expressed to a very high degree that they developed the skill required to make contact with potential house owners, especially compared to students who only gave out flyers.

The majority of students in both classes that felt nervous about making contact with potential clients expressed that they felt more self-secure regarding taking contact after conducting this part of the mission (5 out of 8 for class of 2023 and 5 out of 5 class of 2024).

" It was a little nervous in the beginning to make contact with house owners but after I had done it a couple of times it disappeared. ... I have become more comfortable in making contact with external persons and developed my social skills. " - student 106

3 students in the class of 2023 lost their motivation while knocking on doors to recruit house owners due to potential clients telling them that they were not interested.

All students that expressed a feeling towards this part of the mission as "scary", "hard" or "troublesome" (6 students from the class of 2023) knocked on house owners doors or tried to make physical contact with potential clients.

"felt troublesome to make contact with an unknown person. After the meeting (the house owner said no) I felt perplexed, but glad that I had tried and that it still went decent." - student 123

Generally, the students in the class of 2023 more often expressed that to contact house owners felt easier than the students in the class of 2024.

Only students in the class of 2024 expressed that they thought of the target audience for the Attefallshus and adapted their marketing strategy according to it.

5.1.2 Interview house owners

About half of the students in both classes expressed nervousness before or during the interview (15 of 29 in 2023 and 9 of 18 in 2024).

Students in both classes (5 of 29 in 2023 and 3 of 18 in 2024) expressed a feeling of uncertainty regarding the house owners expectations of the Attefallshus .

"To interview the house owner was very strange as I was not completely sure of what she wanted with the Attefall extension. Apparently she was not sure either but wanted to have more space. The interview cleared up a whole lot of questions that I had before. ..." - Student 100

A clear majority of the students in both classes expressed that they felt "good", "more clear", "safer" or more "certain" about the mission after the interview (15 of 29 in 2023 and 16 of 18 in 2024), especially the students that expressed a feeling of nervousness before the interview.

"Before the interview it felt quite nervous in the beginning, ..., but the customer was very kind, nice and talkative, which helped a lot. ... After the interview it felt much better as we had started to get an idea and a clearer picture of how we should design our customer's floor plan " - Student 218

Only students in the class of 2023 expressed that they felt calm or not nervous towards the interview.

A common learning outcome often expressed by students in both classes (13 of 29 in 2023 and 9 of 18 in 2024) was how to conduct an interview. Which included interviewing techniques and how to conduct an interview with an external recipient.

The learning outcomes that was most often expressed by students in the both classes

were; *"Developing the skill to make contact with potential clients"*, *"Learning new social skills"* and *"To act professionally"*.

Regarding the aspect of interviewing technique when interviewing an external recipient. Students in the class of 2024 that had expressed this learning outcome had, among others, written in their reflections that they learned to let the recipient to "finish speaking" as essential when conducting an interview (4 out of 9).

Students in both classes expressed a learning outcome which was the importance of being well-prepared before the interview (6 of 29 in 2023 and 4 of 18 in 2024). About the same percentage of the students in both classes expressed that they were not prepared enough before the interview (about 17%). And 2 out of 3 students in the class of 2023 that expressed that the interview felt "ok/neutral" were not well-prepared.

Students in the class of 2023 (2 out of 29) expressed the insight that they probably would have gotten more out of the interview if it were held physically instead of digitally.

In the class of 2023 a major learning outcome was that *"Adults are not scary, mean, or rude."* or *"Adults are actually nice"* (13 out of 29 students), which was not mentioned at all as a learning outcome by the class of 2024. In the class of 2024 a major learning outcome was instead social competences and skills, which were mentioned to a much smaller extent in the class of 2023.

"... Except it I have learned that people often are much nicer than what you expect and therefore I have gained a much more positive attitude towards reaching out to unknown persons..." - Student 103

5.1.3 Give and receive feedback

More students in the class of 2024 (63%) expressed that it felt good to give feedback to another group than in the class of 2023 (32%).

One student in the class of 2023 expressed that when giving feedback you get to see other groups ideas and visions. Which can make you think and reflect upon your own floor plan and how it could be changed. This can be seen as a type of "self-regulating feedback" (Hattie, 2012).

One student in the class of 2024 expressed that earlier assignments had helped when giving feedback to another group and made the student rethink about how to give feedback to the other group.

The students in the class of 2024 had a different attitude towards giving feedback compared to the class of 2023. In the class of 2024 the need to be tactful and constructive when giving feedback was expressed by almost half (9 out of 19) of the students. whereas in the class of 2023 only 3 out of 29 students expressed the need

to be tactful or constructive.

"... that you all the time had to think about to not only give constructive critique but also point out good things. ..." - Student 221

"... It was important to think of how you gave feedback, and to question and come with positive suggestions instead of being negative. ..." - Student 213

In total 9 student from both classes expressed that it was hard or challenging to give feedback on a detailed or thought-through floor plan.

More students in the class of 2023 explicitly expressed that they were going to implement the feedback than students in the class of 2024 (4 of 28 in 2023 and 2 of 19 in 2024).

Students in the class of 2024 seemed to be more open when receiving feedback, not taking it personally but having more of a professional distance to it.

"When we received feedback I was calm and took responsibility in case there was something that had been misunderstood and also if something actually could be improved. It felt challenging to have someone that should find faults/improvements but I listened and took with me all that was important." - Student 204

Students in the class of 2023 referred to the feedback session as "giving/receiving critique", whereas students in the class of 2024 referred to the session as "giving/receiving feedback". Implying that semantically the class of 2023 put a stronger emphasis on the negative side of feedback.

Students in the class of 2023 (8 out of 28) more often referred to the feedback session as "exchanging ideas" or as "a discussion" than the students in the class of 2024 (1 out of 19).

"... It feels like that the most important with this occasion is the exchanging of ideas between groups. ..." - Student 104

A majority of the students in both classes expressed that it was "helpful" or "educational" to receive feedback from another group (15 of 28 in 2023 and 12 of 19 in 2024).

5.1.4 Final presentation

In both classes the majority of students that felt nervous about presenting the end result to the external recipient expressed that it felt better after the presentation (7 of 10 in 2023 and 9 of 9 in 2024).

Generally, the students that had a physical meeting with their external recipient expressed to a greater degree that they felt that they had met the expectations of the external recipient. In the class of 2023 5 students had a digital meeting with their external recipient and none of them expressed that they had met the recipients expectations.

"It was very fun to present the final product to the customer. i felt calm both before and meeting as I already knew from earlier meetings that the customer was very nice. Before the meeting I was curious of how the customer would react to the house, after the meeting I was satisfied over how happy the customer became when she got to see the house. ..." - Student 107

"It was hard to present the result, due to that they had problems with the connection and could not hear us and thereafter could not see when we screen shared. It was already nervous before the meeting, but this did not make it better. When we had begun they did not seem completely satisfied, which gave an unpleasant feeling after the meeting. At the same time it was nice to be done and to have shown the product. ..." - Student 123

Students in both classes expressed that they had perceived the mission "Attefallshuset" as meaningful, that they had created value for someone else (3 of 27 in 2023 and 3 of 16 in 2024). And 2 students in the class of 2024 also mentioned that the feedback from the external recipient was important.

"... When the meeting was done I felt proud and it felt like I had done something meaningful. ..." - Student 224

"... he seemed very happy, and also gave us feedback in a good way that made me feel like that I really could take it with me. ..." - Student 200

The importance of feedback also becomes evident as students in both classes who explicitly stated that they have met the expectations of the external recipient (11 of 27 in 2023 and 9 of 16 in 2024) also expressed a "positive", "good" or "joyful" feeling.

Two students in the class of 2024 expressed that they had learned to sell their product. This is a way of viewing the mission that was not expressed in the class of 2023.

Whilst 10 out of 27 students in the class of 2023 had expressed that a major learning outcome was that "Adults are not scary, mean, or rude." or "Adults are actually nice", only 1 student in the class of 2024 had mentioned the same learning outcome.

The major learning outcomes expressed by the students from both of the classes concern technical aspects of the mission, such as CAD, drawing floor plans and architectural decisions (in total 34 out of 43). But also the skill to communicate and act

professionally when working with external recipients (in total 33 out of 43).

5.1.5 General results

Students in the class of 2024 expressed that they were affected by emotions during the mission to a lesser extent than students in the class of 2023.

All real interaction (non-digital) with the external recipient seems to bring a higher effect on learning both course content and social competences for the students, and at the same time making the students express a stronger emotional response towards the mission. The emotions are both positive (such as: meaningfulness, enjoyment and personal development) and negative (such as: nervousness, worry and uncertainty).

"It felt nervous. I got to practice on talking with people that I do not know which I thought was scary/hard and therefore I learned to do it better. I also distributed flyers. It was not as challenging and therefore not as educational since then I did not have to make contact with any persons."

- Student 118

A common new attitude acquired by the students in both of the classes is that they express nervousness before meeting the external recipient, but that after the meeting it feels better and that they felt more self-secure and prepared to meet other external recipients in the future.

"An attitude that I brought with me was to dare. To dare knock on doors, to dare asking questions and also to dare to give feedback to other groups."

- Student 129

It seems that when students see that their efforts are rewarded (for example when they have succeeded with recruiting a home owner for the project), the students experience feelings of meaningfulness and that they did a good job.

The preparatory assignments that were a part of *"The water bottle"*, with the aim of easing the students feeling towards working with an external recipient, seems to have had an effect on the students' perception of adults and working with external recipients. Quite a few students in the class of 2023 expressed that they acquired a new attitude which can best be described as; *"Adults are not scary, mean, or rude."* or *"Adults are actually nice"*, in the collection points; *contact house owner, interview house owner, final presentation*. Whereas almost no one in the class of 2024 expressed that they had acquired that same attitude.

In the class of 2024 there was a greater feeling of not being prepared enough for the mission than in the class of 2023.

It seems that some students acquire a new more positive attitude towards working in group projects, compared to what they usually feel.

"My attitude towards projects like these have also improved. I used to think that they were dull, but with a good group and a good focus I have changed my view of it." - Student 204

Only students in the class of 2024 express that they planned activities according to a certain target audience, a concept that was highlighted during "The water bottle".

5.2 Results from the end-of-mission forms

In the questions which have been analysed, all student answers have been translated to its corresponding integer in the range of 1-4 (see section 3.2.2), and are abbreviated as follows:

- **Q1:** To what extent did you feel that you were *motivated* to perform the mission?
- **Q2:** To what extent did you perceive that you had enough *prior knowledge* in engineering to perform the mission?
- **Q3:** To what extent did you feel that you were *prepared* to perform the mission?
- **Q4:** To what extent did you perceive the mission as *educational*?
- **Q5:** To what extent did you feel that the mission *prepared* you for performing missions with an *external recipient in the future*?

5.2.1 Comparison of the class of 2023 to the class of 2024

As a first step, to get a general understanding of the students' answers to the questions, the mean was calculated in relation to each question and class. The populations are; the class of 2023 with $n=30$ (except for question 4 where $n=29$), and the class of 2024 with $n=20$. The results are shown in table 5.1 below:

Class	Q1	Q2	Q3	Q4	Q5
2023	3.069	3.207	3.276	3.357	2.897
2024	3.000	3.278	3.222	3.333	2.833

Table 5.1: The means of what the students in each respective class answered to the specific questions.

To verify if the students perception of the mission differed between the classes we need to verify if their answers are statistically significant (or not). In order to claim if

there is a significant difference hypothesis testing was used (for details see chapter 3). Hypothesis testing was carried out using a Mann-Whitney U-test with the significance level $\alpha = 0.05$. The test was corrected, as multiple tests were conducted, according to the rules of Bonferroni correction. The results are shown in table 5.2 below:

	Q1	Q2	Q3	Q4	Q5
p-value	0.770	0.721	0.803	0.815	0.657

Table 5.2: P-values from the comparison of the mean of each question between the classes by hypothesis testing.

The resulting p-values in table 5.2 clearly shows that the differences between the classes are *not statistically significant* when comparing the answers given by the class of 2023 to the answers of the class of 2024.

5.2.2 Comparison between question outcomes

As a next step of the quantitative analysis, we want to investigate if there may be some kind of correlation effect between the outcomes of the questions. Therefore we exhaustively calculate the correlation coefficients between the answers to the questions. Here the data from both classes are merged into one population ($n=50$, but for all correlations involving question 4, $n=49$ since one student in the class of 2023 had left question 4 unanswered). In order to verify if any of the correlations are significant, all correlation coefficients are investigated by a permutation test. Correlation coefficients and their respective p-values are shown in table 5.3 below:

	Q1	Q2	Q3	Q4	q5
Q1	1.000(0.000)	0.033(0.440)	0.186(0.070)	0.267(0.039)	0.270(0.027)
Q2	0.033(0.440)	1.000(0.000)	0.336(0.017)	-0.066(0.618)	-0.116(0.736)
Q3	0.186(0.069)	0.336(0.015)	1.000(0.000)	0.095(0.214)	0.082(0.333)
Q4	0.267(0.039)	-0.066(0.618)	0.095(0.214)	1.000(0.000)	0.506(0.00031)
Q5	0.270(0.033)	-0.116(0.736)	0.082(0.333)	0.506(0.00031)	1.000(0.000)

Table 5.3: Correlation coefficients of the answers of each question against each other. The p-values from the permutation tests are in the parenthesis to the right of each correlation coefficient. Bold p-values are the ones that are significant. The population consists of the students from both classes.

When comparing the p-values from table 5.3 given by the permutation test with a significance level of $\alpha=0.05$ we can conclude that some correlations are significant (visualised in figure 5.1). These are:

- **Question 1 against question 4.** Which shows that the motivation of students correlate with how educational they perceived the mission to be.
- **Question 1 against question 5.** That shows that the students experience that their motivation correlate with how well they feel prepared for future missions with an external recipient.
- **Question 2 against question 3.** Which says that there is a correlation between the prior knowledge in engineering that the students felt they had and to what extent they were prepared to perform the mission.
- **Question 4 against question 5.** That shows that how educational the students perceived the mission to be correlate with how well they feel prepared for future missions with an external recipient.

5. Results

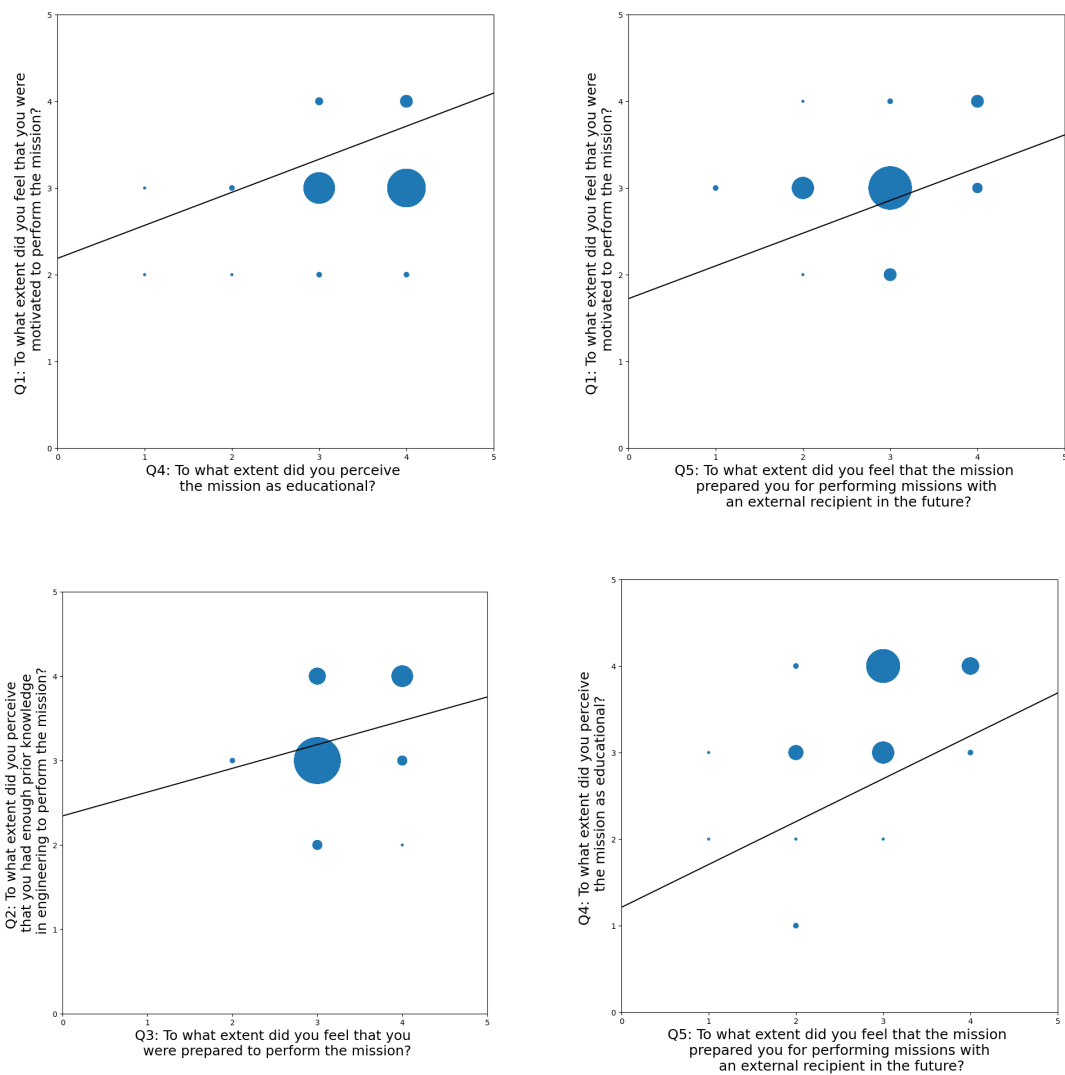


Figure 5.1: Scatter plots of the significant correlations, with a regression line added to visualise the trend in the scatter. Marker size depends on the number of identical answers, as the area of the circle is proportional to the number of answers.

6

Discussion

Two thesis parts will be the focal point of this discussion, first the results, then the methodology.

6.1 Results

Research about education is in itself a tricky endeavour, since one tries to simplify the myriad of aspects that are present in it to a number of quantifiable statistics, or to summarise it in an educational, didactic or pedagogical model. This means that when comparing certain closed off aspects of a project, such as we did in "Atterfallshuset", there will be a lot of uncertainties and factors that are not controlled for, especially when the same project is evaluated twice. With this in mind, aspects of the qualitative and quantitative results that needs to be discussed will be presented below.

6.1.1 Qualitative analysis

From the qualitative analysis it seems that adapting the level of contact with external recipients is an important aspect when conducting a VCL mission as a teacher. The teacher has to know the class, and carefully choose the level of progression (see figure 2.2) according to what they believe is appropriate. The qualitative analysis also suggests that the students who have had a higher level of contact with a/their external recipient has had a stronger emotional response, and also mentioned more learning outcomes - which is in line with the research by Lackéus on VCL's effects on students (Lackéus, 2022). In "Attefallshuset" a clear aspect of the level of contact with a/their external recipient is in the data collection point: "Contact house owners". In this part of the mission, the students that went knocking on doors and attempting to make contact with external recipients through physical means expressed a higher degree of emotional response and new learning outcomes compared to the students that mainly made contact with house owners through flyers and social media. The greater emotional effect when student take physical contact with external recipients seems to be caused by the nervousness that students experience in beforehand. Then as the students makes contact the feeling of being nervous is complemented by the feeling of accomplishment as they overcome the initial fear of taking contact, but also by getting direct feedback from the external recipient. This phenomenon of overcoming is caught in the words of Hesiod:

"But between us and Goodness the gods have placed the sweat of our brows; long and steep is the path that leads to her, and it is rough at the first; but when a man has reached the top, then is she easy to reach, though before that she was hard." - (Evelyn-White et al., 1920)

According to the qualitative analysis the class of 2024 seem to have a more open attitude towards giving and receiving feedback - keeping a professional distance to a higher degree. As I have observed this class during the whole mission of "Atterfallshuset" I wonder if this effect also could stem from the group dynamics of the class. In the class the jargon is quite tough and with a hard edge. Which means that harsh and borderline mean comments are a part of a usual day for most students. This requires the students to have another distance to one another in order to protect themselves, and speculatively this could lead to them having more distance to critique that had risen during the feedback session - which is possibly interpreted instead as a professional distance. However, there are more students in the class of 2024 than in the class of 2023 that expressed the need to be tactful and giving constructive critique, which also could indicate that they deliver feedback in a more professional manner and thus makes it easier for the receiving group to keep a distance to it.

Another interesting remark from the feedback session is that the students in the class of 2023 generally referred to "giving or receiving *critique*", whilst the students in the class of 2024 most often referred to "giving or receiving *feedback*". If we analyse the usage of the word it could symbolise that the feedback given in the class of 2023 would have had a greater focus on the negative aspects of feedback, and not as much on the positive. To a larger extent point out what was wrong instead of complimenting what was right. In the class of 2024 however, the feedback was probably more balanced between the positive and the negative, and may be an effect of the preparatory exercises.

Some students expressed that it was hard to give feedback on a floor plan that they felt was "complete" or "thought-through" and that they did not know what to point out or highlight. It shows two things, first is that the student are not used to giving feedback that is not banal or novel, and that this is a first step for them in the process of giving more complex feedback. Second is the principle that it is hard to feel that you are allowed to change a detailed high fidelity prototype, as some of the floor plan were, as some students had made them in a CAD-program. The suggestion would be to instead give and receive feedback on a floor plan that is low-fidelity, and more of a sketch. Low-fidelity sketches are better suited for feedback and the earlier decisions of the design process where a lot of changes usually need to be considered (Rudd, Stern, and Isensee, 1996).

One area where the preparatory exercises seems to have had some effect on the students in the class of 2024 is when it comes to the attitude towards working with an external recipient. As mentioned in the results, mainly students in the class of 2023 mention that they have acquired a new attitude which is "*Adults are not scary, mean, or rude.*" or "*Adults are actually nice*". The students in the class of 2024 rarely mention

this and instead focuses on that they have learned social competences, acting professionally or becoming more self-secure when making or taking contact. Since there is this great difference in how the students perceive the external recipients I think that it is not a stretch to assume that the earlier project of "The water bottle" prepared the students better in the class of 2024 and made the leap from level 2 to level 3 in the progression model of VCL (see figure 2.2) less intimidating.

A question that has arisen many times during the qualitative analysis is that of how certain we can be about the effects that seem to come from the preparatory exercises given to the class of 2024. Is another attitude towards, for example, interviewing a house owner an effect of better preparation for it? Or is it only because of that the students in the class of 2024 are different individuals from the students in the class of 2023 and thus perceive and experience the mission in another light? These are questions that will remain unanswered, and something that the reader has to have in the back of their head as they interpret the results. It is left to their own judgement. It all boils down to the question of how we can be certain of effects that are not quantifiable and examined by statistical methods. Especially in this case where we only study two, rather small, populations of students that are part of the same context and interpreting their written reflections.

6.1.2 Quantitative analysis

From the Mann-Whitney U-tests conducted to analyse if there was a difference between the results of each question in the class of 2023 compared to the class of 2024, no significant results were obtained. One reason leading to it may have been the factor that the teacher can not present the material or facilitate the mission in the exact same way as the year before (explained more in section 6.2). Another possible source of error was the house owners that the students made contact with, as what the students perceived or experienced was dependent on how well the contact with the external recipient functioned. On a more speculative note, since the class of 2024 had been prepared in the previous project of "The water bottle" the anticipated result this year was that their results on the end-of-mission forms should have been that they answered "to a larger extent/degree" (3 or 4) more often than that of the class of 2023 (resulting in a higher mean). But as the students in the class of 2023 were much more motivated than the class of 2024 according to the teachers, the effect of the preparatory exercises for the class of 2024 might have only made them "equal" to the class of 2023. If the preparatory exercises had not been made with the class of 2024 one possibility is that they actually would have answered "to a smaller extent/degree" (1 or 2) more often than the class of 2023.

Even if four correlations between the students' answers of the questions seemed to be significant, it can not be certain that there actually exists a causal connection between them. However, by logical reasoning it seems probable that there is a causal connection between Q1 and Q4, Q2 and Q3, as well as between Q4 and Q5 (for reference see figure 5.1). Which tells us that we can see a trend in the students' answers to the question of their motivation and the question about if they perceived the mission

as educational. We can also see that there is a trend between the students' answers of their perception of that they had enough prior knowledge in engineering and that they felt prepared to perform the mission. As well as a trend in the students' answers to that they perceived the mission as educational and that they felt prepared to perform missions with an external recipient in the future. But the one correlation that stands out as probable of having nothing but a strong correlation coefficient and p-value is the correlation of Q1 and Q5, which says that there is a trend between the students' answers of their motivation and that they felt prepared to perform missions with an external recipient in the future. Even if the students are motivated as they participate in the mission, it does not say anything about how well they will be prepared to handle future missions. Therefore I think that it would be wise to rule out that there exists a causal connection between Q1 and Q5.

6.2 Methodology

A general concern, and liability, in all educational research is that the teacher can not act the same way twice - and will unconsciously change their behaviour from year to year - which undoubtedly will affect the results. Since the mission of "Attefallshuset" was conducted once in 2023, then again almost exactly a year later in 2024, it is very likely that the teacher did a lot of things differently. This would probably have contributed to a slight distortion of the data and making it less directly comparable between the classes.

Concerning the method of qualitative data collection, the question of the suitability of LoopMe as a tool used for educational research has been brought up during the data collection and the analysis. The main concern is that when the teacher is the active part who initiates the data collection and is responsible for it, students may not clearly separate, or differentiate, the end goals of the data. Students doubt whether their answers will be evaluated only for research purposes or used for assessment of their accomplishments, which makes the students wanting to please the teacher. In dialogue with the responsible teachers at the collaboration school the teachers expressed that some students wrote in a completely different style which was more keen to please the teacher than actually expressing their genuine reflections. There was a discrepancy between the attitude towards the mission and how some students had acted during the lessons, compared to what they wrote in their LoopMe reflections. A conclusion is therefore that when conducting research with LoopMe, the person responsible for data collection should ideally be the researcher and not the teacher - as students in that age are too concerned and scared of being assessed, not being able to relax even if the teacher is clear about their intentions.

The class of 2023 did not receive their end-of-mission form at the actual endpoint of the mission, but instead about 6 months later. This is something that probably distorted the data in some way. From the teachers' observations of the class of 2023 the students' motivation of working with "Attefallshuset" was high compared to the class of 2024. But, when the answers of the classes to the question regarding motivation from the end-of-mission forms were compared, the difference in mean is only

a mere 0.069 for Q1. It is uncertain whether this would have been the same if the class of 2023 had gotten the form at the right time, but the late form is a potential source of error which may explain why there seem to be no statistical difference in how the classes experienced or perceived the mission, although the teachers observed a difference.

Another aspect of that there seems to be no statistical difference between the class of 2023 and the class of 2024 according to the end-of-mission forms is that of operationalisation and which concepts that were chosen to be measured, prior to the creation of the form. In this case, one classic pitfall may be affecting the results - the one of validity of concept. Namely if we operationalise correctly and actually choose the correct aspects which we want to measure (Esaiasson et al., 2017). In this, one key factor is how the abstract concepts are broken down into quantifiable units and in the case of the end-of-mission form one aspects that potentially caused a problem is that asking students to give a measurable answer to a question about a wide concept, for example motivation, is not tangible enough. The depth of a word such as motivation makes it hard to pinpoint and break down into easy measurable units and as an effect its definition becomes dependent on the eye of the beholder.

I believe that it is right to mention that the theoretical analysis has been conducted by applying the frameworks presented in each theoretical analysis *inductively* on VCL. The problem of induction is well known and has been studied since at least the 18th century (Sloman et al., 2005). The problem lies in when we are going from what has been observed to making a generalisation, and that in this process there is a possibility that what we generalised can be false. This is illustrated (famously) by Karl Popper in his book *"Logic of Scientific Discovery"* from 1935 as: all swans that we observe are white, therefore we conclude a law stating that all swans are white, but then we observe an Australian black swan, which leads us to falsify the first law stating that all swans are white (Popper, 2005). Here inductively stating that "all swans are white" was deemed false by encountering a black swans, which illustrates the problem of induction.

Since the quantitative analysis did not generate any clear results, or conveyed a much better understanding of how the mission of "Atterfallshuset" is perceived or experienced by the students, it has to be asked if quantitative methods are the right way of evaluating practice centred VCL projects. My experience is that the qualitative methods gave a much better understanding of what the students perceived or experienced and probably served as a better method of evaluating the mission. In the future I think that approaching this type of research with further qualitative methods, such as interviews, would be preferable.

Ethical aspects has taken the backseat of this thesis as it has strictly focused on the analysis of already collected data and theoretical investigations. But an ethical aspect of this thesis is the pseudonymisation of the students and that the students remain anonymous during the analysis. The responsibility in this case lied upon the teachers that collected the data which later handed was over to be analysed. This procedure

worked well in our case, but in it lies a problem with all practice centred research, especially if the teacher sits on two chairs - as both the teacher and the researcher. Then the teacher will probably know their students and would be able to identify them among the data even though it was anonymous or pseudonymised in the first place. Another important ethical aspects is the consent of the participating students, which was taken into account before the data collection in this thesis. All student had to sign an agreement stating that they willingly participated in this research project, these agreements were managed according to Chalmers rules of personal data protection (Chalmers, 2024).

7

Conclusions

Quite surprisingly, according to the end-of-mission forms *there were no significant differences* between the classes in terms of; motivation, prior knowledge, feeling of being prepared for the mission, educational outcomes or feeling of being prepared for future missions. But can it actually be true that there are no differences in the experiences or perceptions of the mission? As mentioned in chapter 6, end-of-mission forms may not have been the most appropriate method of analysing "Attefallshuset". Therefore, when looking for answers, the thematic analysis may be a more appropriate tool at hand. What can be concluded from the qualitative analysis is that the progression probably had some positive effect on the feelings and attitudes of the students in the class of 2024 compared to the class of 2023. It seemed that the class of 2024 were less "scared" or "intimidated" by the external recipients than the class of 2023. An interpretation is that the vibrations in the wire (Rosa, 2019) between the students in the class of 2023 and the external recipients were *dampened* or *mute*, whilst the wire vibrated at least some between the students in the class of 2024 and the external recipients. This appears to have made the process of VCL seem less tedious and flowing along more naturally for the class of 2024. The class of 2024 also seemed to be more comfortable with giving and receiving feedback with a professional distance and an open attitude. It can be viewed as a sign of functioning progression from the preparatory feedback session and assignments that were practised during "The water bottle".

A conclusion that rhymes with both classes is that the feeling of being nervous is almost at all times overcome when students are; making contact with, interviewing or presenting their artefact to the external recipient. Leading to students feeling more self-secure and having more self-efficacy in relation to these type of missions. This opens up the possibility of the students experiencing resonance, as this becomes a real example of what Rosa calls "transcending" an alienating experience (2019). The vibrations of the relational wire between the students and the external recipient are in this case amplified, thus going from mute to vibrating. It should also be mentioned that meeting the recipients physically rather than digitally generally produces a stronger emotional response in the students, which seems to deepen their insights and learning - and is in line with Lackéus' results (2022).

My overall impression is that a new general model of progression in VCL can not be obtained and motivated by the data in this study. However, I believe that the importance of Lackéus' original model of progression (figure 2.2) has been highlighted. Especially the facilitating role of the teacher is put on the spot as they have put care-

ful attention to the class and its dynamics in order to decide the most suitable level of the VCL mission to reach the best result. As well as to consider if a class needs a lower level mission in beforehand, to be adequately prepared. A hope is that with an appropriate level of the VCL mission, the majority of students' perception of the unknown challenge (Rosa, 2013, 2019) that a VCL mission presents becomes that of an opportunity or a fun experience - instead of as a threat.

As for the theoretical questions I believe that they are investigated and discussed sufficiently in their respective part of chapter 4. Even though both questions stem from philosophical schools with foundationally different views of how the subject should be realised through the educational system, they are both asking the question of the purpose in education. This I believe is a central question that should permeate every decision in the working day of the teacher. It puts the teacher in role where they have to be self-reflective of their own ethics and formalise them concretely as they design their education and conduct their lessons.

Even though entrepreneurship as an educational buzzword has reached its peak in the Swedish educational discourse (Lackéus, 2022), VCL acts as an exceedingly interesting interpretation of what educational entrepreneurship can be. With its many foundational roots and wide array of theories VCL becomes something that actually reaches a complexity which has the capacity to capture the reality of education. However, VCL still inherits a strong bond to functions of qualification and socialisation stemming from its entrepreneurial foundation, as shown in the previous analysis (section 4.1). But I still believe that it has evolved from the recent elation of entrepreneurial education and is now capable to stand on its own - making it relevant as a contemporary educational practise. Furthermore VCL's layers make it susceptible for further practical, theoretical as well as critical research in order to deepen the understanding of how it can function (and functions) in schools. Especially since VCL as a method of entrepreneurial education initially refrain from entrepreneurs' capitalist and monetary connotations, and this non-capitalist interpretation of entrepreneurial education is what teachers usually prefer (Christensen, 2016). My hope is that this thesis serves as a part of a continuing attempt at understanding VCL's function in schools, and by presenting new perspectives may open up for further aspects of VCL to be analysed.

To end this thesis I would like to cite on of my favourite viewpoints of Lackéus, which I hope will be more acknowledged in the future (and contemporary) educational discourse:

"This gives us yet another reason to strive for educational philosophical balance in schools. Some lessons fit some students, other lessons fit other students. Overall pedagogical variation will lead to that we hopefully can reach all students." - (Lackéus, 2022 p. 162)

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A

End-of-mission forms

This is the end-of-mission form (in Swedish) that both the class of 2023 and the class of 2024 answered after the mission "Attefallshuset" was completed.

Progression i värdeskapande lärande på teknikprogrammet: Attefallshuset

Efter du har genomfört projektet "Attefallshuset" vill vi att ni svarar på följande enkät. Projektet är en del av ett forskningssamarbete med Chalmers. Utvärderingen kommer läsas av dina tekniklärare, forskaren på Chalmers och en student på Chalmers. Ni kommer använda er av en personlig kod som anonymiserar datan. Spara den koden för ni kommer använda den även vid ett kommande projekt.

1. **Personlig kod (som din tekniklärare gett dig)**

2. **I vilken utsträckning kände du dig motiverad att utföra uppdraget?**

Markera endast en oval.

1 2 3 4

I väldigt liten utsträckning ○○○○ I väldigt stor utsträckning

3. **Till vilken grad upplevde du att du hade de förkunskaper inom teknikämnet som krävdes för att utföra uppdraget?**

Markera endast en oval.

1 2 3 4

Till väldigt liten grad ○○○○ Till väldigt stor grad

4. **Var det några konkreta förkunskaper som du upplevde att du saknade?**

5. I vilken utsträckning kände du dig förberedd för att utföra uppdraget?

Markera endast en oval.

1 2 3 4

I väldigt liten utsträckning ○○○○ I väldigt stor utsträckning

6. Vilket deluppdrag kändes mest utmanande?

Markera endast en oval.

- Att ta kontakt med extern kund
- Att intervjua extern kund
- Att få feedback från en annan grupp i klassen
- Att leverera slutprodukten till kund

7. Till vilken grad upplevde du uppdraget som lärorikt?

Markera endast en oval.

1 2 3 4

Till väldigt liten grad ○○○○ Till väldigt stor grad

8. Beskriv konkret vad du lärde dig.

9. I vilken utsträckning tror du att uppdraget förberett dig på att genomföra uppdrag med en extern mottagare i framtiden?

Markera endast en oval.

1 2 3 4

I väldigt liten utsträckning ○○○○ I väldigt stor utsträckning

10. Vilka erfarenheter tog du med dig efter att uppdraget var avslutad?

B

Example of spreadsheet from the thematic analysis

Elevid:	Elewsvar:	1) Avtyder & känslor:	Ingensting "Mullsvan"	Mött kundens förväntningar	Möte inte kundens förväntningar	Kändes lugn/tryggt	Kändes bra/positivt	Kändes pifrigt/nervöst	Mötade kundmötet, inget riktigt möte
100	Elewsvar: Innan mötet var jag rädd om vilka gjord det kunden ville. Det var väldigt bra att ha								
107	presentera slutförslaget för kunden. Det var väldigt bra att ha								
109	kunde dela nåt vi skulle förnya svar att rätta to var								
101	både parter hade tid att träffa kunden. Det var väldigt bra att ha								
102	Det var väldigt bra att ha								
103	ha lite tid innan mötet								
106	Det var väldigt bra att ha								
104	Det var väldigt bra att ha								
108	Kunden hade ett tillägg till det som jag hade sagt								
110	Det var väldigt bra att ha								
112	Det var väldigt bra att ha								
111	Det var väldigt bra att ha								
113	Det var väldigt bra att ha								
114	Det var väldigt bra att ha								
117	Det var väldigt bra att ha								
116	Det var väldigt bra att ha								
115	Det var väldigt bra att ha								
118	Det var väldigt bra att ha								
120	Det var väldigt bra att ha								
121	Det var väldigt bra att ha								
123	Det var väldigt bra att ha								
122	Det var väldigt bra att ha								
124	Det var väldigt bra att ha								
125	Det var väldigt bra att ha								
128	Det var väldigt bra att ha								
126	Det var väldigt bra att ha								
129	Det var väldigt bra att ha								


```
[112, 3, 3, 3, 2, 1],  
[113, 3, 3, 3, 4, 3],  
[114, 2, 3, 3, 3, 3],  
[115, 3, 2, 3, 4, 4],  
[116, 3, 3, 3, 3, 2],  
[117, 4, 3, 4, 4, 4],  
[118, 4, 3, 3, 4, 3],  
[119, 3, 3, 3, 3, 3],  
[120, 3, 4, 4, 4, 3],  
[121, 3, 4, 3, 4, 3],  
[122, 3, 3, 3, 4, 4],  
[123, 3, 4, 3, 4, 3],  
[124, 3, 4, 4, 4, 2],  
[125, 4, 4, 3, 4, 4],  
[126, 3, 3, 3, 3, 3],  
[128, 4, 2, 3, 4, 4],  
[129, 3, 3, 4, 4, 3],  
[130, 3, 4, 3, 0, 3]]
```

```
# Without the last answer
```

```
student_matrix_te22_question_4 = np.array([  
    [100, 3, 4, 4, 3, 3],  
    [101, 3, 3, 2, 3, 3],  
    [102, 3, 3, 4, 4, 4],  
    [103, 3, 2, 4, 4, 3],  
    [104, 3, 3, 3, 3, 3],  
    [105, 3, 4, 4, 1, 2],  
    [106, 3, 4, 4, 3, 3],  
    [108, 3, 3, 3, 4, 2],  
    [109, 3, 3, 3, 2, 2],  
    [110, 2, 3, 3, 2, 3],  
    [111, 3, 3, 3, 3, 1],  
    [112, 3, 3, 3, 2, 1],  
    [113, 3, 3, 3, 4, 3],  
    [114, 2, 3, 3, 3, 3],  
    [115, 3, 2, 3, 4, 4],  
    [116, 3, 3, 3, 3, 2],  
    [117, 4, 3, 4, 4, 4],  
    [118, 4, 3, 3, 4, 3],  
    [119, 3, 3, 3, 3, 3],  
    [120, 3, 4, 4, 4, 3],  
    [121, 3, 4, 3, 4, 3],  
    [122, 3, 3, 3, 4, 4],  
    [123, 3, 4, 3, 4, 3],  
    [124, 3, 4, 4, 4, 2],  
    [125, 4, 4, 3, 4, 4],
```

```

        [126, 3, 3, 3, 3, 3],
        [128, 4, 2, 3, 4, 4],
        [129, 3, 3, 4, 4, 3]])

student_matrix_te23 = np.array([
    [200, 2, 3, 3, 4, 3],
    [201, 3, 2, 3, 3, 3],
    [203, 3, 4, 3, 3, 2],
    [204, 3, 3, 4, 4, 3],
    [205, 3, 3, 3, 4, 3],
    [206, 2, 4, 3, 3, 3],
    [208, 3, 3, 3, 4, 4],
    [209, 4, 3, 3, 3, 4],
    [212, 3, 4, 4, 4, 3],
    [213, 2, 3, 3, 4, 3],
    [217, 2, 3, 3, 1, 2],
    [218, 3, 2, 3, 3, 2],
    [219, 4, 4, 4, 3, 4],
    [221, 3, 3, 2, 3, 2],
    [222, 3, 4, 3, 4, 3],
    [223, 3, 4, 4, 3, 2],
    [224, 4, 3, 3, 4, 3],
    [230, 4, 4, 4, 3, 2]])

# ===== SCATTER PLOT =====

def scatter_plot_columns_from_same_matrix(matrix, index1, index2,
regression=None):
    fig, axes = plt.subplots(1, 1, figsize=(10, 10))

    question_1 = get_column(matrix, index1)
    question_2 = get_column(matrix, index2)

    label1 = str(get_question(index1))
    label2 = str(get_question(index2))

    axes.set_ylim(0, 5)
    axes.set_xlim(0, 5)

    marker_size = get_marker_sizes(question_1, question_2)

    axes.scatter(y=question_1, x=question_2, s=marker_size)

    axes.set_ylabel(label1, fontsize=18, color="black")
    axes.set_yscale('linear')

```

```
for label in axes.get_yticklabels():
    label.set_color("black")

axes.set_xlabel(label2, fontsize=18, color="black")

if regression == "yes":
    k, m = np.polyfit(question_1, question_2, deg=1)
    x = np.linspace(0, 10, num=100)
    axes.plot(x, k*x+m, color="black")

plt.show()

def get_marker_sizes(column1, column2):
    sizes = np.array(np.zeros((4, 4)))
    m_sizes = np.array(np.zeros(len(column1)))

    for i in range(0, len(column1), 1):
        sizes[column1[i]-1][column2[i]-1] += 1

    for i in range(0, len(column1), 1):
        m_sizes[i] = ((sizes[column1[i]-1][column2[i]-1])*3)**2

    return m_sizes

# ===== CORRELATIONS =====

def get_correlation_coefficient(question1, question2):
    return np.corrcoef(question1, question2)[0][1]

def get_correlation_matrix(cmd=None):
    if cmd is None:
        print("Give command", "all, te22 or te23")
        return

    correlations = np.array(np.zeros((5, 5)))
    for i in range(1, 6, 1):
        for j in range(1, 6, 1):

            if cmd == "all":
                all_pop_q1 = concatenate_arrays(get_column(
                    student_matrix_te22, i), get_column(
                    student_matrix_te23, i))
                all_pop_q2 = concatenate_arrays(get_column(
```

```
        student_matrix_te22, j), get_column(
        student_matrix_te23, j))
        correlations[i - 1][j - 1] =
        get_correlation_coefficient(all_pop_q1, all_pop_q2)
    elif cmd == "te22":
        correlations[i - 1][j - 1] =
        get_correlation_coefficient(get_column(
        student_matrix_te22, i), get_column(
        student_matrix_te22, j))
    elif cmd == "te23":
        correlations[i - 1][j - 1] =
        get_correlation_coefficient(get_column(
        student_matrix_te23, i), get_column(
        student_matrix_te23, j))

    return correlations

# ===== HYPOTHESIS TESTING =====

def hypothesis_mann_whitney_u_test(index):
    question1 = get_column(student_matrix_te22, index)
    question2 = get_column(student_matrix_te23, index)
    U, p = scipy.stats.mannwhitneyu(question1, question2,
    method="exact")

    return p

def false_discovery_test(ps):
    return scipy.stats.false_discovery_control(ps, axis=0,
    method="bh")

def bonferroni_test(ps):
    ps_adjusted = multipletests(ps, alpha=0.05, method='bonferroni')
    return ps_adjusted[1]

# Returns p-value of the proportion of randomly paired correlation
# coefficients that are greater than the original.
def permutation_test(data1, data2, n, og_correlation_coefficient):
    number_of_greater_c_coefficients = 0

    for i in range(0, n, 1):
```

C. Python code used in the statistical analysis of the quantitative data

```
np.random.shuffle(data1)
np.random.shuffle(data2)

p_correlation_coefficient = get_correlation_coefficient(
    data1, data2)

if p_correlation_coefficient > og_correlation_coefficient:
    number_of_greater_c_coefficients += 1

return number_of_greater_c_coefficients / n

# ===== AUXILLiERY =====
def get_question(index):
    return form_questions[index]

def sort(array):
    r_array = np.sort(array)
    return r_array

def get_mean(array):
    return scipy.stats.tmean(array)

# Fetches a colum from the matrix, returns as an array
def get_column(matrix, index):
    if index < len(matrix[0]):
        return np.array([val[index] for val in matrix])

def concatenate_arrays(arr1, arr2):
    c_arr1 = np.array(arr1)
    c_arr2 = np.array(arr2)
    return np.concatenate((c_arr1, c_arr2), axis=None)

def concatenate_matrices(mat1, mat2):
    c_mat1 = np.array(mat1)
    c_mat2 = np.array(mat2)
    return np.concatenate((c_mat1, c_mat2), axis=0)
```

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