UNIVERSITY OF TURKU

Exploring Motivation of Engineering Students in Face-to-Face and Hybrid Learning Environments in Finland: A Qualitative Analysis

Education and Learning/Department of Education
Master's thesis

Author:
Aslıhan Özgül

31.07.2024
Turku

Master's thesis

Subject: The master's degree program in Education and Learning (EdLearn)
Author: Aslıhan Özgül
Title: Exploring Motivation of Engineering Students in Face-to-Face and Hybrid LEs in Finland: A Qualitative Analysis
Supervisors: University Lecturer Jenni Tikkanen, Postdoctoral Researcher Suvi Jokila
Number of pages: 108 pages
Date: 31.07.2024

Abstract

This master's thesis explores the factors influencing the motivation of engineering students in both face-to-face and hybrid learning environments at a University of Applied Sciences in Finland, and what kind of support the students perceive would sustain and improve their motivation. As engineering students face increasing demands for high skill levels and competencies in social and innovation areas, understanding their motivation is crucial for their success in completing their degrees. Using the Situated Expectancy-Value Theory by Eccles and Wigfield as theoretical framework, this research centers around six male engineering students pursuing the same degree in a face-to-face and hybrid learning environment. The study uses a qualitative research approach, with semi-structured interviews, to capture detailed personal factors and experiences influencing their motivation. The findings reveal how individual experiences, such as the personal interest and significance of their studies, career aspirations, learning environments and interactions with instructors, shape their motivation. Further, the analysis identifies a range of support mechanisms that students wish for, from institutional policies and their instructors. The findings underscore the critical role of motivation among the interviewed engineering students and highlight the need for support and improvements in the current educational practices.

Key words: Engineering Education, Motivation, Situated Expectancy-Value Theory, Learning Environment, Finnish Higher Education

In this thesis, artificial intelligence was used to support the writing process, specifically for language editing and proofreading. Further, no personal data was disclosed to it, and it was not used to generate ideas or interpretations.

Table of contents

List of Abbreviations 5

1 Introduction 6

2 Understanding Motivation 10

3 Educational Context 17

3.1 New Learning Environments 17
3.1.1 Educational Technology in Learning Environments 18
3.1.2 Instructional Format 19
3.1.3 Instructor Role 22

3.2 Face-to-Face and Hybrid Learning Environments in Finnish Universities of Applied Sciences 23

4 Engineering Education in Finnish Universities of Applied Sciences 25

4.1 Engineering and Motivation 26

4.2 Engineering Culture 27

5 Methodological Approach 29

5.1 Participants and Recruitment Process 29

5.2 Data Collection 31

5.3 Interview Protocol 32

5.4 Data Analysis 33
5.4.1 Development of the Coding System 34
5.4.2 Intercoder Reliability 36
5.4.3 Development of the Themes 37

5.5 Trustworthiness and Ethical Considerations 38
5.5.1 Credibility 38
5.5.2 Transferability 38
5.5.3 Researcher Subjectivity 39

5.6 Limitations 40

6 Findings 42

6.1 Internal Motivation 42

6.2 Career Aspirations and Practical Benefits 44
6.2.1 Career Growth 44
6.2.2 Financial Stability 47

6.3 External and Personal Influence 48
6.3.1 Engineering Culture in Finland 48
6.3.2 Individual Circumstances 49
6.3.3 Instructor's Role 60

6.4 Institutional Policies 65
6.4.1 Competency-Based Courses 65
6.4.2 Financial Aid 65
6.4.3 Individualized Learning Approaches 66

6.5 Instructor's Role and Teaching Methods 66
6.5.1 Instructors' Role 67
6.5.2 Feedback 67
6.5.3 Guidance 68

7 Discussion 69

References **76**
Appendices **92**
Appendix 1 Survey **92**
Appendix 2 Interview Guide **97**
Appendix 3 Coding Scheme **100**

List of Abbreviations

EVT - Expectancy Value Theory

ICR - Intercoder Reliability

ICT - Information and Communication Technology

LE - Learning Environment

LMS - Learning Management System

SEVT - Situated Expectancy-Value Theory

SSI - Semi-Structured Interview

STEM - Science, Technology, Engineering and Mathematics

UAS - University of Applied Sciences

Each term will be introduced once in its full form, with the corresponding abbreviation in brackets. From that point onward, the abbreviation will be used throughout the entire thesis for simplicity.

1 Introduction

Over the last 20 years, several emerging trends have challenged engineering education worldwide. Engineering students must now be prepared to address global sustainability issues (Beagon et al., 2023), while developing a complex skill set that encompasses innovation, entrepreneurship, stress management (Hadgraft & Kolmos, 2020), and essential soft skills such as teamwork and empathy (Caeiro-Rodriguez et al., 2021). Amidst the evolving global and industry changes, including economic uncertainties influenced by events like the COVID-19 pandemic (Matthews et al., 2022), the role of engineers has become increasingly critical. They are the ones navigating and leading through these new demands and challenges (Lee et al., 2022). Engineers are at the frontline multifaceted and interconnected problems that require not only technical expertise but also collaboration across various fields of knowledge (Beagon et al., 2023; Tejedor et al., 2019). In addition to this development, employers elevated their expectations for engineers (McGunagle & Zizka, 2020). A study involving 250 Human Resource Managers identified the most valued skills in new graduates as 'being a team player, self-motivation, verbal communication, problem- solving and being proactive' (McGunagle & Zizka, 2020, p. 600).

As the demands evolve globally, it is important to explore how different countries have adapted their education systems to meet these new challenges and educate their prospect engineers. In this context, one notable example is Finland, as indicated by its ranking of 6th among the top 10 most innovative countries in the world (World Intellectual Property Organization (WIPO), 2023). It has improved to 5th place in innovation inputs, which include such factors as human capital and research investments in education and research and development, while maintaining its 9th place in innovation outputs, which refer to the creation and impact of knowledge and technology. In essence, Finland has made successful investments in its national development, however, there is still potential to enhance its global competitiveness and ensure sustainable growth in innovation and the engineering education that supports it. Finnish engineering students are vital to advancing its development, contributing positively to the nation's innovation landscape. They use their theoretical knowledge to develop technological advancements and thereby increase the nation's economic growth. Consequently, it is crucial to further explore and transform the educational experiences of future engineers to better align with market needs and enhance their motivation (Lappalainen, 2011).

Given these circumstances, the focus of this master's thesis is to explore the key factors behind engineering students' motivation and address the current gap in research specifically related to the engineering domain (Lee et al., 2022). Students' motivation has a significant impact on their path of study and can result in program dropout, which depicts both a personal and societal loss (Rump et al., 2017). Addressing the factors that contribute to dropouts is crucial to optimizing investment in education and promoting economic and social development through innovative approaches, with motivation being a key element (Bargmann et al., 2022). Multiple studies conducted in recent years have determined that low levels of academic motivation are a critical factor in student dropout and intention to drop out (Bargmann et al., 2022; Behr et al., 2021; Rump et al., 2017; Tayebi et al., 2021). The challenge of maintaining motivation is especially pressing in fields that face unique pressures, such as engineering. In engineering education, one of the key challenges for engineering students is the engineering stress culture (Jensen & Cross, 2021). It has become an urgent concern for the engineering community, describing the phenomenon that engineering students perceive high levels of stress and mental health difficulties as inherent in their studies (Jensen & Cross, 2019). Moreover, this stress culture impacts the engineering identity and what students associate with being an engineer and contributes to normalizing poor mental health and high stress levels as part of engineering studies (Jensen et al., 2023).

In addition to these cultural challenges, the evolving learning environments (LEs) complicate the educational landscape. To address these complexities, there has been a shift towards educational trends such as student-centered learning (Hadgraft & Kolmos, 2020), or the implementation of learning management systems (LMS) like itslearning (itslearning, n.d.-b), which facilitate virtual problem-based and collaborative learning (Buus, 2016). This increased use of Information and Communication Technologies (ICTs) in higher education has changed the availability and style of LEs, with crucial implications for both learning and students' motivation (Bond et al., 2020). This shift sets the stage for examining how these changes specifically affect the learning experiences of higher education students. Fatehiboroujeni and colleagues (2020) explain that instructors can now offer hybrid or fully online environments for their students by providing prerecorded videos, online lectures, or online platforms for discussions and assignments. This approach creates new opportunities for students access to education, and more specifically individual learning, allowing students to study and work simultaneously with greater flexibility in scheduling their own time (Fatehiboroujeni et al., 2020). Contrariwise, an increase in the use of ICTs does not necessarily lead to an equal increase

in the quality of education, which can affect students' motivation if the new LEs are perceived as ineffective or demotivating. The success of these environments also depends on the integration of ICTs and the skills of the instructors (Amutha, 2020). Recent research has explored the use of ICTs in Science, Technology, Engineering, and Mathematics (STEM) (González-Pérez & Ramírez-Montoya, 2022; Kaluyu & Ndiku, 2020), but there is still a need to investigate their applications in different LEs and cultural contexts (Bond et al., 2020).

While the discussions about 'innovation readiness' frequently focus on the necessary skills and knowledge for science and engineering graduates or on general organizational factors (Webster & Gardner, 2019), it is equally important to consider how students' motivation plays a role. The impact of motivation extends beyond academic achievement and deeply into the professional sphere, shaping the effectiveness and productivity of these highly skilled individuals as they enter the workforce (Savage et al., 2011). Understanding the underlying factors that drive engineering students' motivation is crucial, and has been extensively researched due to its significant impact (Brown et al., 2014). Previous studies have found that motivation influences various aspects of engineering education, including why students choose engineering in the first place (Maharaj et al., 2018), their persistence and performance throughout their studies (Lee et al., 2022), and how their LE affects their motivation (Hadgraft & Kolmos, 2020).

For a more nuanced understanding of the motivational dynamics in engineering education, it is essential to consider them within a theoretical lens. The Situated Expectancy-Value Theory (SEVT) (Eccles & Wigfield, 2020), which provides a valuable theoretical framework for this purpose, offers insights into the contextual factors influencing engineering students' motivation. Eccles and Wigfield (2020) highlight that students who believe they can succeed and see value in their education are more likely to be motivated and achieve academic success. Studies over the past decade have further reinforced the relevance of this theory to students in higher education. For instance, Perez and colleagues (2014) demonstrated that university students' motivation significantly impacts their academic performance and persistence, particularly when their studies align with their personal interests and career aspirations. Similarly, Richardson and colleagues (2012) identified that higher education students with strong expectancy and value beliefs are more engaged and perform better academically.

Considering all these circumstances, it is crucial to explore the key factors behind engineering students' motivation. This master's thesis builds on the previous understanding of engineering

culture and its challenges, aiming to explore the motivational factors of six engineering students at a University of Applied Sciences (UAS) in Finland. The research focuses on a detailed perspective of the individual experiences and perceptions of the interviewees, exploring what sustains and could improve their motivation in both face-to-face and hybrid LEs. The research questions are:

1. What are the key factors influencing Finnish engineering students' motivation in face-to-face and hybrid learning environments?
2. From the students' perspective, what kinds of support would sustain and improve their motivation?

2 Understanding Motivation

In this chapter, the aim is to provide an overview and establish a theoretical foundation for the complex topic of motivation. 'The Latin root of the word 'motivation' means 'to move'; hence, in this basic sense the study of motivation is the study of action' (Eccles & Wigfield, 2002, p. 110). Building on this underlying idea, an empirical perspective on motivation examines the factors that drive an individual to exert effort and stay focused on a task in the face of challenges and distractions, as well as their personal beliefs, values, and goals (Howell & Buro, 2009). From this, several motivation theories have been developed to conceptualize this phenomenon in different settings (Wigfield & Eccles, 2000), for example the self-determination theory by Deci and Ryan (2000) or situated expectancy-value theory by Eccles and Wigfield (2020). Consequently, researchers have focused on various aspects of motivation, such as the potential impact it may have on an individual's decision-making process and subsequent performance. In essence, most motivation theories revolve around expectancy, reasons for engagement, motivation and cognition, or expectancy and value (Eccles & Wigfield, 2002). At present, a diverse selection of key motivation theories that are commonly accepted or frequently referenced have been identified (Brown et al., 2014; Eccles & Wigfield, 2002). Despite this, numerous articles continue to rely on a broad interpretation of motivation without the use of conceptual frameworks, as evidenced by Brown et al. (2014). A review of the literature revealed that approximately half of the analyzed articles lacked a theoretical framework, while 20% provided some level of definition and 28% integrated a motivational theory into their research questions or rationale (Brown et al., 2014). This illustrates the complexity of exploring motivation and choosing the most suitable motivation theory for one's research and theory development.

The selection process of the theoretical motivation framework for this study started with Eccles and Wigfield (2002) classification system, which categorizes motivation theories into (1) expectancy, (2) reasons for engagement, (3) integrating expectancy and value constructs and (4) integrating motivation and cognition. Based on these categories, Brown and colleagues (2014) conducted a literature review highlighting the most prevalent motivation theories in engineering education. Table 1 provides a summary of this literature review.

Table 1

Most Commonly Referenced Motivation Theories

Theory Focus	Definition	Examples	Related Theories
Expectancy	Conceptualized as an individual's perception of task difficulty Involves confidence in successfully completing the task	A student confidently takes on a challenging project, believing in their ability to succeed based on past experiences and support from peers	Self-Efficacy Theory (Bandura, 1997) Control Theories (Skinner, 1995)
Reasons for Engagement	Focuses on the motives driving individual's engagement divided in extrinsic and intrinsic Emphasizes the significance of competence, autonomy, and relatedness needs in motivating behavior	Employee participates in educational training for career advancement and possible better salary but also to develop new skills in a field	Self-Determination Theory (Deci & Ryan, 2000) Flow Theory (Csikszentmihalyi, 1990)
Integrating Expectancy and Value	Involves combining beliefs about the likelihood of success with subjective importance or value Aims to explain factors influencing educational and occupational choices	A student enrolls in an advanced art course, confident in their painting skills and relevant for future career as painter	Expectancy-Value Theory (Eccles-Parsons et al., 1983) Attribution Theory (Weiner, 1985)
Integrating Motivation and Cognition	Explores the intersection of motivation and cognition, particularly in learning contexts Theories emphasize motivation's role in regulating behavior to achieve learning goals	A student sets goals to improve academic writing skills, monitors progress, and adjusts study strategies, recognizing the importance of writing for academic and professional success	Self-Regulated Learning Theory (Schunk & Zimmerman, 1994) Self-Regulated Learning Model (Butler et al., 2011)

Note. Content summarized from Brown et al., 2014, pp.188–189.

The theoretical basis for the present research is the SEVT, formerly known as the Expectancy-Value Theory (EVT) of achievement choice (Eccles-Parsons et al., 1983), developed by Eccles and colleagues (Eccles & Wigfield, 2020). Over the past 40 years, EVT has profoundly shaped motivation research, evolving to provide a deeper understanding of motivation (Eccles & Wigfield, 2020). It is recognized as one of the most broadly applicable motivation theories (Brophy, 2009) and has led to substantial achievements in motivation research (Eccles & Wigfield, 2020). These include the detailed development of the task value construct and the inclusion of different empirical perspectives, such as social-cognitive concepts like attribution or personality theory (Wigfield & Eccles, 2024). In the following subchapter, the SEVT is explained in detail and contextualized for this context.

As an achievement-related motivation theory, SEVT examines the influence of individuals' goals, values, and beliefs about their capabilities on their drive to succeed in academic and performance-based settings. Research indicates that the mechanisms underlying SEVT are dynamic, evolving over time and influenced by the immediate environment (Eccles & Wigfield, 2020; Wigfield & Eccles, 2024). This understanding has led to a revised model emphasizing its 'dynamic, contextual, and situated nature' (Wigfield & Eccles, 2024, p. 3), resulting in the addition of 'situated' to its title (Eccles & Wigfield, 2020). Accordingly, 'situated' describes the context in which a person decides to engage in an activity (Eccles, 2022). This context can be defined by factors such as the setting in which the activity takes place (for example, face-to-face or hybrid setting), the social context (for example, with study colleagues or alone), or the physical context (for example, whether the activity is done in a classroom or at home). Further, SEVT proposes to investigate how developmental and contextual factors shape the sources of information used by individuals of different ages, the processes by which they form their academic self-concept and subjective task values, and the hierarchies that come into play. Another proposed change is to refocus the research objectives. As the initial theory focus was on exploring the impact of different parenting practices and school environmental factors on children's developing subjective task values and their academic self-concept, there are several other crucial factors that deserve investigation as exemplary peer relationships, cultural and ethnic background or nowadays media and technology.

SEVT was selected for this study because it provides a comprehensive framework for understanding the influence of situational factors on motivation, as 'SEVT is both situationally specific and culturally bound' (Eccles & Wigfield, 2020, p. 4). This theory is particularly relevant for the purposes of the present study taking into account its situational and cultural

context. This study has two specific objectives: firstly, to explore the motivation of Finnish undergraduate engineering students attending a UAS in both face-to-face and hybrid LEs, thereby advancing the further development of the SEVT model by exploring the motivation context in Finnish higher education. Secondly, it employs a situated approach to allow for a in-depth exploration of each interviewee's personal experiences, expectations, and values. SEVT provides the basis for the subsequent analysis, which is discussed in detail in the following chapters.

A comprehensive understanding of the application of SEVT in the present context requires defining its key components, which have remained consistent since the initial EVT theory (Eccles-Parsons et al., 1983). These components are divided to ability and expectancy beliefs, which are crucial in this framework (Wigfield & Eccles, 2000). Ability beliefs refer to an individual's self-perceived competence in a particular activity, while expectancy beliefs concern an individual's subjective evaluation of their likelihood of success in an activity, with a focus on future outcomes (Wigfield & Eccles, 2000). Expectancy beliefs are divided into two subcategories: expectancies for success and subjective task values, both essential for determining one's motivational decisions, task persistence, and performance (Eccles & Wigfield, 2020; Eccles-Parsons et al., 1983). Expectancy is a better indicator of performance, while task values are more commonly associated with choice to pursue a task and one's persistence in a task (Wigfield & Eccles, 2000). Expectancies for success represent beliefs about one's anticipated performance on future tasks, '[…] distinguished conceptually between expectancies for success and individuals' more stable beliefs about their current beliefs about their ability or academic self-concept [...] (Eccles & Wigfield, 2020, p. 8). For the purposes of this study, the focus is on the STVs to understand how the engineering students sustain and improve their motivation in their ongoing degree. Subjective task values encompass one's perceived importance, interest, and utility of a task as well as the cost (Eccles & Wigfield, 2002, 2020; Eccles-Parsons et al., 1983). The components are crucial in determining and shaping an individual's motivation to engage in and persist with tasks and thus influence decisions about which activities to pursue or avoid. Brophy's (2009) evaluation of various motivation theories concludes, one's personal values oftentimes drive career choices more than perceived competence of expectations of success, including the division of subjective task values into the four value categories, also described as 'person-task-characteristics/constructs' (Wigfield & Eccles, 2024, p. 6), known as (1) intrinsic value, (2) utility value, (3) attainment value, and (4) cost. Each of these categories is discussed in the following section after.

Intrinsic value refers to the inherent enjoyment or interest an individual finds in performing a task (Eccles & Wigfield, 2020; Wigfield & Eccles, 2024). It is solely the pleasure or satisfaction derived from the task itself, rather than from any external results. For instance, an engineering student enjoys designing new prototypes, finding intrinsic value in the design process and is driven by their passion for design. As exemplified, intrinsic value is critical because it drives individuals to engage in activities for the sheer pleasure of doing so, which can lead to sustained motivation and deeper engagement with the subject matter as in this case engineering. A student pursuing an engineering degree may be discouraged from pursuing further studies if they perceive engineering tasks to be uninteresting, despite feeling competent in them. This highlights the critical role of intrinsic value in maintaining educational pursuits. While intrinsic value and intrinsic motivation by Deci and Ryan (2000) and interest motivation by Hidi and Renninger (2006) appear to be closely related concepts, Eccles (2005) has distinguished between intrinsic value, intrinsic motivation and both situational and personal interest, crucial for understanding motivation in the context of the present work. Deci and Ryan (2000) associated intrinsic motivation with the source of engagement in a task, focusing on the internal drive to participate. Hidi and Renninger (2006) present a concept that is most closely aligned with the SEVT's intrinsic value: situational interest. Their interest development model suggests that environmental factors can prompt immediate interest in a task, which may result in longer-term engagement. This focus on the task's value aligns more closely with the definition of intrinsic value in the SEVT model.

Utility value is the perceived usefulness of a task in achieving present and/or future aspirations (Eccles & Wigfield, 2020; Wigfield & Eccles, 2024). It represents the practical benefits and relevance of a task to an individual's long-term goals. For engineering students, utility might be found in mastering technical skills and knowledge that are essential for their future careers. Recognizing the utility of their studies can motivate students to persist in their efforts, even in challenging situations, because they understand the direct link between their current tasks and their future aspirations. In the context of SEVT, the utility value is associated with extrinsic motivation by Deci and Ryan (2000). When an individual's STV is predominantly driven by utility, the followed task becomes a means to achieve an external goal rather than an inherently satisfying experience. Further, the utility value can be shaped by an individual's personal goals, such as achieving a certain occupation. This connection between personal goals and self-concept highlights how interconnected one's utility value and attainment value are.

Attainment value indicates the importance an individual places on doing well at a task because it is perceived as central to one's self-concept and personal identity (Eccles & Wigfield, 2020; Wigfield & Eccles, 2024). Consequently, the attainment value cannot be manifested, as it pertains to the alignment and confirmation of a task with one's core self, which is an intangible concept. For example, an engineering student who views themself as a capable engineer will place a high attainment value on excelling in their coursework and graduating successfully as engineer. Distinguishing the nuances between intrinsic, utility and attainment value can be challenging. The complexity arises from the degree to which the underlying goals resonate with an individual's own identity and personal values and goals.

'Eccles-Parsons et al. (1983) argued that every task has costs as well as benefits and that individuals will avoid tasks that cost too much relative to their benefits, particularly when compared to alternative tasks with a higher benefit to cost ratio.' (Eccles & Wigfield, 2020, p. 15). The component cost, consists of three different types: (1) effort cost, an individual's subjective evaluation regarding the time, energy, and mental effort required for a task, weighed against the perceived benefits, which ultimately determines whether the investment of effort is worthwhile; (2) opportunity cost, the potential loss of opportunities, as ability and time, to engage in other valued activities and (3) emotional cost, possible emotional or psychological consequences of engage in a task, 'particularly anticipated anxiety and the emotional and social costs of failure.' (Eccles & Wigfield, 2020, p. 15; Wigfield & Eccles, 2024, p. 7). For example, an engineering student may perceive the effort cost of extensive study time as high, given the considerable effort and time that could have been spent on other activities, such as social events or relaxation. Understanding the component cost is crucial because it can affect the overall motivation if the perceived costs outweigh the perceived benefits of engaging in the task. In recent years, there has been a growing debate in the motivation research field about the inclusion of cost within subjective task values (Eccles & Wigfield, 2020). This debate has centered on the question of whether cost should be integrated or treated separately. Just recently in their newest update on SEVT, Wigfield and Eccles (2024) refer to their original theory in which cost has been included and justify its inclusion of cost in subjective task values for several reasons (Wigfield & Eccles, 2024). One of the reasons is integrating cost in the subjective task values enhances the comprehensive assessment of task value, providing a balanced perspective that includes both the benefits of a task, named intrinsic, utility and attainment value, and the disadvantage, such as associated costs. This approach considers the net value of tasks, acknowledging the practical implications where understanding costs aids individuals in making

informed decisions. Tasks perceived as more challenging or costly may still be pursued if their benefits outweigh these costs, thereby reflecting real-world decision-making processes.

Another aspect to the key components in SEVT are that expectations and values are domain-specific (Eccles & Wigfield, 2020; Wigfield & Eccles, 2000). In the case of engineering, also the focus of this study, motivation may operate differently compared to other areas, such as language or the other STEM disciplines (Lee et al., 2022). One reason could be that engineering being perceived as a demanding field of study due to the high personal effort, stress, and sacrifices required, such as forgoing other pursuits because of the heavy workload and time constraints (Mosyjowski et al., 2017; Olewnik et al., 2023; Osam et al., 2017). The multifaceted understandings of competence only in engineering and its unique challenges shape the expectations and values, thereby influencing the overall motivation of engineering undergraduates (Lee et al., 2022).

In summary, SEVT has significantly impacted the field of motivation research (Eccles & Wigfield, 2020, 2023; Rosenzweig et al., 2019; Wigfield & Eccles, 2024). The key components of the theory include ability beliefs, expectancy beliefs, and subjective task values, such as intrinsic value, utility value, attainment value, and cost. The theory emphasizes the dynamic and contextual nature of motivation, which evolves over time and in different environments. Recent updates to SEVT highlight the importance of supporting self-efficacy and values in education, particularly in fields such as engineering (Lee et al., 2022). This theoretical framework forms the foundation for the present analysis of engineering students' motivation in face-to-face and hybrid LEs at a Finnish UAS.

3 Educational Context

In this chapter, the focus is on the educational context in which engineering students in Finland study and learn. A LE is a multi-faceted term which often refers to the 'physical, social and psychological context for learning' (Shochet et al., 2013, p. 246). LEs are characterized by a variety of factors, as for example students' perceptions of their course experiences and their instructors (Guo et al., 2022), or the extent to which instructors' use versatile teaching methods (Cayubit, 2022). Considering the term LE has a variety of definitions, it is beyond the scope of this thesis to explore them all. However, a short summary of the criteria for the definition of LEs for the operationalization in this study is provided. Further, the following subchapter defines LEs, particularly face-to-face and hybrid LEs, and their impact on student motivation. Additionally, the role of educational technology and instructional methods will be discussed to provide a comprehensive understanding of the educational context for engineering students at Finnish UAS.

3.1 New Learning Environments

Valtonen and colleagues (2021) summarized three key criteria of a LE, as '[…] pedagogy is enlarged by technology and enabled by space, space encourages pedagogy and embeds the technology, and technology enhances pedagogy and extends the space (Valtonen et al., 2021, p. 373). The space refers here to the physical space, which is defined by including buildings or lecture rooms in which students study and learn in. A good physical space is associated with easily accessible technologies and tools for displaying and working with documents. While the physical space does not necessarily promise particular pedagogical practices (Fraser, 2014), the flexibility of the space might affect teaching (Whiteside et al., 2010). It was found that instructors in a positive physical space can have a positive impact on their students' engagement and satisfaction (Valtonen et al., 2021), and enhance their motivation, as they tend to emphasize more student-centered practices which are as well associated with higher motivation (Owens et al., 2020). As educational spaces evolve, the LEs in higher education have undergone a strong transformation, with technology becoming an essential component (Fang et al., 2017; Valtonen et al., 2021). This transformation is driven by the emergence of new pedagogical practices and advancements in ICT, which encompass the use of various technological devices such as tablets and laptops, commonly referred to as bring-your-own-device, LMSs, and virtual LEs (Valtonen et al., 2021). In the context of higher education, these advancements are collectively known as educational technology (Bond et al., 2020). The gaps in the technological infrastructure of

student's LEs and lack in use of educational technology was exposed during the abrupt global shift to online learning due to the COVID-19 and higher education closures (Abu Talib et al., 2021; AlMunifi & Alfawzan, 2023). Consequently, a more student-centered and technological approach, such as hybrid learning, has emerged as a flexible tool for students, allowing them to manage their time and space freely (Olakanmi, 2017).

In addition, Rusticus and colleagues (2023) describes a 'good' or 'positive' LE is one that yields positive outcomes for all students. This is particularly important as it has been associated with various beneficial impacts on students' lives, such as positive correlations with satisfaction (S. Lin et al., 2019), increased academic performance (Lizzio et al., 2002), emotional wellbeing (Tharani et al., 2017), decreased stress levels and burnout (Dyrbye et al., 2009; Kuittinen & Meriläinen, 2011) and, most importantly, the context for the present study, increased motivation (Cayubit, 2022; Vermeulen & Schmidt, 2008). All these factors underline the importance and possible impact of a LE on students' experiences.

3.1.1 Educational Technology in Learning Environments

Given these findings, it is crucial to understand the role of educational technology, which has emerged as a critical factor in the development and flexibility of higher education settings (Bond et al., 2020). As this thesis explores motivation in the context of face-to-face and hybrid LEs, using different technological tools, the term educational technology will be examined in more detail. The five most researched technologies in the context of education, ranging from discussion boards, general websites, LMSs, general campus software and videos Henrie and colleagues (2015). In addition, Valtonen et al. (2021) has referred to the term virtual LE which is used intensively in higher education exemplary through Zoom or Microsoft Teams Meetings also associated with social collaborative learning which is one of the most used educational technologies (Bond et al., 2020). In the present case, Microsoft Teams is the designated platform used by all participants, both face-to-face and hybrid LEs, within their educational setting. Apart from social collaborative learning and LMS, the other tools are self-explanatory and not within the scope of this thesis. Although several LMS options are available, this research is specifically focused on itslearning (itslearning, n.d.-a), as this is the LMS that is used by the participants and the University of Applied Sciences in this study. itslearning is one of the most successful and international LMS utilized for example in the Netherlands, France, Germany, Norway and for this study most relevant Finland (itslearning, n.d.-b). In itslearning, instructors and students can communicate through various messaging options, such as one-on-

one or mass messaging (itslearning, n.d.-b). Instructors can set notifications to alert their students to events like assessment completions or shared announcements. Further, the students can complete group assignments on the platform, and instructors can directly evaluate their work on the platform. An online gradebook records all assessments, allowing instructors to monitor individual student progress and customize their courses accordingly. Overall, itslearning provides a variety of tools for both instructors and students. This platform exemplifies how educational technology can facilitate diverse LEs (Bond et al., 2020). The development of educational technology has introduced additional forms of instruction beyond the traditional face-to-face LE with synchronous teaching. Hybrid LEs now offer a combination of asynchronous and synchronous teaching tools, such as pre-recorded videos in LMS and live interactions in virtual LEs (Bond et al., 2020). In Bond's (2017) literature review of 243 articles on student engagement and educational technology, 55% of the reviewed articles have worked with asynchronous technology, 18% used both methods and 12% used synchronous tools. This review exemplifies the prevalent use of educational technology in higher education. Given the extensive use of technology, educators are encouraged to integrate a variety of tools in their LEs as they provide unique learning opportunities, for example knowledge-sharing tools, such as collaborative platforms, and multimedia production tools, such as video creation (Bond et al., 2020). It is crucial to recognize that while educational technology offers numerous benefits, it also lead to disengagement if not implemented effectively, resulting in frustration or rejection (Bond et al., 2020). For example, students might feel overwhelmed or lose interest when using platforms or website creation tools if they lack sufficient training or do not find the topics engaging.

3.1.2 Instructional Format

With the increased use of educational technology in higher education, the instructional format, a key aspect of LEs, has also transformed. There is a considerable inconsistency in the terminology used to describe instructional methods, with different terms often referring to the same form of instruction. Consequently, it is essential to conceptualize the LE and its instructional form for the present study. In the following section all relevant terms will be discussed.

First, the traditional form of instruction is face-to-face learning, also known as offline learning (Pei & Wu, 2019). This method involves teaching in a classroom setting, in which both instruction and learning occur simultaneously in the same physical location, and the most

common form in the ‘pre-internet era’ (p.1). With the digitalization of higher education, the use of LMSs, like itslearning, have become a common feature of face-to-face learning, despite the fact that classes are live in a shared physical location (Washington, 2019). The term face-to-face is often used interchangeably with in-person (AlMunifi & Alfawzan, 2023). It should be noted that the scope of this thesis does not allow for an exploration of all related terms. For the purposes of the present study, only face-to-face learning is relevant, which includes the use of LMS, and will be used from here on. As research into motivation has expanded over the years, the initial focus was naturally on face-to-face learning, which continues to be the predominant mode of instruction in higher education. Building on this, Cayubit (2022) has conducted a study on the impact of students’ face-to-face LEs on academic motivation, learning strategies, and engagement. The findings from this research are particularly relevant to the context of the current study, especially in terms of their implications for motivation. The study concluded that a supportive face-to-face LE has a significant positive impact on students’ academic motivation. Key components that contribute to students’ intrinsic and extrinsic motivation include ‘personalization’, which includes opportunities for interaction and instructor concerns for the students’ well-being, as well as active student participation. In addition, ‘student cohesiveness’, which reflects social bonds among students, ‘satisfaction’, which is derived from enjoying the class, and ‘task orientation’, which refers to the clarity and organization of class activities, collectively enhance the participants’ motivation, learning strategies and engagement. This study suggest that educators should prioritize quality interactions, active participation and an organized, supportive face-to-face LE to enhance student motivation and success (Cayubit, 2022). Further extending this research, Stephan (2021) investigated the division between face-to-face and fully online LEs. In her doctoral thesis, ‘Online and face-to-face teaching from the perspective of teacher training students’, and the comparison is between fully online versus fully face-to-face classes with a mixed method approach throughout a semester. The study compared the effects of face-to-face and online classes on higher education students preparing for their exams. Online learners found the e-learning system more user-friendly and had higher computer self-efficacy. However, they reported less joy and more negative emotions such as anger and boredom by the end of the semester compared to the face-to-face students. The participants performance levels were similar at the start, but face-to-face learners showed a significantly higher increase in performance over the semester until the end. The qualitative data of the study revealed that the students preferred face-to-face classes due to easier continuous learning and better interaction with instructors and peers. Online learning required more self-regulation and motivation, and interactions were less seamless. Overall, the study

confirmed that both LEs significantly impact the students' motivation, with face-to-face learning providing better outcomes. These results are consistent with previous research, which has similarly found that only online classes tend to result in lower levels of motivation compared to face-to-face classes (Candelaria & Clements, 2023).

Given these insights, it becomes evident that the method of delivery has a profound effect on students' motivation. Building on the advantages of face-to-face and fully online formats, the second, and increasingly common, instructional format is the hybrid LE. In the context of education and specifically the present study, 'hybrid' refers to the merge of face-to-face and online learning (Candelaria & Clements, 2023). It can be also described as a blend of online and offline learning components (Li, 2022; Pei & Wu, 2019), commonly referred to as 'blended learning' (Candelaria & Clements, 2023, p. 33). However, due to the limitations of this thesis, only the term 'hybrid learning' will be used in the following sections. This environment demands students to use both online and classroom learning resources as part of their learning path (Halverson et al., 2014; Means et al., 2009; Porter et al., 2014). Conversely to the motivation research in face-to-face studies, the need for more student experiences in hybrid LEs can be identified (Butz & Stupnisky, 2016; Raes et al., 2020). AlMunifi and Alfawzan (2023) researched the experiences of civil engineering students in all three instructional formats as face-to-face, hybrid, and fully online. Most of the participants preferred the hybrid learning mode in their educational environment, valuing its combination of flexibility, efficient time use, and reduced commuting time. The participants indicated that this mode offered the optimal combination of benefits, enabling them to manage both their academic and personal responsibilities in an efficient manner. Furthermore, the face-to-face LEwas perceived as conducive to prompt question-and-answer sessions and beneficial social interactions, which were deemed instrumental in comprehending complex concepts. Conversely, fully online learning was the least favored option due to technical difficulties and challenges in content delivery. However, some students did perceive the convenience and time saving offered by this form of instruction. The findings provide insight into how different LEs meet different needs and preferences, and highlight those preferences varied by course type. Students preferred distance learning for theoretical courses, while face-to-face sessions were preferred for practical analysis and design courses.

The results of the mentioned studies demonstrate how individual preferences in LEs, including the instructional format, significantly influence the overall learning experience.

3.1.3 Instructor Role

Another crucial factor affecting students' motivation is their instructor's role. Students' motivation is influenced by their perceptions of the learning environment, which includes their views on instructors' behavior and the quality of interactions (Lizzio et al., 2002). For the purposes of this study, the term 'instructor' is used and refers to the individual responsible for coordinating the students' course content in the face-to-face and hybrid LEs, organizing the LMS, like itslearning, creating the course content and overseeing exams.

Although educational technology in higher education is now widely accessible, its effective integration is has been found to be dependent on the instructor. This integration determines whether educational technology will have a beneficial, neutral, or even negative impact (Bond et al., 2020). Further, it was found that instructors at the university level often do not use the full potential of the available technological resources (Mercader & Gairín, 2020).

At the same time, research has shown that the interaction between student and instructor is crucial for fostering student motivation and engagement in both face-to-face and hybrid learning (Candelaria & Clements, 2023). Instructors play a vital role in the students' LE, and can significantly impact students' perception of their LE and overall academic experiences (Meriläinen, 2014). For instance, students reported that lecturers who rely heavily on PowerPoint presentations and read directly from the slides were 'not very motivating' (Savage et al., 2011, p. 42). Studies suggest focusing on students' expectations to improve the quality of relationships between students and faculty, such as through helpful behavior and reducing affective conflict (Snijders et al., 2020). This is particularly important in challenging field like engineering, where students are at a higher risk of study-related burnout (Meriläinen, 2014). Positive interactions with lecturers, characterized by friendliness and understanding, have been shown to reduce stress levels, prevent burnout and reduce feelings of inadequacy in students (Meriläinen, 2014).

In recent years, there has been a shift in expectations placed upon instructors (Fang et al., 2017). Instructors are now expected to provide enhanced support to students as they navigate the complexities of engineering and their individual learning paths. This transformation in the instructor's role moves away from mere instruction towards guiding students in effective learning strategies and the application of acquired knowledge (Demirkan, 2016; Fang et al., 2017). Furthermore, in the online environment, which is part of hybrid settings and face-to-face learning using LMSs, the instructor's role demands a unique and often new set of skills (Kyei-

Blankson & Keengwe, 2011). These skills, which include online course management, effective communication online, and technical proficiency with tools such as whiteboards and videochat (Martin et al., 2020), can influence students' motivation depending on how they are used. By mastering these skills, instructors can create engaging and motivating LEs for students. Additionally, critical components for an instructor's success include being approachable and encouraging, providing pedagogical counseling, and conducting evaluations that support learning. These factors are essential for enhancing students' academic engagement, well-being, and motivation in face-to-face and hybrid LEs (Lizzio et al., 2002; Meriläinen, 2014). Given that this study occurs in a face-to-face and hybrid LE within the particularly stressful field as engineering, the perception of the instructors' roles is invaluable.

The following subchapter contextualizes the present study, conducted at a Finnish UAS, and introduces the current state of LEs in Finland's higher education landscape.

3.2 Face-to-Face and Hybrid Learning Environments in Finnish Universities of Applied Sciences

In Finland, there are various instructional formats for bachelor's degrees offered across 24 UASs. Table 2 presents a comprehensive overview of these instructional options.

Table 2

Overview of Forms of Instructions at Finnish Universities of Applied Sciences

Learning Environment	Finnish Name	Description	Frequency*
Blended Teaching	Monimuoto-opetus	A combination of various study forms, including both contact and online learning. May feature: • Online chats and group work • Exams conducted both online and in exam halls	23
Contact Teaching	Lähiopetus	Occurs at a specific location and time, requiring physical presence. May feature: • Lecture teaching • Group work • Face-to-face exams	24

Distance Learning	Etäopetus	Not bound by time or place, allowing flexibility in study schedules. Typically conducted online with a web-based LEor website. May feature: • Access to learning materials via the internet • Guided or independent study under teacher supervision	22
Online Teaching	Verkko-opetus	A web-based LEor website is typically created. Students access course materials via the internet, which can be studied either under teacher guidance or independently. May feature: • Scheduled appointments and contact teaching	21
Independent learning	Itsenäinen opiskelu	Students study according to their own schedules with minimal interaction with the teacher, occurring only at the beginning and end of the studies.	20

*Only applicable to Bachelor's Degrees at Universities of Applied Sciences.

Note. Content based on Opintopolku.fi (2024, July).

As presented in table 2, Finland offers various forms of instruction for bachelor's degrees at UASs. In the present study, only 'contact teaching' and 'blended teaching' are relevant. In Table 2, the LEs refer to 'teaching', focusing on the role of the instructor and how they provide knowledge, which is important for prospective students when considering their study options and formats.

For this study, the focus is on the LE, emphasizing students and their perceptions. Therefore, only this term is used. Furthermore, in the present research, 'contact teaching' is described as 'face-to-face LE', as this term better represents the students' perspective and is more commonly used in the theoretical foundation. Similarly, instead of 'blended teaching', the term 'hybrid LE' is used. For simplification purposes, this study exclusively uses the terms 'face-to-face' and 'hybrid LE'.

4 Engineering Education in Finnish Universities of Applied Sciences

Currently, there are 22 UASs, ammattikorkeakoulu in Finnish, operating in Finland (Ministry of Education and Culture, n.d.). All UASs offer a form of engineering bachelor's degree varying from electrical engineering, information technology engineering, mechanical engineering, environmental engineering or industrial engineering, an overview of the different engineering options is given on the official Finnish website 'opintopolku.fi' which is maintained by the Finnish National Agency for Education (Opintopolku, n.d.-a). Although Finnish universities also offer engineering undergraduate programs, the scope of this thesis is limited to Finnish UASs. This is since all participants are pursuing their studies at a UAS, and thus their insights are inherently limited to their experiences at this form of university. For further insights into the Finnish university system, additional information can be found online (Finnish National Agency for Education, n.d.). Consequently, this section, as well as the rest of the thesis, will focus exclusively on the Finnish engineering education provided within UASs, as the present research has been conducted in one of these 22 Finnish UAS institutions.

Finnish UASs provide bachelor's and master's degree programs, albeit with notable variations in admission criteria between UASs (Opintopolku, n.d.-b). The bachelor's studies have usually a length of three years with the possibility of a master's degree of two years (Lepori & Kyvik, 2010). UASs have the capacity to conduct independent selection procedures, which often include entrance examinations, in addition to admitting applicants based on their presentation of required knowledge and preparedness for the studies (Finnish National Agency for Education, n.d.; Fulbright Finland Foundation, n.d.; Opintopolku, n.d.-b). In order to address labor market demands and assist with local educational development, UASs place a high priority on training specialists in eight different categories (Opintopolku, n.d.-b), one of them being engineering. For the purposes of this study, engineering bachelor's degrees refer specifically to the traditional ones, such as mechanical, electronic, automation, energy and technology engineering. This distinction is crucial for understanding the target group of undergraduate engineering students.

The literature on engineering education is also affected by the variety of inconsistent motivational theories that include different perspectives on the interplay between beliefs in one's own abilities, intrinsic needs, subjective values, and the central role of motivation in learning and goal attainment. In the following subchapter an overview of recent motivation research in engineering education is given.

4.1 Engineering and Motivation

Overall, it is evident that there remains the necessity to investigate the motivation of students considering both individual and situational factors (Eccles & Wigfield, 2020; Maharaj et al., 2018), particularly among engineering students as highlighted in this work. Maharaj et al. (2018) have conducted a mixed method study and found that engineering student motivation is influenced by a variety of internal and external factors within their academic journey. This study was in a face-to-face environment. The engineering students' motivation was partially driven by future goals as achieving good grades to secure employment, good income and making their families proud of them. Additionally, while motivation to study varied among participants, peer encouragement played a significant role, contrasting with limited support from lecturers. In terms of self-improvement, motivations varied between intrinsic aspirations for education and extrinsic incentives like financial gains. Another result was the influence of the LE influencing students' motivation and engagement due to technical difficulties, for example the projectors not working, and the need for interactive experiences. Lastly, the workload exerted a notable impact on motivation, with the students often feeling overwhelmed and seeking additional support from the university to manage academic demands and maintain motivation. The results in this study collectively underscore the complex interplay of intrinsic and extrinsic motivations, highlighting the multifaceted nature of student motivation and the importance of addressing various challenges to foster a supportive learning environment. While students may fluctuate between these motivations depending on context, Maharaj et a. (2018) found a predominant reliance on external sources, such as encouragement from peers and the aspiration for future career success.

Similarly, Mosyjowski and colleagues (2017) examined the motivational factors influencing the persistence and success of engineering PhD students, comparing those who entered their doctoral studies immediately after completing their undergraduate degrees (direct-pathway students) with those who returned to academia after spending significant time in the workforce (returners). They found that returners perceived higher financial, academic, and balance costs, which negatively impacted their expectations of success. However, returners still maintained a high expectancy of success, valuing the doctoral degree for career advancement and personal fulfilment. The study highlighted the importance of support systems, such as academic advising and financial aid, to mitigate perceived costs and improve the academic experience for both groups of students.

Together, these studies demonstrate that while motivation in engineering education is influenced by several factors, including teaching practices, situational contexts, and specific costs and values, the overarching domain of engineering remains consistent. Each study, situated in different contexts and focusing on different educational stages, contributes to a comprehensive understanding of the impact of motivational factors on student outcomes in engineering. Focusing, predominantly on traditional face-to-face LEs, it highlights the significant impact of the instructor role and their practices on student motivation and success. Although they do not explicitly address online or hybrid LEs, their findings are crucial for understanding how different factors influence student experiences in engineering education. Subsequently, another key aspect to consider is that expectations and values are not only domain-specific but also situated within different contexts. Therefore, it is important in the present context to analyze the context of higher education and LEs, particularly face-to-face and hybrid LEs.

4.2 Engineering Culture

A comprehensive understanding of the present research requires an overview of the engineering field and its distinctive cultural values, which can be observed all over the world. Embedded in the engineering culture is the concept of engineering meritocracy, as outlined by Rohde and colleagues (2020). In other words, anyone can study engineering, but only some will be able to pursue it by meeting certain criteria, such as '[…] commitment to the profession and particular traits or skills (e.g. thinking like an engineer, working well with others) (Rohde et al., 2020, p. 89), also known as 'engineering mindset'. This culture does not only define who belongs in engineering, engineering culture further defines how one becomes a successful engineer (Jensen et al., 2023). This mindset, along with the demanding nature of engineering programs often limits students' flexibility to engage in co-curricular activities and pursue personal interests due to common challenges such as comprehensive coursework, heavy workloads, and time restraints (Olewnik et al., 2023), which influence students' motivation negatively.

Another part of the engineering culture, impacting engineering students' motivation, is the Engineering Stress Culture (ESC) (Jensen & Cross, 2021). High levels of stress and high cost to pursue engineering degrees are described among students as being 'part of the package' (Jensen et al., 2023, p. 13). And while students are aware that while seeking help could alleviate the students' distress, it also adds to their already high stress levels (Jensen et al., 2023).

Changing the established engineering culture is essential to be able to support students' mental health and focus instead on their motivation. This change requires a wider understanding that high stress and poor mental health are not prerequisites for success in engineering.

Building on this understanding of the distinctive challenges faced by engineering students, it is evident that especially undergraduates, represent a sample group with established expectations and values associated with their field. Considering all these challenges, this research explores engineering undergraduate students' motivation at a Finnish UAS and further how the principles of the SEVT model manifest in a context where both intrinsic and extrinsic motivational factors play a significant role. In the subsequent chapter, the methodology of this study is explained in detail.

5 Methodological Approach

The necessity of the present research lies in its aim to delve deeper into the factors influencing students' choice to stay in engineering studies within the context of Finnish higher education. As noted by Eccles and Wigfield (2020), these factors are closely linked to students' unique socio-cultural environment, as in this case Finland. When looking at Finnish research on engineering and motivation a gap in research is identified, thus necessitating further investigation and analysis. In the following, the procedure and basis for the present work is explained in detail, analyzed and discussed. Consequently, the objective of this research is to contribute to the existing body of knowledge in the field of motivation in Finnish engineering education by offering qualitative insights into six engineering undergraduates' experiences. As a reminder, the present research is guided by the following research questions:

1. What are the key factors influencing Finnish engineering students' motivation in face-to-face and hybrid LEs?

2. From the students' perspective, what kinds of support would sustain and improve their motivation?

The methodological foundation of this study is a qualitative approach, which allows for an in-depth exploration (Cheung & Tai, 2023). The objective of this approach is to provide valuable insights into the current situation of the participants, the key factors influencing their motivation and their wishes and comments for support to sustain and improve their motivation. It is noteworthy that a qualitative approach is utilized to gain an understanding of the multiple and complex realities of all individuals, with a particular focus on the perspectives of the interviewees as engineering students, and to gain insight into their immediate contexts (Braun & Clarke, 2013). This aligns with the theoretical basis of this work, SEVT (Eccles & Wigfield, 2020), which underscores the situated nature of motivation. A qualitative approach using semi-structured interviews (SSIs) was considered the most appropriate and was therefore selected. The following section provides a detailed overview of the data collection process and elaborates on the analytical approach utilized.

5.1 Participants and Recruitment Process

The participants in this study are students at one of the 22 UASs in Finland. Specifically, the target group compromised first year undergraduate engineering students enrolled in the same program, which is offered as face-to-face and hybrid LE option. The recruitment process

commenced within the framework of another research initiative at the same UAS, where students participated in a survey focused on their motivation in Autumn 2023. This survey was developed independently of the current researcher, Aslıhan Özgül, and is therefore not integrated into the present data analysis. For reference, the survey instrument can be found in appendix 1. Instead, the survey served as a foundation for conducting SSIs, facilitating a deeper exploration of students' responses to their open-ended questions in the survey. Those survey respondents who expressed interest in participating in a follow-up interview were contacted via mail in early spring of 2024. The performed interviews were designed and conducted by the current researcher and constitute the primary source of data for this study.

A total of seven students were invited to participate in the interviews, ultimately, six students agreed to take part in online interviews. The final group of participants consisted of six individuals who identify as male and preferred the pronouns he/him. All six interviewees are native Finnish speakers, while the researcher is a non-native Finnish. The researcher is a non-native English speaker, but has developed a high level of English over the last few years and therefore felt comfortable conducting the interviews in English. During the recruitment process, potential interviewees were asked if they were comfortable with having the interview conducted in English. This allowed the researcher, who developed the interview guide and wanted to actively participate in the data collection process, to conduct the interviews herself. Conducting the interviews in Finnish was considered, however it was found that having the research group leader, who is also a prominent lecturer in the student program, conduct the interviews could lead to participants withholding or limiting their statements due to the hierarchical relationship. Research supports this concern, indicating that hierarchical dynamics between researchers and participants can influence the honesty and openness of responses (Frers & Meier, 2022). Such power imbalances can cause participants to feel pressured to provide socially desirable answers or withhold critical information about the institution or individuals involved. Although English was not the interviewees' first language, they managed to express themselves clearly and no notable communication issues were observed by the researcher. In addition, the researcher has a basic knowledge of Finnish, which allowed participants to use Finnish terms when they encountered unfamiliar English words, ensuring that the conversation progressed smoothly.

Three of the participants were enrolled in the face-to-face study program, while the remaining three were enrolled in the hybrid version of the same program. Notably, despite the difference in the instructional format, the content and structure of the studies were identical for both groups. Further details regarding the participants are provided in Table 3. Additionally, there

was a notable age difference between the two participant groups. The students' age varied in both groups, with the ones in the face-to-face LE being between 18–30 years old, and the ones in the hybrid LE being 30–45 years old.

Table 3

Table of Participants

Participant Number	Alias	Learning Environment	Employment	Living Conditions
1	Antti	Face-to-Face	Irregular*	Single, living with his parents
2	Eero	Face-to-Face	Irregular*	In a relationship, living with his partner
3	Matias	Face-to-Face	Irregular*	Single, living alone
4	Joonas	Hybrid	Full-time	In a relationship, living with his partner and children
5	Mikael	Hybrid	Full-time	In a relationship, living with his partner
6	Onni	Hybrid	Full-time	In a relationship, living with his partner and children

Note. *Irregular employment refers to participants who have infrequent or minimal work hours, such as working once a month, or those who previously held a position and are currently seeking employment again.

5.2 Data Collection

The data was collected through online SSIs in Microsoft Teams, with a varying duration between 30–60 minutes, conducted in English. It is important to note that the initial survey was conducted in Finnish, while the interviews were conducted in English, as explained in the previous section. The survey was conducted in the beginning of the undergraduates' first semester in Autumn 2023. The follow-up interviews were conducted, approximately half a year later, in their second semester in Spring 2024. These interviews were conducted as part of

another research project, where participants had previously given their consent during the survey phase, which extended to subsequent data collection activities, including the recording and conduction of the present interviews. Participants were reminded of their consent to participate both before and after the interviews and were informed of their right to withdraw at any time. This process ensured that all interviewees were fully aware of the study's aims, their rights as participants, the measures in place to protect their privacy, and data. In the scheduling mails for the interviews as well as during the interviews, the participants were informed about the interview being recorded and following processing of their data for the analysis.

Microsoft Teams was utilized for conducting the interviews, recommended by the leader of the overall research project conducting the survey. The data was initially transcribed automatically within the platform. Subsequently, manual corrections and adjustments were made by the researcher. Video recordings were securely stored in Microsoft Teams to facilitate the automatic transcription process, after which they were deleted to maintain data protection standards. To further protect their privacy, interviewees were assigned alias names, which were used consistently throughout the study, as shown in table 3.

5.3 Interview Protocol

For this thesis, a SSI protocol was used to collect comprehensive qualitative data from participants. SSIs are particularly effective for examining the independent thoughts of individuals within groups (Adams, 2015), which aligns with the goals of this study. The SSI aimed to gain in-depth insights into each participant's reality, their motivations, and the types of support they need and wish. Additionally, SSIs allow for the exploration of unforeseen topics that may arise during the interviews, enabling respondents to express their feelings more freely (Adams, 2015).

The interview guide underwent careful development to ensure it covered all relevant topics thoroughly, while still allowing for flexibility and natural flow in conversations. To refine the guide, a trial interview was conducted with a research assistant from the initial data-gathering research group. This assistant, who brings experience in motivation research for engineers and qualitative research, provided valuable insights that contributed to its enhancement, such as rephrasing questions and the overall order. The refined interview guide can be found in detail in appendix 2.

Building upon the previous survey data collection, participants automatically provided their consent to for follow-up research, such as the conducted interviews. The researcher, Aslıhan Özgül, reinforced this consent by verbally confirming it with each participant at the beginning of their interviews. Each interview was conducted and recorded using Microsoft Teams, to ensure accuracy and facilitate detailed analysis. Microsoft Teams follows over 90 data protection laws, such as the General Data Protection Regulation (Winqvist, 2024). The GDPR is a comprehensive data protection law by the European Union (intersoft consulting, n.d.). It aims to protect the personal data of EU citizens and residents and applied to any organization that processes their data, which is valid for the present study conducted in Finland. This further validates the use of this platform as a secure way of conducting and recording interviews.

The interview guide covered a wide range of topics considered relevant to the study, including motivation in engineering, which focused on the students' current motivation and the factors influencing it. Additionally, it explored innovation competence, exploring the sub-dimensions of teamwork and networking. The guide also addressed participants' perceptions of their face-to-face or hybrid LE. Finally, the interview provided participants with the opportunity to share their wishes, suggestions, and comments on the support they needed to sustain and improve their motivation in their engineering studies. The full interview guide, with detailed information on each topic, is included in appendix 2. For the purposes of the current research, the primary focus of the analysis is on the themes of motivation in engineering and support needs. These themes are explored with reference to the interviewees' LEs observing possible influences and tendencies.

5.4 Data Analysis

The data collected from the SSIs were analyzed using thematic analysis (TA) as outlined by Braun and Clarke (2006, 2023) with NVivo software, version 14. This study specifically employed their reflexive thematic analysis approach (Braun & Clarke, 2019). This method emphasizes the researcher's active role in knowledge production, which aligns well with the present study's theoretical foundation, SEVT (Eccles & Wigfield, 2020). This theory emphasizes the situated and contextual nature of motivation research, making reflexive TA ideal as it requires theoretical awareness, transparency and ongoing reflection. This approach involves the active creation of themes through the interplay of data, the analytical process and the researcher's subjectivity, allowing for a nuanced exploration of participants' experiences.

Given this alignment, a deductive approach was selected for this study. A deductive TA, as outlined by Braun and Clarke (2006), involves applying pre-existing theoretical frameworks or research questions to guide the analysis of qualitative data. In this study, this approach incorporates the SEVT as theoretical framework and the research questions guiding this analysis as 'What are the key factors influencing the motivation of Finnish engineering students in face-to-face and hybrid LEs? And how do these factors relate to the types of support students perceive as beneficial?'.

The first step of the reflexive thematic analysis after Braun and Clarke (2006) is getting familiar with the data. This process includes reviewing the transcripts, and in the present study the removal of the interviewees' names and replacement with aliases. Transcriptions are often a reduction of the original information, with the primary focus typically on the content of the language. The present transcriptions are a combination of Mayring (2014, p. 45) 'clean read or smooth verbatim transcript', in which colloquial articulations as 'uhm' and 'ah' are left out, and 'pure verbatim protocol', very spoken word, regardless of its nature, aiming to preserve natural language but potentially making readability challenging. The researcher has proposed the term 'semi-verbatim' to describe this approach, which involves the exclusion of frequently occurring filler words like 'uhm' due to the non-native English backgrounds of the participants. These filler words, which frequently disrupted the reading flow alongside the repetitions of words, have been purposefully omitted from the transcript to enhance comprehension and streamline the text. Conversely, colloquial terms such as 'yeah' or 'um' are retained to facilitate comprehension and to some extent to maintain participants' natural language usage. Once the transcriptions were finalized, the researcher imported the anonymized transcripts into the data analysis tool NVivo 14. NVivo was used for efficient data management and a structured analysis, enabling systematic coding and categorization to develop the findings. In NVivo the data analysis continued by reviewing the data multiple times, noting preliminary ideas and potential connections to the SEVT in the platforms' coding section on how the data answers the research questions. The following section provides a detailed exploration of the development of the coding system.

5.4.1 Development of the Coding System

In the subsequent phase of the TA, initial codes were developed deductively based on the key components of the SEVT (Eccles & Wigfield, 2020). For example, the component being the subjective task values, which was explored first. The unit of analysis varied from single

sentences to whole passages of multiple sentences selected by the researcher based on their relevance to the study. This selection process is in line with Braun and Clarke's approach, which encourages the active involvement of the researcher in the generation of codes. Further assistance in developing the current coding scheme was shaped by the coding scheme by Matusovich and colleagues (2010), which explored reasons why students choose engineering from the perspective of the SEVT.

Table 4

Value Codes Showing Definitions and Examples of Use

Value Codes	Literature Definition Add ecIlem2005	Operationalized Definition	Example
Attainment	The perceived importance of doing well on a task, particularly to how engaging in the task is consistent with self-concept	A reason for pursuing (or not pursuing) engineering that is related to being the type of person who is an engineer	I am a problem-solver and engineers are problem-solvers
Cost	The price of success or failure in terms of effort, time and/or psychological impacts	The price of success or failure in terms of effort, time and/or psychological impacts of pursuing engineering or another career	Being an engineer means not being able to pursue interests in art
Interest	The enjoyment experienced in doing the task	The enjoyment (or lack of enjoyment) experienced in doing engineering activities and/or being or becoming an engineer in the future	Engineering is the career name for the hobbies I enjoy
Utility	The perceived future direct or indirect importance of engaging in the task	The perceived usefulness (or lack of usefulness) of being or becoming an engineer and/or earning and engineering degree	Engineers are well-paid

Note. From 'Why Do Students Choose Engineering? A Qualitative, Longitudinal Investigation of Students Motivational Values', by Holly M. Matusovich, Ruth A. Streveler, and Ronald L. Miller, 2010, Journal of Engineering Education, 99 (4), p. 294 (DOI:10.1002/j.2168-9830.2010.tb01064.x).

For instance, the theme intrinsic value, referring to tasks are undertaken purely for enjoyment, formed the basis of the related codes in this theme. An example code derived from this category was 'Knowledge Acquisition', which captured interviewees' descriptions of engaging in studies or classes for the pleasure of learning. This methodological approach guided the formulation of all other initial codes in a similar way. Sections that did not contain any statements relevant to the research question and related codes were ignored, i.e. not coded. In the following several 'data sessions' (Evenhouse et al., 2020), were used to refine codes and their descriptions based on the interviewees' transcripts with relevant transcripts with the NVivo software. Example

statements from interviewees were coded directly in NVivo to illustrate and refine the codes. Once the initial coding process was broadly complete, the next step focused on assessing intercoder reliability, which will be discussed in more detail below.

5.4.2 Intercoder Reliability

In the present analysis, the intercoder reliability (ICR) was measured to ensure an insightful qualitative analysis. According to O'Connor and Joffe (2020), internal ICR quantifies the agreement among coders on how qualitative data should be coded, providing consistency and enhancing dialogue within a research team when conducted internally. However, in this study, ICR was performed externally to 'assess the rigor and transparency of the coding frame and its application to the data' as well as 'transcends the imagination of a single individual' (O'Connor & Joffe, 2020, p. 3). While Braun and Clarke (2019) emphasize that quality reflexive thematic analysis is not about following procedures 'correctly' or 'achieving consensus between coders' (p.594), but rather about the researcher's reflective and thoughtful engagement with their data and the analytic process, the use of ICR in this context supports rather than contradicts these principles. By involving an external coder, the researcher was able to reflect more deeply on her own coding decisions and assumptions. This collaborative process enriched the analysis, fostering a more nuanced and comprehensive understanding of the data. Thus, measuring ICR, even in a reflexive thematic analysis, aids in generating and refining codes, particularly when working individually, by offering an additional layer of critical reflection and ensuring that the resulting themes are both robust and thoughtfully developed.

Drawing upon the anticipated advantages of collaboration, the ICR assessment was undertaken with a graduate (she/her) from the University of Regensburg with a master's degree in adult education. Currently pursuing further master's studies at the University of Applied Sciences in Regensburg, she brings a robust academic foundation and stands external to both this project and its broader context. This external perspective ensures her neutrality as a coder, making her well-suited for this task. For this study, the researcher, who also served as coder I, randomly selected transcripts from two out of six interviewees, accounting for approximately 33.3% of the total interview transcripts. These transcripts underwent coding in two rounds, with each round covering about 16.7% of the total transcripts. In the initial round, the selected transcripts were exported from NVivo to an external Word document, where coder I conducted the initial coding. Subsequently, the same document, now without coding but with main categories and coding instructions, was shared with coder II. Following mutual agreement, a transcript along

with the current codes and themes was sent to coder II via email. Upon completion of coding by coder II, both coders convened for an online meeting to compare their codes and ensure coherence, achieving a joint-probability agreement of 73.1%. Based on initial discrepancies, coder I refined codes, summarized some, and devised a revised coding system. Coder II then applied this refined system to a new transcript, following the identical steps as in the first round. During the subsequent analysis in the second meeting, inter-rater agreement with coder II was determined to be 71.8%, prompting further adjustments to codes based on the outcomes of this round. Through the ICR assessment and collaborative efforts, this study strives to enhance the credibility and depth of its qualitative analysis, illustrating a commitment to methodological rigor and robust data interpretation.

5.4.3 Development of the Themes

First, the main categories were defined based on the relevant key components of SEVT to address the first research question. The primary components identified as relevant were subjective task values and situational factors. These components guided the development of codes such as academic intrinsic value, academic achievement value, utility value and cost value. Each transcript was coded according to these initial codes, and subcodes were developed for more complex ones. For example, utility value was subdivided into career development, which includes job autonomy, job security, and real-world career examples. Another code under utility value is financial stability, which did not require further subcodes as it was defined consistently across all interviews. The process of creating codes and subcodes for the first research question involved analysing similarities and differences within each code. For example, career growth and financial stability both relate to participants' aspirations and future goals, one focusing on their desired career or career path and the other on specific financial outcomes. This analysis led to the development of the theme 'Career Aspirations and Practical Benefits'. Subsequent themes for the first research question were generated using the same methodology.

For the second research question, which focuses on students' needs for support, a pattern was identified through transcript review. This pattern included both the sources of support and the specific needs of the students. For example, one code identified was institutional policies wished for by different educational entities, and within this a specific need such as competency-based courses emerged. This led to the creation of the theme 'Institutional Policies' for the second research question.

Based on the conducted interviews, and subsequent reflexive thematic analysis, a total of 319 codes and five themes were identified. Appendix 3 includes a representative excerpt of the full coding scheme.

5.5 Trustworthiness and Ethical Considerations

The present study was completed following the ethical guidelines of the University of Turku. Accordingly, participants anonymity and confidentiality were secured throughout the whole study. In this section, the ethical considerations for this study are presented.

The objective of ensuring trustworthiness in qualitative research is to justify the claim that the research findings are worth considering (Lincoln & Guba, 1985). To achieve this, evaluation criteria were developed to provide a consistent basis for empirical research (Lincoln & Guba, 1985). For the purposes of the present study the relevant criteria are credibility and transferability (Elo et al., 2014).

5.5.1 Credibility

Using the criterion credibility, the researcher ensures that the data represents the participants' responses rather than the researcher's biases or viewpoints (Polit & Beck, 2012). Further, this criterion involves the researcher's confidence in the truth of the findings and accurately representing the participants' views (Elo et al., 2014). In this study, credibility was enhanced through peer debriefing, which provided an external check on the research process (Nowell et al., 2017). During the measurement of intercoder reliability, an external Educational Scientist reviewed the findings and shared insights on them. Additionally, the present researcher engaged in self-reflection and addressed personal biases, discussed in the following sections.

5.5.2 Transferability

In the present study, the criterion of transferability was considered, although it may encounter challenges in being replicated in different settings or groups due to its specificity. While the objective of generalization is to ensure the applicability of findings on a universal scale, the aim of transferability is to facilitate the meaningful application of findings across similar contexts (Drisko, 2024). This study's transferability is relevant as the whole process of the thesis is displayed in the present work and it could be adapted to similar contexts as other Finnish UASs. It is noteworthy that while the findings may be applicable in very similar contexts, they might not be adaptable to significantly different contexts, such as other European countries, due to the situated and cultural nature of the research (Eccles & Wigfield, 2020).

5.5.3 Researcher Subjectivity

As in all research, the subjectivity of the researcher is a critical aspect, as it recognizes that researcher's backgrounds, experiences, and viewpoints shape one's interpretations. By being aware of and critically examining their subjectivity, the researcher can improve the credibility of their findings (Mruck & Breuer, 2003). The present researcher is an outsider to the target location and group. At the time of conducting the interviews, she had lived in Finland for approximately two and a half years and has an academic background in Educational Sciences, with no in-depth knowledge of engineering beyond occasional conversations with individuals in the field. The researcher has a strong interest in understanding different target groups motivation and how to sustain and improve it. This interest was one of the main reasons for pursuing this research and may have influenced her approach to the study. Despite efforts to maintain a concise approach, the researcher's personal experiences, beliefs, and perspectives inevitably influence to some extent the research process, from the formulation of research questions to the collection and analysis of data. Recognizing and reflecting on this subjectivity is essential to maintaining the integrity and validity of this qualitative research. Kalu (2019) discusses the concept of the 'subjective Is' and their impact on qualitative research. 'The "subjective Is" are those values and beliefs that a researcher or a practitioner brings to the research project or practice' (Kalu, 2019, p. 97). Further, the process includes three questions one should ask to be able to identify their own subjective Is '[…] (a) "who am I?"; (b) what factors have influenced or informed the beliefs and values; and (c) how these beliefs and values affected my approach to developing a research interest, its research questions, theoretical approach, and methodologies.' (Kalu, 2019, p. 97). In the following the researcher of this thesis discusses her own subjectivity from the perspective of the 'Subjective Is' (Kalu, 2019).

The Finnish I - Having lived in Finland for more than three years, the researcher has encountered a wide variety of Finnish individuals, which has led to preconceptions about the Finns, especially the stereotype of being introverted and reserved. Exposure to different genders, ages, and ethnic backgrounds in Finland has influenced these biases. Acknowledging this, the researcher has consciously strived for objectivity in exploring Finnish personality traits, consciously setting aside biases during interviews and analysis.

The Gender I - In preparation for the data collection, the researcher engaged in extensive reflection on personal biases toward men. This introspection revealed the need to avoid

generalizations based on bias and instead to recall positive experiences. Recognizing research as an opportunity to support men facing challenges, the researcher aimed for fairness and empathy in her inquiry.

The Education I - The researcher, with academic expertise and personal passion in education, resonates strongly with individuals in similar fields. This resonance stems from shared backgrounds and experiences, fostering empathy and understanding. The researcher recognized biases about engineering, such as stereotypes about social skills, and addressed them through discussions with peers, fostering an appreciation for diversity in education and career paths.

The researcher, as an external source, initially facilitated the establishment of a neutral discourse. It is also important to consider the researcher's personal experiences in Finland and interactions with engineers in general. These experiences may have influenced the research, and this potential impact was duly reflected upon prior to creating the interview guide and conducting the interviews.

5.6 Limitations

As in all research, the present one has its limitations, which are further discussed in the subsequent section.

In the present study, the small sample size of six interviewees provides valuable insights into their realities but limits the transferability of the findings to its specific context. Moreover, a small sample size is more sensitive to researcher bias, as the influence of each participant's data is more pronounced. With only six participants, the diversity of perspectives is restricted, and a limited range of viewpoints is offered. This limitation results in a reduced scope of themes and insights, preventing a comprehensive or holistic understanding of the research topic. Further the sample compromised only six cisgender men, highlighting the ongoing gender imbalance in STEM fields, such as engineering (Dos Santos, 2022, p. 264). This study did not include the perspectives of cisgender women, non-binary or transgender people. Future motivational research should prioritize the inclusion of these groups to capture a broader range of experiences and influences on their perspectives. In addition, the present research exclusively presents the perceptions of students and does not include the viewpoints of instructors, whom are a crucial part in the students' LEs and motivation. Methodologically, the survey used prior to the interviews was conducted entirely by another researcher. Despite efforts to mitigate potential flaws, such as inconsistencies in data collection or interpretation, the study remains

subject to methodological limitations transferred from the previous researcher's work. Language barriers present another limitation. The researcher, being a non-native Finnish and English speaker, may have faced challenges in communicating with participants, who are native Finnish speakers. Conducting interviews in English might have created a language boundary, influencing and potentially limiting participants' expressions and responses. For instance, some participants appreciated the opportunity to practice English but struggled to articulate their thoughts effectively, which could have impacted the depth and accuracy of the data collected. Additionally, cultural differences between the researcher, who has a multicultural background from Germany and Türkiye, and the Finnish participants could have influenced interactions and introduced biases or limitations in the data conduction, analysis or interpretation. Furthermore, the researcher's background as an Educational Scientist rather than an engineer may have influenced the framing and interpretation of engineering-specific motivations and statements. Another limitation is the the temporal limitation of the study, with interviews conducted at a single point in time, which restricts the ability to observe long-term motivational changes. Lastly, the interview format, which was conducted entirely online, may have affected participants' willingness to share openly and could have impacted the depth of the responses.

These limitations underscore the need for caution in generalizing findings and indicate the importance of future research to explore diverse other perspectives, to have a more holistic view on motivation in engineering education. Following this discussion, the findings of this research are presented.

6 Findings

Based on the conducted interviews and subsequent reflexive thematic analysis, a total of 319 codes and five themes were identified. A representative excerpt of the full coding scheme is provided in appendix 3. The themes are (1) internal motivation, which encompasses the intrinsic pleasure from tasks and the personal significance of academic success, (2) career aspirations and practical benefits, which includes students' career and financial goals, (3) external and personal influences, covering factors like personality, living conditions, LEs, and workload, (4) institutional and financial support, referring to what educational entities can provide, and (5) instructor engagement and teaching methods, which focuses on the role of instructors in sustaining and improving student motivation. Understanding these themes is essential for comprehending the individual perspectives of the interviewees, their insights on motivation, how to sustain and improve their motivation. This chapter introduces the key factors affecting the interviewees' motivation, which include their subjective task values, their individual and situational factors, and their wishes for support in sustaining and improving their motivation. By considering all these elements, a holistic understanding of the individual student can be achieved.

Notably, the interviewees often shared similar thoughts and comments, regardless of their LE. However, some discrepancies did emerge, which are discussed in detail in the LE section and addressed within individual themes where relevant. In the subsequent question the key factors influencing the students' motivation is thematized.

6.1 Internal Motivation

The first and one of the most prominent themes in the participants' motivation is their internal motivation. This theme is built on the interviewees' intrinsic value, primarily stemming from the pleasure and interest they find in acquiring knowledge. Their intrinsic value sustains the students' engagement and enthusiasm in their academic pursuits as they work towards completing their degrees. This was regardless of whether they study in the face-to-face or the hybrid learning environment, as both groups shared similar views on their individual interests. Further, all students indicated that placing a high intrinsic value on their studies, leads them to participate in learning activities due to their genuine interest rather than external pressures. For instance, Mikael highlights the intrinsic pleasure of acquiring new knowledge and skills, which not only keeps students as him engaged but also encourages him to actively pursue learning opportunities:

> **Excerpt 1.** Of course, learning new things has always been fun and interesting. I think it's really closely tied to my motivation. (Mikael, hybrid, age group: 30–45)

> **Excerpt 2.** What keeps it [motivation] up is that we do quite interesting stuff. (Eero, face-to-face, age group: 18–25)

Eero refers here to the engaging nature of his courses which helped him maintain his motivation for throughout the course span. When students find their studies interesting and relevant for them personally, it strengthens their motivation, which in turn maintains their interest and effort in their academic pursuits. Similarly, Antti highlighted how his motivation is driven by the excitement and satisfaction of acquiring new knowledge. He describes this experience as enjoyable, noting that having the knowledge itself is a motivating factor.

Conversely, a decrease in interest can lead to a drop in motivation, as noted by Matias referring to his courses in the first semester:

> **Excerpt 3.** There [was] more interesting stuff for me by then. So, there has been a drop in motivation from that. (Matias, face-to-face, age group: 18–30)

The present participants motivation is maintained and further increased by ensuring that courses, along with their content and delivery methods, are engaging and tailored to align with their personal interests and skills. This particularly related to courses that participants perceive as challenging or uninteresting.

In addition to the interviewees' intrinsic value, the attainment value, which refers to the personal significance students attribute to achieving academic and career success, also plays a pivotal role in the present theme. For example, Antti's experience with failure reveals how not meeting personal academic standards can be highly demotivating for engineering students as him:

> **Excerpt 4.** If you're failing tasks or not being good enough at them as you would imagine yourself to be, that is really demotivating. (Antti, face-to-face, age group: 18–30)

Antti's perception of his individual academic performance relative to his own expectations influences his motivation based on his personal views. Eero's drive for good results further illustrates the importance of the attainment value:

> **Excerpt 5.** I wouldn't be happy with myself if I'd got a low grade from a course that I know I could have done better in if I just studied more. (Eero, face-to-face, age group: 18–30)

It also highlights the emotional impact of the attainment value, as Eero indicates that he would be unhappy with himself if he didn't achieve the results, he believes he is capable of. Mikael provides an alternative perspective, illustrating how initial failure to achieve his goals can serve as motivation to exert greater effort in upcoming attempts:

> **Excerpt 6.** If it's something I want to do correctly and I don't make it the first time, then I'm gonna be more motivated on the next time.' (Mikael, hybrid, age group: 30–45)

Mikael's statement illustrates how setbacks can sometimes increase his motivation to improve and succeed in future attempts. Overall, students' internal motivation is crucial in shaping their perceptions of what they find interesting and personally meaningful, which in turn influences their motivation levels. The answers varied according to the students' individual interests and beliefs, which are shaped by these values.

6.2 Career Aspirations and Practical Benefits

Another notable factor impacting the participants' motivation are their career aspirations and practical benefits. This theme explores how the interviewees directly connect their personal academic efforts to their future career, success, and practical benefits, such as financial gain. In detail, the factors impacting the engineering students' motivation include aspirations for career growth, which can be divided into job autonomy, job security, and real-world career examples. Additionally, financial stability plays a vital role in inspiring their aspired professional lives as engineers. In the present theme, the participants' perspective was affected by the experiences of the hybrid students who had worked before their studies in a related industry and continue to do so throughout their bachelor's degree. The hybrid students' employment and practical experiences has provided them with insights that the face-to-face students lack. These differences will be explored in detail in the following section.

6.2.1 Career Growth

Career growth opportunities were mentioned as powerful motivator for all hybrid participants as they see their current studies as a pathway to advancing their professional status. For

instance, Joonas, who balances full-time work alongside his studies, articulates a strong desire to advance in his current career. He expresses this by stating that:

> **Excerpt 7.** The decision is that I don't want to work […] on the ground floor for the rest of my life. So, this is the major thing. I've [done this job] in the past and currently. (Joonas, hybrid, age group: 30–45)

His motivation to pursue and complete his engineering degree, is to escape the monotony of his current job, where he has been performing the same tasks for nearly two decades. He emphasizes his determination to improve his career situation:

> **Excerpt 8.** Every day I'm at work, I see the same idiots there and I have to do the same shit I've been doing for 20 years or close to 20 years. I want out of there and this is what drives me. (Joonas, hybrid, age group: 30–45)

Similarly, Mikael recognizes a necessity of completing an engineering degree for his career advancement from his current position. He reflected on his career trajectory, noting that at some point, career progression requires changing one's working tasks or advancing educational qualifications.

> **Excerpt 9.** The jobs above my current position all require an engineering degree, so better to get it now. (Mikael, hybrid, age group: 30–45)

Mikael notes, highlighting how the pursuit of an engineering degree is a strategic move to secure his future career opportunities and avoid stagnation in his professional life. In this subtheme, only the experiences of hybrid students were relevant, as none of the face-to-face students had similar experiences and shared related insights.

The prospect of job autonomy also plays a crucial role in the motivation of the interviewees. Joonas looks forward to the new opportunities his degree will provide, acknowledging that upon completing his studies, he will have more options in the engineering field, than in his current position. Onni, who also works, shares this perspective and values the autonomy his current degree will offer him in allowing him to make autonomous decisions about his future workplace, such as the option to work remotely. He described how he first recognized the importance of job autonomy in his job, which has become a key factor in maintaining his motivation to complete his pursued engineering degree.

> **Excerpt 10.** ‘It [to work remotely] came when Corona started more. When I was working then on the product development, then all the engineers went home to work, some of them left to [another European country], and so. (Onni, hybrid, age group: 30–45)

Similarly, job security is another critical motivator for the students. The assurance of a stable job and salary post-graduation is a compelling reason for all of them to commit to their studies. The participants’ utility value and further, importance of job security, was a recurring topic among the face-to-face students. These engineering students are generally younger, ranging in age from 18 to 30 years old, without related job experience and are preparing to enter the engineering job market for the first time. Antti explained his motivation as:

> **Excerpt 11.** When I graduate and get a good job and a stable income, that is really motivating since that’s what we all strive for. (Antti, face-to-face, age group: 18–30)

Similarly, Matias sees engineering as a field with abundant job opportunities and a demand for workforce, especially with the rise of innovative technologies. Their perceived job security in the engineering field reinforces their commitment to their studies.

Another subtheme that was identified, that increases the interviewees’ motivation are real-world career examples. Matias recalls a visit to another city where he toured with his class a company, seeing various workplaces offering opportunities in the engineering field.

> **Excerpt 12.** And during last semester we did a visit [another Finnish city] where are many places that offer work for my field and it was interesting to see those places with and thinking about those positive experiences, knowing the workplaces and seeing the workplaces does give some motivation for me. (Matias, face-to-face, age group: 18–30)

Onni also finds motivation in the real-world examples, through his work experience and collaborations with engineers.

> **Excerpt 13.** And one of the reasons, too, why I have to like want to become an engineer because the engineers I saw was so damn bad at designing it. Because they haven’t done a real day work, you know they haven’t done anything, so they make pointless mistakes because they [don’t] know what to do. So, I trust that this is my advantage in this future career, that long line of working. (Onni, hybrid, age group: 30–45)

His interactions with working engineers have become a major motivation factor for him to successfully complete his bachelor's degree. He considers himself skilled and aims to outperform the engineers he has worked with. The present engineering students' insights reveal that their utility and career-oriented values are multifaceted and influenced by previous work experiences and their future expectations. The practical benefits and relevance of their academic efforts to long-term career goals motivate the students to engage in and persist with their engineering degree.

6.2.2 Financial Stability

Financial stability and a sense of personal responsibility contributes to the utility and career values of the participants. These factors extend beyond personal financial security, to include the capacity to support and provide for their families, which sustains their motivation. The perspectives of the interviewees vary between the two groups. The face-to-face students are in average younger, all without their own families or financial responsibilities, such as mortgages. However, an exception within the face-to-face group is Antti, who, while living with his parent and not having a family of him own, expressed a strong sense of duty to support them. He said:

> **Excerpt 14.** I wanna help them the best I can with like anything I like possibly can since well, they've raised me. So, I don't know. I just kind of feel like an obligation to, like kind of pay them back some way. So that's also the reason why I like applied for like engineering studies since, like, the pay is pretty like, pretty decent. (Antti, face-to-face, age group: 18–30)

This highlights how family responsibilities and the desire to provide can influence a student's educational choices severely, as pursuing engineering, and following commitment to successfully completing the degree. Antti also mentions his aspiration to own his own home and live a stable life, indicating that the financial security provided by an engineering job would allow him to be financially independent. As Antti, all three hybrid students, Joonas, Mikael and Onni, refer to engineering as a safe field that enables them to pay off their apartment loans and mortgages. All share their desire for a secure job in the future, allowing them to meet their financial responsibilities and continue providing for their families. The potential for the interviewees' financial stability are powerful motivators that reinforce their commitment to their engineering studies.

Joonas adds another dimension to this factor on their motivation by discussing the importance of rising in his current position and with that higher salary prospects. He sees his education as a critical tool:

> **Excerpt 15.** Especially with the so-called climbing of the corporate ladders and salary wise and so on. So, this is the main reason for educating myself and of course to open some new doors as well. (Joonas, hybrid, age group: 30–45)

By educating himself, Joonas aims to open new doors and advance his career. The desire for financial stability and the associated benefits of a stable job, the ability to support family, and the potential for career advancement are key motivators for the interviewees to succeed in their studies. The interviewees' motivation is profoundly influence by their individual career aspirations and practical benefits, especially among the hybrid students. The hybrid students already work and balance their studies, and they highlight the importance of these factors to provide for their families.

6.3 External and Personal Influence

The next theme is the external and personal influence in each student's life, which affects their motivation. A holistic understanding of each interviewee's unique circumstances and the embedded culture within engineering is crucial to fully explore their perspectives.

6.3.1 Engineering Culture in Finland

In general, one external factor all participants share is the engineering culture as they all study the same program in the engineering field. This culture is characterized by rigorous academic demands and a high level of expected competency, and a certain degree of stress which plays a substantial role in shaping student motivation. These characteristics were consistently observed in the present Finnish context. For instance, Antti reflects on the difficulty of some tasks:

> **Excerpt 16.** There's been some stuff that like really grind my head and I have to like think extra, but it's not like rocket science or anything. (Antti, face-to-face, age group: 18–30)

While the academic workload can be demanding, Antti perceives it as manageable and certainly within his capabilities and has no further impact on his motivation. Eero further elaborates on the typical high stress levels associated with engineering studies, describing his experience:

> **Excerpt 17.** OK, like it's not that I'm burnt out or anything. But there's just, I don't know, a normal amount of stress and anxiety, like a small amount from school and personal life. (Eero, face-to-face, age group: 18–30)

He emphasizes that this stress is not overwhelming but rather a standard in his engineering student experience. Joonas humorously comments on his need for more time, suggesting that eliminating the need to sleep could potentially enhance his motivation. While this is a sarcastic remark, it underscores the reality that time management and workload balance are significant concerns for the interviewees. The demanding nature of their coursework requires them to constantly find ways to stay motivated and manage their time effectively.

6.3.2 Individual Circumstances

The unique circumstances of the interviewees vary and are mainly personal influences such as their current financial status, living conditions, interpersonal relationships, personality traits, psychological well-being, and preferences for their study schedule. The impact of each factor is explored in the following.

Current Financial Status

The interviewees' current financial status is one factor that has an impact on their motivation. For instance, Eero stated that he is financially secure during his studies as he receives governmental financial aid known in Finland as KELA benefits, has savings, and has as well taken out a study loan. All the above which help him not worry about his economic situation while studying and after him therefore do not affect his motivation. This financial freedom allows him to focus more on his studies, free form financial stress, as he navigates through this challenging study program.

The opposite case is for Matias, who describes how financial difficulties and issues with his KELA benefits lower his motivation. These issues make it difficult for him to focus on his studies when he is preoccupied with financial concerns. He said:

> **Excerpt 18.** Besides the courses there has also been in my personal life I have been having some difficulties with my benefits and how I live. So that is also one point that does lower my motivation because it's hard to focus [on] studies when there are so many other things that needs to be done and sorted out. (Matias, face-to-face, age group:18–30)

Eero and Matias represent two contrasting financial realities: Eero is financially secure, while Matias faces financial instability. Their experiences share that finances can severely affect motivation, either as a major concern or not at all when they are well-managed.

Living Conditions

The living conditions of the participants also play a crucial role in their motivation. Matias mentioned his challenge of living in a small apartment, despite being a face-to-face student with on-campuses classes, he finds his living space restrictive. He also noted that he regularly spends time at home working on coursework and preparing for upcoming classes and exams, during which his apartment feels even smaller and more confining. This situation affects his energy levels and motivation to work on courses negatively, ultimately impacting his overall academic performance in his studies.

> **Excerpt 19.** Living in a small space, you get to feel cramped […]. (Matias, face-to-face, age group: 18–30)

In the context of Finland, the interviews reveal a location-specific challenge. Onni lives in a rural area, in a house heated entirely by wood. He is primarily responsible for managing this heating, a task that demands considerable time and effort, particularly during the winter months.

> **Excerpt 20.** I live in a house that is fully heated with woods, […] burning wood […] takes time. We have to, this is big house, we have to [chop and carry] multiple of trees, logs [of trees]. I have to burn it [to have heating] and so in the winter it's more harder, because […] there's snow work. It's a lot of work. (Onni, hybrid, age group: 30–45)

Furthermore, this responsibility restricts his already limited study time, as he works full-time and has family obligations, such as spending time with his children or wife.

Interpersonal Relationships

Interpersonal relationships are another critical factor influencing the interviewees' motivation. Mikael, who lives with his partner together and balances both work and study, exemplifies how obligations to his partner and conflict impact his motivation to study. He explained:

> **Excerpt 21.** I don't have much time to do anything. So then if that of course creates problems with my like relationship at home with my spouse and that's usually goes quite well. But of course if we fight about something we were supposed to do, something

> on the weekend, and then I can't because I have to study or have to work then of course that's gonna change or do things with my motivation. (Mikael, hybrid, age group: 30–45)

He further elaborated on the positive side when that his partner's supports him:

> **Excerpt 22.** And so if I get support from home and like understanding for what I'm doing right now, then that helps my motivation would say yeah, of course. (Mikael, hybrid, age group: 30–45)

Mikael identified two scenarios where his partnership acts as both a positive and a negative influence on his motivation. In addition to having a partner, Joonas also has children. He finds it challenging to balance family responsibilities, work, and education as it is very time-consuming. However, he appreciates the support from his wife, which helps sustain his motivation.

> **Except 23.** I have some kind of support for that [his studies], I mean my wife enables me to do this so […] I have support at home as well. It's a big deal because […] basically if I have to study something I don't have to watch over the kids or stuff like this or she [his wife] takes some of the load off of this. So, I can free up time because time is the most, most you know rare thing in here that I don't have enough. (Joonas, hybrid, age group: 30–45)

As seen in Mikael's and Joonas's case, while family responsibilities can complicate matters, having a supportive partner can significantly contribute to maintaining motivation and achieving success in a demanding field such as engineering.

Personality Traits

Personality traits, which are unique characteristics in each of the engineering student, and only an internal influence on their motivation, have also been identified as substantial. Eero describes himself as someone who rarely asks for help, feeling intimidated in large groups.

> **Excerpt 24.** It feels very intimidating when there's a hundred students around you and you have to ask like 'Hey, how do you, […] can you come help?' Then when we're like a lot fewer, like a 1/4 of that amount, then I usually ask for help. (Eero, face-to-face, age group: 18–30)

He showed how personality traits as introversion or shyness can hinder his active participation and diminish his motivation. Similarly, Matias noted his reluctance to ask questions in class due to embarrassment or fear of wasting time, which impedes his learning process and motivation. He described himself as:

> **Excerpt 25.** And I'm not the type of person who would be asking during class a lot when you don't understand something. (Matias, face-to-face, age group: 18–30)

It is noteworthy that both examples are from the face-to-face group, which, aside from potentially reflecting a personality trait, may also be influenced by the younger ages of the students. In contrast, none of the hybrid students have mentioned anything related to this subtheme.

Psychological Well-being

Psychological well-being is a personal and again internal challenge, as each interviewee has their own unique experiences and challenges that impact their ability to participate in and persist with their studies. Furthermore, the well-being of the interviewees is closely linked to the culture of engineering, which makes Eero's insights particularly relevant to this discussion. He mentioned

> **Excerpt 26.** Okay, like it's not that I'm burnt out or anything. But there's just, I don't know, a normal amount of stress and anxiety, like a small amount from school and personal life. But it's nothing like that, nothing bad. (Eero, face-to-face, age group: 18–30)

He demonstrated an understanding of the term 'burnout' and recognized its negative implications, but he does not currently view it as a concern for his own psychological well-being. Matias provides another perspective, pointing out the severe impact of negative psychological well-being on his motivation. He described how the combination of long study days, the repetition of failed studies, and dealing with depression makes it difficult to cope:

> **Excerpt 27.** And then besides that you'll get the feeling about constantly failing when you start studies again and again. And it adds to the depression. […] When you combine long days and depression, it's kind of a huddle to get along. (Matias, face-to-face, age group: 18–30)

He elaborated further, noting how these struggles can exacerbate his sense of failure and negatively influence his overall well-being and accordingly his motivation in his current engineering degree.

Study Schedule Preferences

Study schedule preferences have proven to be relevant among the students' motivation factors, particularly among the hybrid learning students. Joonas prefers to progress through his studies quickly and finds it frustrating when institutional constraints slow him down. He is ahead of his schedule and would prefer reduce his studies by half a year, but finds it challenging to arrange within his University of Applied Sciences (UAS). He elaborated:

> **Excerpt 28.** I mean, not anything new, maybe this organization [of his UAS]. I don't know if I'm right, but it might be a bit stiff for me because. The way I see it, I'm now a bit ahead of schedule and I've been told that I could shave [reduce] like 1/2 a year off of these four-year studies. But anything other than that, then it becomes complicated to arrange from the school perspective, and that's what I don't like […]. I mean, I wanted the degree to be something else [his hybrid studies] and I wanted it as fast as I can. So then if the institution becomes some kind of break to this thing and I have to spend more time than I would require, then I just don't really like it. (Joonas, hybrid, age group: 30–45)

Additionally, Joonas points out the difficulty in adjusting course schedules to better fit his needs:

> **Excerpt 29.** And it seems it's somehow hard for the school [UAS] to time it differently. And this is or something that could be timed when I have room in the calendar. Then it's like I haven't done some courses because it's like to do a course one year early, then I would have to do something else in between, something that is required for that course, like a baseline knowledge. Then I'll just have to go at the pace that they already decided and it would seem that the pace is quite slow for me. (Joonas, hybrid, age group: 30–45)

Similarly, Mikael finds it frustrating when coursework that could be completed on his own time is held back by institutional schedules. He notes:

> **Excerpt 30.** […] I find it really frustrating if we have a course that you can basically do on your own time, […] I mean because shouldn't like this wanting more to be about freedom and doing things at your own time. And then the teacher is like sitting on top of the assignment. And especially with my work schedule, it's sometimes the week in advance, it's impossible for me because I mean I could be stuck at work for 80 hours that week and I have absolutely no time to do the assignments. But then of course I have easier weeks and I have for example weeks when I have absolutely nothing to do with work [...]. And during that time, I could advance in all my classes and then if somebody is just like just because doesn't open the assignments because we need to. I don't know why, probably some made-up pedagogical reason of their own, but that kind of like goes against the idea of the reason I chose the program I chose [Hybrid learning]. (Mikael, hybrid, age group: 30–45)

Both participants mentioned that their initial reason for choosing this engineering degree was its compatibility with their full-time jobs. They imagined the flexibility of the program would allow them to adapt their study load to their work demands, reducing it during busy weeks and increasing it during less busy weeks to maintain a balance. As this flexibility was not available at the time of the interviews, they feel demotivated. Despite the effort they put into coordinating everything, they still managed to keep up with their heavy study and workload. They were on track to finish their studies on time, and in Joonas's case, even earlier.

Learning Environments

The learning environment, encompassing both face-to-face and hybrid models, has a certain degree of influence on student motivation. Remarkably, all students, regardless of their chosen learning format, share similar views on motivational factors, although some express these thoughts more strongly than others. This can be attributed to the conscious decisions made by both groups in selecting their preferred environments. The younger face-to-face group, having experienced disruptions in their previous education due to COVID-19, sought to regain face-to-face and physical interaction. Conversely, the hybrid group chose their format to balance full-time work commitments while advancing their careers through an engineering degree, aiming for career progression and higher positions. This section looks into the students' chosen LEs and its role in their motivation.

The face-to-face students describe motivating factors, such as in-person interaction with their peers and instructors. Two of the three face-to-face students were in high school when Covid-

19 first started, which also influenced their personal preferences and motivational factors. Antti said:

> **Excerpt 31.** I like study face to face, I'd say the fact that like I get to like meet new people and make new friends, that also motivates me. (Antti, face-to-face, age group: 30–45)

Antti also finds that face-to-face learning helps him stay focused, as studying online during the COVID-19 pandemic was demotivating him.

> **Excerpt 32.** Studying in person helps me study easier since back when the COVID was a thing and we had to study online, I couldn't study that well because it was really distracting. (Antti, face-to-face, age group: 30–45)

Matias shares a similar sentiment, explaining that he learns better in a classroom environment:

> **Excerpt 33.** I'm not so good at studying alone and studying from material. It's much easier to learn when there are examples from who is teaching. (Matias, face-to-face, age group: 30–45)

Eero shares similar views about the benefits of being physically present in class, as it helps him to avoid distractions such as his mobile phone or irrelevant activities, thereby improving his focus on learning. Like Matias, Eero finds it motivating to be in the physical environment of the classroom because it helps him to concentrate on the material.

On the other hand, the hybrid students do not refer to their experiences during COVID but instead focus on other factors, such as jobs or family responsibilities. Onni appreciates the hybrid model because it accommodates his work schedule and financial obligations.

> **Excerpt 34.** Maybe it's better if by day learning [referring to face-to-face], but this is when you have people like me, with working because we have apartment loans and families we don't have the time or the money to go. That's why we do it hybrid. This is really good. (Onni, hybrid, age group: 30–45)

Mikael and Joonas also find hybrid learning essential due to time constraints and financial needs as Onni. Mikael mentions that he doesn't have time to be at school every day and that hybrid learning helps condense his studies, reducing menial tasks. Joonas emphasizes that attending a daily model would be financially unfeasible as he needs to work to support his family.

> **Excerpt 35.** If I go to daily model then I'm bankrupt. So, I'm broke because I have to work because I have a life and kids and a family to support. (Joonas, hybrid, age group: 30–45)

It is becoming apparent that the LE(LE) does not have a direct influence on the students' motivation, as their motivation for their LE was established before they applied to the program. Students have actively chosen this engineering course based on their individual circumstances, which show different patterns within each group. As they are aware of what they committed to, they refer to their motivational factors in this context. As a result, their motivation is influenced more by their initial choice and personal circumstances than by the specific LE itself.

Procrastination

Procrastination is a prevalent issue that significantly impacts students' motivation and productivity. Antti highlights this challenge, noting that the 'lazy factor' often leads him to postpone tasks until the end of the week. This tendency to delay work creates a buildup of pressure and stress, which subsequently reduces his motivation. He explained:

> **Excerpt 36.** I'd say like more the lazy factor like that. […] It's just like, I don't know if I want to do this today. I'll just, like push it back to like, I don't know the end of the week or something. So, like then it's just like kind of pressures you to like work more towards the end of the week and kind of just gets me like God, I don't like this at all and stuff like that. So, it is more like the procrastination stuff that, like, get in the way and it's just like kind of melts it [his motivation] down. (Antti, face-to-face, age group: 30–45)

Antti's example underscores a common cycle where procrastination leads to increased workload and stress towards the end of his week. This not only affects his ability to complete tasks efficiently but also contributes to a negative emotional state, further negatively affecting his motivation. He further elaborated:

> **Excerpt 37.** Basically, getting like through some of them is like very, very difficult and like it gives so much stress that like it does like drop down your motivation sometimes. (Antti, face-to-face, age group: 30–45)

Antti described how the stress caused by his procrastination can become overwhelming and lead to a decrease in motivation. In contrast, Eero is not only aware of the stress caused by procrastination but also manages his time strategically to avoid difficult situations. He said:

> **Excerpt 38.** If I have like, […] some homework. I know that it's due like […] Sunday evening. And then if I have some time for say Wednesday, it's like at the lunchtime and I have a couple hours in school between then or before the next lesson, then I would do that homework. So, then I don't have to stress about it Sunday evening, like 'Oh damn, I have this math homework still' and then I just stressed about it the whole week. And if I haven't gotten it done, so I do that. I don't want to be in the situation, but I have like 3 things for Sunday evening, and it is Sunday evening, and I actually have to do them. So, then I do them earlier. (Eero, face-to-face, age group: 18–30)

Eero's narrative highlights a proactive approach to mitigating the stress of procrastination by completing tasks ahead of time. His experience underscores the importance of time management and early task completion in maintaining motivation and reducing stress.

Subject Difficulty

The difficulty of subjects has also been identified as a factor influencing the participants' motivation. This subtheme is multifaceted, as the subject difficulty has been described as either barrier to the students' engagement or as a source of motivation when they have successfully overcome them. Onni finds for example mathematics particularly challenging. He told:

> **Excerpt 39.** Mathematics is difficult for me, so I don't like it that much. But it's the mathematics, it's more difficult to me because, I don't need it before. Never. (Onni, hybrid, age group: 30–45)

For Onni, the challenge is the perceived irrelevance of mathematics to his past experiences, which reduces his enthusiasm and motivation for the course. He mentioned that he has been out of school for over two decades, never liked math and has not needed it in his work since. Matias also experiences a decline in motivation due to a subject's difficulty. He notes a drop in his motivation at the start of the spring semester due to the focus on physics and calculation-based courses, which he finds more difficult than previous subjects:

> **Excerpt 40.** There has been a drop in my motivation when this spring semester did start because we had more courses based on physics and calculating stuff. (Matias, face-to-face, age group: 18–30)

He also mentioned a sudden shift in the program's subjects from the last semester to his current one, which now includes several more challenging courses, making it difficult for him to maintain his motivation. Antti, however, has a different perspective. He mentioned that overcoming difficult subjects increases his motivation:

> **Excerpt 41.** But like then there's like the other factors like if you get through like harder. That tasks and stuff you'd like dust like pump up your motivation, just like you. You completed and like got that call. (Antti, face-to-face, age group: 18–30)

He stated how the experience of overcoming challenges can be rewarding to him and positively impact his motivation. Simultaneously, Antti also acknowledges that an overwhelming workload in any subject can be negatively influencing his motivation:

> **Excerpt 42.** But I think basically like in some courses there is like an overwhelming amount of like stuff to be done and I think some workload could be like lessened definitely. (Antti, face-to-face, age group: 18–30)

Antti illustrated that both the difficulty of a subject and its' perceived workload can affect his personal challenge and, consequently, his motivation. Eero provides another dimension to this subtheme by highlighting frustration with overly simple content in a language course:

> **Excerpt 43.** The stuff we're supposed to be learning is something that you learn in, I don't know, 6th grade. Like it's so easy and then it's frustrating that it is very easy. And I had the feeling that because we're in like a higher degree of school but maybe we should be learning something useful and not where, we had this lecture that was about like a like professional and unprofessional speaking and that you can explain it in 5 minutes and then you can be off. But now it takes like an hour to explain some. (Eero, face-to-face, age group: 18–30)

This statement exemplifies that content that is perceived as too easy can also demotivate students like Eero, who expects more advanced and relevant material from his university degree.

Work-Study-Life Balance

The balance between work, study and private life is an important factor in the motivation of the respondents, especially given their different individual circumstances. Antti notes that his part-time job, which consists of short, manageable weekend shifts, does not impact his motivation. as his workload is rather low due to the irregularity of the job. This is because his workload remains low due to the irregular nature of the job. As in Antti's case, when work responsibilities are light and manageable, they may not interfere with his motivation. However, Joonas described a more complex situation where balancing a full-time job, studies, and family responsibilities can be overwhelming. He said:

> **Excerpt 44.** We have a limited amount of time in a day, and if you work 8, 9, 10 hours and then study for six hours, you're out of hours eventually. Time is always not enough. (Joonas, hybrid, age group: 30–45)

His statement underscores the pressure of managing extensive work hours alongside academic commitments and family life, which is the case for all hybrid students. Joonas emphasized the importance of having support at home to manage these demands effectively, as discussed in the interpersonal relationships subtheme. Joonas' experience highlights how family responsibilities add another layer of complexity to the already challenging balance of work and study, necessitating constant adjustments and support from his family members. Matias experiences difficulties in maintaining a healthy balance between his academic studies and his personal time. He frequently stays up late to meet deadlines, which then leaves him with insufficient time for engaging in hobbies. This results in a cycle of sleep deprivation, creating a snowball effect that perpetuates the problem. Mikael adds that working long hours, sometimes up to 70 hours a week, combined with his studies, leaves little time for rest or leisure:

> **Excerpt 45.** There's not enough hours in the week, so then something has to give, and usually it's free time or sleep. (Mikael, hybrid, age group: 30–45)

This lack of balance severely affects his motivation and overall well-being. Mikael's demanding work schedule coupled with academic responsibilities results in sacrifices in his personal time, highlighting the link between this subtheme and psychological well-being. Eero presented a different perspective:

> **Excerpt 46.** Because now in the spring I have had so much like free time. So, I would have I would have liked to work some job, but the problem is to now in the spring all the companies are searching for summer jobs. So, the amount of just normal jobs is very limited. (Eero, face-to-face, age group: 18–30)

Since beginning his studies, Eero has not been employed and he expressed a desire to work along his on-going engineering degree. He believes that he currently maintains a good balance and overall motivation in his studies, which gives him the confidence to believe that he can manage a job concurrently.

6.3.3 Instructor's Role

The role of instructors has been identified as one of the most crucial factors influencing the interviewees' motivation. This role is explored from several different perspectives, including the instructor's course design, the availability and quality of their provided course materials, and the perceived availability and own motivation.

Course Design

Firstly, Eero highlighted that the course design largely depends on how the instructor organizes everything. He stated that a well-organized course can enhance his motivation by making it easier him to follow the course content during his class. Joonas added that the way courses are designed greatly impact his motivation:

> **Excerpt 47.** If everything is done right, it's quite enjoyable, but if it's not, it's really a pain. (Joonas, hybrid, age group: 30–45)

Mikael shared a similar view, finding it demotivating when teachers rely solely on reading from textbooks or using monotonous PowerPoint presentations. He expanded:

> **Excerpt 48.** But then if lots of the like learning is based only on watching videos, it's kind of well, first of all it's kind of hard to for me to like concentrate on videos for a long time. And it's also very time consuming because I, I'm quite a fast reader and watching an hour long video is something I could read in maybe 20 minutes. So it's really good if there's options if you can either, you know, read it or then maybe some PowerPoint slides or then a video or just you know, assignments (Mikael, hybrid, age group: 30–45)

Although Mikael prefers to have more text materials in his courses, he acknowledges that others might have different preferences to maintain their motivation. He believes that courses should offer various options to cater to different needs and learning styles. Further, Onni criticized some instructors for their lack of effort in organizing course structures, noting that some instructors randomly assemble the content and itslearning courses.

Instructor Availability

As Onni notes, the availability and quality of the course materials also play a vital role in the course design and the participants' motivation. Eero provided a positive example by expressing his appreciation for instructors who offer comprehensive course materials:

> **Excerpt 49.** But this teacher he has like a prerecorded like lectures basically where he goes over the problems that we are going to solve and then if you have a problem with the task, you can just look at the video and look there 'Ah this is how I'm supposed to do it' if you get stuck. And then he has a lot of videos on like the theory behind everything. And I think that's very nice because then you if you get stuck you can like use his old videos to get help. And it also feels like he wants us to learn because he has gone through all the trouble for in making these videos. (Eero, face-to-face, Age group: 18–30)

Eero said that this instructor's approach not only helps him to understand the material better but also demonstrates his instructor's commitment and availability to him as his student. In contrast, Joonas expressed frustration with instructors who are unresponsive to student question. He noted that it can be demotivating when help is not readily available and that he feels overlooked.

> **Excerpt 50.** There are teachers who don't really give a fuck. (Joonas, hybrid, age group: 30–45)

He bluntly illustrated the negative impact of unresponsive instructors on his motivation. Meanwhile, Matias highlighted the benefits of having recorded lectures that he can review at his own pace. This feature is particularly helpful when his instructors are not immediately available to answer his questions but still try to be accessible to students like him.

Instructor Engagement

Another crucial aspect of the instructor's role is their level of engagement. Joonas emphasized that the quality of information and organization provided by the teacher can significantly influence his motivation. He explained:

> **Excerpt 51.** I would say that if everything is organised and it's set so that it's doable, it's somehow-how allocated that we have to do weekly this and weekly that or some kind of some kind of allocation for this that we have for a course like to complete in, say two months and then we have weekly tasks for that and somehow a clear schedule for this. And clear things what, we need to learn and what is required to pass and so on because I have seen courses that I have absolutely no information. What should I do to pass this or anyhow? So, I mean if it's well organised, that helps a lot. (Joonas, hybrid, age group: 30–45)

Further, Mikael proposed that instructors should use their expertise to create engaging assignments rather than relying solely on traditional lectures:

> **Excerpt 52.** There's ways you can teach people without lecturing. You can use your own strengths, and you know ask people to return assignments and then grade them on your own time and or I don't know, use your own expertise to make assignments that can be created because you're an expert in the field. So, you should be able to teach other how to do it in some way. (Mikael, hybrid, age group: 30–45)

Part of the instructor engagement is the organization of the instructors. Eero mentioned instructors who go to great lengths to prepare materials and organize their courses logically:

> **Excerpt 53.** He [the instructor] has put them [course materials] on there like on the first day of the course. And you can go look at them. And like anytime they're it's not like they're only the information is only in like in person. So it's pretty nice. (Eero, face-to-face, age group: 18–30)

He added that it is helpful to him when instructors hide completed content on itslearning and highlight current topics, making it easier to focus on what is important now. Joonas added that having a clear schedule and understanding what is required to pass a course are characteristics of an organized instructor, which maintains his motivation. Matias underlined the value of content organization and the integration of content-related examples, in addition to

administrative organization, which can make it easier to begin working on assignments and increase his motivation.

Conversely, disorganized instructors can substantially hinder the students' motivation. Antti mentioned that it can be challenging to find necessary materials when courses are not well-organized. Additionally, Eero shared that poorly structured courses can make it difficult to locate specific topics, which is frustrating and demotivating. Joonas elaborated:

> **Excerpt 54:** There's nothing wrong with that environment [itslearning]. It's just what's wrong with the teacher that uses it. Some people build the courses differently and use this environment like it should have been used and then some people don't, so that's just so simple. Other people just don't put in enough information or they don't put in set dates when something needs to be done. And or they don't that build it up the environment so that I can find anything. […] That's mainly a teacher issue, not itslearning issue, but I mean this is all. Otherwise, there's no nothing wrong with it [itslearning]. It works like it should. (Joonas, hybrid, age group: 30–45)

Joonas noted that the organization of the course depends solely on the instructors, regardless of the platform. He emphasized that a disorganized instructor could make many mistakes, negatively impacting his motivation. Mikael recounted comparable experiences with courses lacking structure, where he felt left alone navigating through the disorganized materials and unclear deadlines. Building on that, the disorganization also includes not only thei disorganized course content and coordination but now showing up, as Mikael exemplifies:

> **Excerpt 55.** And he [the instructor] shows up like 15 minutes late after somebody calls him then after 10 minutes his laptop's like battery dies and then the rest of the lecture is by his phone and it's just, it's like bad joke. (Mikael, hybrid, age group: 30–45)

Based on Mikael's statement, it becomes evident that the instructor's lack of punctuality and preparedness, has a substantial demotivate him. He feels frustrated by such behaviour, expecting instructors, as professionals, to be organized and dependable.

Related are the instructional delivery methods that were a factor in the interviewees' motivation. Eero criticized instructors who merely read off PowerPoint slides, finding it unengaging and demotivating. He said about well-doing instructors:

> **Excerpt 56:** But then we have some teachers who are like very good again who actually they don't read off the PowerPoint. They just have some picture and explain it very well. (Eero, face-to-face, age group: 18–30)

Eero mentioned that he feels motivated when instructors bring their passion for the subject into their teaching and use different, more engaging delivery methods. Matias finds it challenging to keep pace with some lectures that, while engaging, are delivered at a fast pace. He acknowledges that this method may be effective for some students, but for those who learn differently, having access to recordings could be a beneficial alternative to stay motivated.

Lastly, the perceived motivation of instructors has been identified as a pivotal factor influencing the motivation of the interviewees. In this subtheme, both groups shared the same views on the importance and influence of their instructors' motivation:

> **Excerpt 57**. So, they don't really inspire to do your best […] And they don't really seem that interested in in being there and when they are, when they're or when I have teachers like that, I'm really couldn't be bothered to study very hard. (Eero, face-to-face, age group: 18–30)

> **Excerpt 58.** I mean, you can see it when you're in a class. If the teacher cares about what he or she is doing. So, I mean, this usually ramps up the motivation as well. (Joonas, hybrid, age group: 30–45)

> **Excerpt 59.** But like the motivation when I can clearly see that the person who is trying to get me to do something doesn't give, like doesn't care at all about his own input or anything then it's, I have absolutely no interest of doing anything after that. It's like, it's worse than doing menial tasks because it's just like how am I supposed to be learning and developing if the person who's supposed to do that the teaching and check what I'm learning like doesn't care at all? (Mikael, hybrid, age group: 30–45)

All three participants stressed how their instructor's motivation or lack of it, affects them. The students expressed that a perceived lack of motivation from the instructor can cause them to question why they should be interested in the subject and motivated to continue in their course. In the subsequent section, the themes for the second research question on what kind of support the interviewees would sustain and improve their motivation is responded to.

6.4 Institutional Policies

This theme discusses students' suggestions for support to sustain and improve their motivation from educational entities. These suggestions, based on their personal preferences and experiences, highlight the need for adaptations at the governmental level through institutional policies.

6.4.1 Competency-Based Courses

Mikael emphasizes the importance of competency-based courses, where students can demonstrate their knowledge through pre-course assessments instead of completing repetitive tasks. He shared an example of a practical course on Microsoft Office tools, where the tasks felt menial and unnecessary due to his prior experience. He suggested that a comprehensive test to demonstrate proficiency would be more effective. This approach would save time and maintain motivation by avoiding redundant work. He also cited a language course where he was able to bypass the coursework by proving his proficiency through oral and written exams. Mikael further explained that if students already know certain material, particularly in general skills such as ICT, they should be allowed to advance quickly through quality assignments rather than standard coursework.

6.4.2 Financial Aid

Financial aid plays a pivotal role in sustaining and even increasing the students' motivation by alleviating their financial stress and allowing them to focus more on their studies. Joonas pointed out:

> **Excerpt 60.** I mean you can get some kind of student benefits [KELA benefits] which no grown-up lives on, it's just impossible. It's like 10th of the money needed. So, it doesn't matter where it goes, it won't go nearly as high enough it should to actually be any kind of beneficial, just to have to go and work, it's the only way. Like I see it is basically they could do a lot, but I mean with. (Joonas, hybrid, age group: 30–45)

Mikael added that financial stability was a significant concern during his previous university studies, making it challenging to concentrate on academics when his financial funds were low. Although he does not currently need financial support due to his job, he acknowledges its importance in maintaining motivation during financially challenging periods.

6.4.3 Individualized Learning Approaches

Individualized learning approaches, including flexible deadlines, were mentioned as positive influence on the students' motivation. Onni advocated for weekly tasks, noting that they help maintain consistent engagement compared to courses with long gaps before exams, which often lead to procrastination. For him this weekly approach ensures that he stays regularly on track and does not lose his focus and motivation. Contrary to Onni, Mikael argues that higher education should move beyond the high school model of unified teaching and learning:

> **Excerpt 61.** I mean we're not in in high school anymore and learning things like we have to like know how to calculate this exact problem. Or even if we do, we there's I think teaching should have evolved, at least at this point, into a point where we can see different paths to learning the same subject and the same general ideas. So, it's not like in high school where everybody has the same book and then the teacher teaches based on the book. We have other options available for us. So, I think they should be utilized, yes. (Mikael, hybrid, age group: 30–45)

Mikael advocates for an individualized learning approach, which Onni supports. Onni personally prefers the flexibility of watching educational videos during breaks at work, finding it more manageable than reading extensive texts and completing weekly assignments. He explains that he sometimes has intense work weeks during which he can do very little for his studies, while other weeks are less demanding, allowing him to dedicate more time to his coursework. Matias provides another perspective, suggesting that having exercises based on a pass/fail system through consistent effort, with additional assignments for those needing extra support, would be beneficial for students like him who struggle with their mental health. In his case, these adaptive learning techniques would provide the right level of challenge and support, helping to sustain his motivation.

By addressing the financial, structural, and instructional challenges, educational institutions as Universities of Applied Sciences (UASs) can create a more supportive and motivating LE for engineering students. These aspects will be addressed in detail in the upcoming discussion section.

6.5 Instructor's Role and Teaching Methods

This theme focuses on participants' experiences with their instructors and their suggestions for how instructors can help maintain and improve their motivation to continue studying.

6.5.1 Instructors' Role

Course Design

The instructors' course design was a prominent aspect mentioned by the interviewees when discussing their support needs. Antti pointed out the need for simplicity and ease in finding course materials, especially for first-year students. Matias suggested further:

> **Excerpt 62.** I would like that teachers would use their functions more sometimes, like adding reminders or that this box [submission box] will close then. It's very awkward for me sometimes when you forget that you need to return something. (Matias, face-to-face, age group: 18–30)

Onni emphasized the importance of consistency in their course structures, suggesting that all courses should follow one scheme to avoid confusion and help the students manage their workload better.

6.5.2 Feedback

The engineering students' often expressed that constructive feedback on their work would be essential in sustaining and increasing their motivation. Eero mentioned the importance for him of receiving detailed feedback:

> **Excerpt 63.** I would be glad if I would get like a constructive criticism and feedback if I have done something incorrect, they would write in dates learning like a return box 'That's hey, this is incorrect.'. And then maybe even now I just now it's just wishful thinking but maybe even right, like how it could have been done better or if something has been done well like just right there as very good, very nice like these, small things. It doesn't have to be like private tutoring in like at like 8 in the evening, but like small things. (Eero, face-to-face, age group: 18–30)

Furthermore, Mikael noted that grades alone do not provide enough information for students to improve. He acknowledges that providing feedback is more challenging in some subjects, such as physics, where the outcomes are always the same. However, the paths to these outcomes can differ. Therefore, he suggests that feedback should focus on the different approaches taken by students, rather than just the result.

6.5.3 Guidance

Further, important and mentioned in the instructor's role is guidance. Eero highlights the importance of teachers actively offering help and support, noting that it can be challenging to seek assistance in large lectures. He suggested:

> **Excerpt 64.** Well support and guidance from teachers. Because they're the ones who will make sure that you maybe learn something or try to teach us something. […] I guess when in in-person lectures try to well of course guide by actually going up to the students and asking do you need any help if they look like they're stuck on a thing for 30 minutes. (Eero, face-to-face, age group: 18–30)

Also here, Eero who is the student wished for this form of support but acknowledged the difficult in it:

> **Excerpt 65.** But then there's again the problem that we're like 120 students and one teacher. So, it's very hard to do in those big, big lectures and not every student actually asks for help. (Eero, face-to-face, age group: 18–30)

These findings underscore the multifaceted factors influencing the motivation of six engineering students at a University of Applied Sciences. The students' motivation was affected by their intrinsic interests, practical career considerations, financial aspirations, personal circumstances, and the perception of their instructor. Addressing these interconnected factors requires a diverse range of support. The next section will provide a detailed discussion of these findings, exploring their implications and potential strategies for addressing the identified challenges and opportunities in engineering education.

7 Discussion

This study explores the motivation of first-year undergraduate engineering students at a UAS in Finland. Through a qualitative approach, the analysis offers nuanced insights into the factors influencing the interviewees' motivation and wishes for support. In this section the most prominent themes are discussed.

The present findings have shown a variety of factors influencing the motivation of the six interviewed engineering students, addressing the first research question. These factors are shaped by their individual interests, identities, circumstances, aspirations, and the costs they bear to pursue their degrees. This observation aligns with the SEVT, which emphasizes the contextual nature of motivation as in the present case (Eccles & Wigfield, 2020; Wigfield & Eccles, 2024). In the present context, the interviewees with high attainment value who are committed to succeeding in their studies, view failure as factor that can influence their motivation. Depending on the personal significance of engineering to them and how they respond to failure, they either find it demotivating or motivating. Additionally, the interviewees' utility value and cost also vary based on external and personal influences. The students in the face-to-face LE view the engineering field as a secure career path, even without having prior work experience. They associate emerging trends and developments, such as advancements in robotics, with engineering, seeing it as a future-oriented and stable profession. This perception aligns with recent trends and the need for innovation, and research highlighting engineering as a promising and secure field (Beagon et al., 2023). The students in the hybrid LE have a different background, as they work full-time and have practical experiences in the engineering field. For them, their studies are a means to advance their current careers. These students share characteristics with what is commonly referred to as 'non-traditional students' or 'adult learners' (Bellare et al., 2023; Osam et al., 2017). It has been observed that utility value is a key motivator for adult-learners, which is consistent with the findings of this study on the students in the hybrid LE. Similarly, the present findings reveal that the costs associated with pursuing higher education do not vary between LEs, but rather reflect the students' individual circumstances. Adult learners, often face challenges as they try to balance their work, study and family responsibilities simultaneously (Bellare et al., 2023). In this study, the students in the hybrid LE typically aged 30–45 and already established in their careers demonstrate similar difficulties in maintaining a work-study-life balance while pursuing their engineering degree. These challenges are in line with previous research highlighting the struggles of adult learners in managing multiple responsibilities (Mosyjowski et al., 2017; Osam et al., 2017). In

contrast, the students in the face-to-face LE followed the direct academic pathway with fewer additional responsibilities, yet they still face the challenging course contents and high workload typical of engineering programs (Olewnik et al., 2023). In SEVT, cost is a crucial factor that can overshadow the intrinsic, attainment, and utility value if perceived as too high (Eccles & Wigfield, 2020). However, the present findings show that despite the high costs faced by the students in the hybrid LE, their motivation remains strong. Their intrinsic value, such as the interest in knowledge development, and utility value as their aspirations for better career opportunities are not diminished by the effort cost of their pursued degree. This resonates with similar findings among other adult learners who seek higher positions, increased salaries, or are passionate about learning (Bellare et al., 2023).

Further, SEVT highlights the situated nature of motivation research (Eccles & Wigfield, 2020; Wigfield & Eccles, 2024), which is essential to consider in the present case. The interviewees are pursuing an engineering bachelor's degree in Finland at a UAS. Consistent with previous research, the ingrained engineering culture was identified in the present interviews as the belief that engineering must be challenging, which is an essential aspect in the 'engineering mindset' (Rohde et al., 2020). These beliefs are an essential part of the engineering stress culture, which normalizes the high workload and expectations associated with the engineering field (Jensen et al, 2023), which the interviewed students also state. They recognize the workload and challenges they face but consider them a standard part of an engineering career. A location-specific and situated aspect of the interviews was evident when one student described living in a rural area and being responsible for heating his house with wood, which added to his already high workload and limited motivation. Additionally, the situated nature is evident in the context of studying at a UAS, which focuses on practical experiences and students' future careers (Arene, n.d.). This aligns with the findings that the students enjoyed interactions with real-world career examples, such as company visits, and found them motivating. It is recommended to include, if not already present, more similar experiences for students to meet representatives from different positions in the same field or companies. This is especially crucial for young undergraduates who choose the direct pathway into higher education, unlike the hybrid students who benefit from their experience and interactions with engineers. Building on this understanding, it is crucial to recognize the evolving nature of motivation in the SEVT. Future research should conduct longitudinal studies to explore how factors influencing motivation may change over time in both student LEs and to identify any similarities and differences. Further, the research should aim to investigate the longterm effects of the engineering culture on

students' motivation and future careers. This recommendation is particularly relevant given that academic motivation tends to decline over time (Fredricks & Eccles, 2002), with this decline being more evident in STEM fields (Robinson et al., 2018).

Another important part of the findings are the external and internal factors influencing the students' motivation. Research indicates that appositive LE is crucial for improving motivation and is characterized by student-centered practices (Owens et al., 2020; Rusticus et al., 2023). The present findings support this view, as interviewees described their positive experiences with student-centered practices, such as the versatile use of educational technology to create individualized learning opportunities, as highly motivating. The used educational technology in the present study is the LMS itslearning. The platform itself does not directly influence the interviewees' motivation, but how it is utilized by the instructors. The variety of tools LMS as itslearning offer, such as versatile communication, tasks, and assessment (itslearning, n.d.-b), allows for individualized learning opportunities for the students (Fatehiboroujeni et al., 2020). In the present study, the engineering students recognize this versatility and personalized features of itslearning and wish for their instructors to make better use of it. These findings support previous research that educational technology alone is insufficient, its integration determines whether the influence on students' motivations is positive, neutral or negative (Bond et al., 2020). The interviewed students criticized instructors who do not utilize the LMS functions available, which validates previous research findings that instructors in higher education often do not utilize educational technologies to develop their teaching practices (Mercader & Gairín, 2020). Another example of this issue is the teaching material instructors use. For instance, instructors who simply read off PowerPoints are found to be very unengaging by students (Savage et al., 2011), which the present interviewees also expressed. They shared that such methods and unengaging way of teaching cause them to lose interest in their course content. Beyond the courses provided by instructors, the students' perceptions of their instructor's motivation emerged as a relevant topic. When instructors were perceived as unmotivated themselves, the interviewees were directly affected by it and wondered why then they should be interested in the topic. When instructors were perceived as unmotivated, interviewees were directly impacted and questioned why they should be interested in the course content. As seen, these findings underscore the essential role of instructors in students' motivation to pursue their studies, as observed in previous research (Candelaria & Clements, 2023; Cayubit, 2022; Martin et al., 2020; Meriläinen, 2014). Noteworthy is that this role has evolved in recent years, and the expectations of instructors have shifted accordingly (Fang et

al., 2017; X. Lin et al., 2024). Students now expect instructors to effectively use educational technology, have strong communication skills (Martin et al., 2020) and be creative and engaging (X. Lin et al., 2024). This is also evident in the present findings, which highlight the interviewees' critique of their instructors' lack of use of educational technologies and expressed a desire for instructors to bring their personalities into teaching, making the learning environment more personalized and engaging.

Following the second research question on what kind of support students would need to sustain an increase their motivation, the students wished for more support from their instructors. Such as noticing when a student is struggling and offer them help, being available to the students, and show genuine interest in their students. This reflects findings from previous research that instructors should be approachable and encouraging (Lizzio et al., 2002; Meriläinen, 2014), creating opportunities for interaction between instructor and student, their honest concern on the students' well-being and being task-oriented, meaning an organized course structure (Cayubit, 2022). As seen, it is crucial to focus on students' expectations to be able to improve the relationship between students and instructors (Snijders et al., 2020), which the findings of this study support.

Nevertheless, it is crucial to acknowledge the numerous expectations placed upon instructors, who may need support themselves before they can effectively support their students. Recent research indicates that although technology resources are available, they are often under-utilized due to a variety of barriers faced by the instructors, ranging from excessive workload, lack of planning, lack of training, and more (Mercader & Gairín, 2020). Providing instructors with support to overcome these barriers could allow them to focus more on delivering feedback and guidance, support identified by the interviewees as essential for their motivation. Students noted that constructive feedback, such as comments on what could be improved in their task, and guidance, particularly when they feel overwhelmed by course content, would make them feel more supported and motivated. This is especially important for both new and returning undergraduate students adjusting to higher education. Future research is encouraged employ a more holistic approach to the exploration of motivation in engineering education, incorporating the perspectives of both instructors and faculty. This includes investigating what has been achieved and identifying ongoing needs to create positive and effective LEs for students and staff.

Another support need discussed is institutional support. This refers on one hand to educational entities, as in the present case the UAS, to provide for more flexibility and independence in scheduling one's studies, allowing them to progress at their own pace. Further, the interviewees wish for more versatile and individualized learning approaches, recognizing their learning styles and living circumstances are unique and so are their colleagues. On the other hand, institutional support, refers to governmental support of the students, particularly regarding financial issues. Some of the face-to-face students encounter difficulties with their government benefits, which decreases their motivation, while the students in the hybrid LE work full-time to fund their studies and living expenses, all on top of their already challenging study program in engineering. It is recommended that financial investments are made to alleviate the financial and mental burdens on students to focus on their motivation and successfully complete their studies and enter the workforce. However, this is contrary to the current development in the Finnish Government's budget plan for 2025-2028 (Yle, 2024). While there are no budget cuts for the army or police, education faces a significant budget cut of 100 million euros, while students already struggle. Thereby, students' housing benefits will be decreased, which the interviewees describe already as insufficient. The high workload in engineering studies, combined with the need to maintain a job to finance their student life, and the engineering stress culture (Jensen & Cross, 2021), can lead to low student motivation. In recent years, several studies have found low motivation as essential in students dropping out or intention to drop out from their degree programs (Bargmann et al., 2022; Behr et al., 2021; Rump et al., 2017; Tayebi et al., 2021). Additionally, the present interviewees, especially those in the hybrid LE, are highly motivated individuals who value lifelong learning. Such budget cuts will also make it nearly impossible for them to participate in higher education, as the external costs would outweigh it, representing a substantial societal loss to Finnish society (Helsinki Times, 2023).

In conclusion, the findings from the interviews demonstrate how each student's unique experiences and values influence their motivation. The findings suggest that while students are generally motivated, they recognize a need to improve current educational practices. This underlines the importance for higher education institutions, particularly in the context of UAS, to consider individual differences among students. As expectations of students continue to rise, higher education institutions should strive to personalize the learning environment and not only maintain but also increase the motivation of students at the start of their studies.

The present study has contributed to expanding the field of motivation research in engineering education in Finland, and future research is encouraged to explore more factors that influence

motivation in engineering students by including students of different ethnic backgrounds, genders, and ages, among others, to gain a broader and deeper understanding of motivation. This comprehensive approach is essential to develop strategies that effectively maintain and increase student motivation in engineering education over the long term.

ACKNOWLEDGMENTS

This work was supported by a fellowship of the German Academic Exchange Service (DAAD).

References

Abu Talib, M., Bettayeb, A. M., & Omer, R. I. (2021). Analytical study on the impact of technology in higher education during the age of COVID-19: Systematic literature review. *Education and Information Technologies*, *26*(6), 6719–6746. https://doi.org/10.1007/s10639-021-10507-1

Adams, W. C. (2015). Conducting Semi-Structured Interviews. In K. E. Newcomer, H. P. Hatry, & J. S. Wholey (Eds.), *Handbook of Practical Program Evaluation* (1st ed., pp. 492–505). Wiley. https://doi.org/10.1002/9781119171386.ch19

AlMunifi, A. A., & Alfawzan, M. S. (2023). Back to the New Normal in Engineering Education towards Student-Centered Learning: Remote? In Person? Hybrid? *Sustainability*, *15*(18), 13510. https://doi.org/10.3390/su151813510

Amutha, D. (2020). The Role and Impact of ICT in Improving the Quality of Education. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3585228

Arene. (n.d.). *The Rectors' Conference of Finnish Universities of Applied Sciences Arene*. Retrieved July 29, 2024, from https://arene.fi/the-rectors-conference-of-finnish-universities-of-applied-sciences-arene/

Bandura, A. (1997). *Self-efficacy: The exercise of control* (Vol. 333). H. Freeman & Co.

Bargmann, C., Thiele, L., & Kauffeld, S. (2022). Motivation matters: Predicting students' career decidedness and intention to drop out after the first year in higher education. *Higher Education*, *83*(4), 845–861. https://doi.org/10.1007/s10734-021-00707-6

Beagon, U., Kövesi, K., Tabas, B., Nørgaard, B., Lehtinen, R., Bowe, B., Gillet, C., & Spliid, C. M. (2023). Preparing engineering students for the challenges of the SDGs: What competences are required? *European Journal of Engineering Education*, *48*(1), 1–23. https://doi.org/10.1080/03043797.2022.2033955

Behr, A., Giese, M., Teguim Kamdjou, H. D., & Theune, K. (2021). Motives for dropping out from higher education—An analysis of bachelor's degree students in Germany. *European Journal of Education*, *56*(2), 325–343. https://doi.org/10.1111/ejed.12433

Bellare, Y., Smith, A., Cochran, K., & Lopez, S. G. (2023). Motivations and Barriers for Adult Learner Achievement: Recommendations for Institutions of Higher Education. *Adult Learning*, *34*(1), 30–39. https://doi.org/10.1177/10451595211059574

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020). Mapping research in student engagement and educational technology in higher education: A systematic evidence map. *International Journal of Educational Technology in Higher Education*, *17*(1), 2. https://doi.org/10.1186/s41239-019-0176-8

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2013). Chapter 1: Some very important starting information. In *Successful Qualitative Research a practical guide for beginners* (pp. 2–20).

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, *11*(4), 589–597. https://doi.org/10.1080/2159676X.2019.1628806

Braun, V., & Clarke, V. (2023). Toward good practice in thematic analysis: Avoiding common problems and be(com)ing a *knowing* researcher. *International Journal of Transgender Health*, *24*(1), 1–6. https://doi.org/10.1080/26895269.2022.2129597

Brophy, J. (2009). Connecting With the Big Picture. *Educational Psychologist*, *44*(2), 147–157. https://doi.org/10.1080/00461520902832400

Brown, P. R., McCord, R. E., Matusovich, H. M., & Kajfez, R. L. (2014). The use of motivation theory in engineering education research: A systematic review of literature.

European Journal of Engineering Education, *40*(2), 186–205. https://doi.org/10.1080/03043797.2014.941339

Butler, D. L., Cartier, S. C., Schnellert, L., Gagnon, F., & Giammarino, M. (2011). Secondary students' self-regulated engagement in reading: Researching self-regulation as situated in context. *Psychological Test and Assessment Modeling*, *53*(1), 73.

Butz, N. T., & Stupnisky, R. H. (2016). A mixed methods study of graduate students' self-determined motivation in synchronous hybrid learning environments. *The Internet and Higher Education*, *28*, 85–95. https://doi.org/10.1016/j.iheduc.2015.10.003

Buus, L. (2016). From Website to Moodle in a Blended Learning Context: *International Journal of Web-Based Learning and Teaching Technologies*, *11*(1), 51–64. https://doi.org/10.4018/IJWLTT.2016010104

Caeiro-Rodriguez, M., Manso-Vazquez, M., Mikic-Fonte, F. A., Llamas-Nistal, M., Fernandez-Iglesias, M. J., Tsalapatas, H., Heidmann, O., De Carvalho, C. V., Jesmin, T., Terasmaa, J., & Sorensen, L. T. (2021). Teaching Soft Skills in Engineering Education: An European Perspective. *IEEE Access*, *9*, 29222–29242. https://doi.org/10.1109/ACCESS.2021.3059516

Candelaria, B., & Clements, M. (2023). Student Perceptions of Instructor-Student Rapport and Motivation in Hybrid Courses During COVID-19. *American Journal of Undergraduate Research*, *19*(4), 31–39. https://doi.org/10.33697/ajur.2023.072

Cayubit, R. F. O. (2022). Why learning environment matters? An analysis on how the learning environment influences the academic motivation, learning strategies and engagement of college students. *Learning Environments Research*, *25*(2), 581–599. https://doi.org/10.1007/s10984-021-09382-x

Cheung, K. K. C., & Tai, K. W. H. (2023). The use of intercoder reliability in qualitative interview data analysis in science education. *Research in Science & Technological Education*, *41*(3), 1155–1175. https://doi.org/10.1080/02635143.2021.1993179

Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. HarperPerennial.

Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Demirkan, H. (2016). An inquiry into the learning-style and knowledge-building preferences of interior architecture students. *Design Studies*, *44*, 28–51. https://doi.org/10.1016/j.destud.2015.12.009

Dos Santos, L. M. (2022). Female Engineering Students' Motivations, Career Decisions, and Decision-Making Processes: A Social Cognitive Career and Motivation Theory. *Journal of Curriculum and Teaching*, *11*(5), 264. https://doi.org/10.5430/jct.v11n5p264

Drisko, J. W. (2024). Transferability and Generalization in Qualitative Research. *Research on Social Work Practice*, 10497315241256560. https://doi.org/10.1177/10497315241256560

Dyrbye, L. N., Thomas, M. R., Harper, W., Massie, F. S., Power, D. V., Eacker, A., Szydlo, D. W., Novotny, P. J., Sloan, J. A., & Shanafelt, T. D. (2009). The learning environment and medical student burnout: A multicentre study. *Medical Education*, *43*(3), 274–282. https://doi.org/10.1111/j.1365-2923.2008.03282.x

Eccles, J. S. (2022). Commentary on within-person designs and motivational science. *Learning and Instruction*, *81*, 101662. https://doi.org/10.1016/j.learninstruc.2022.101662

Eccles, J. S., & Wigfield, A. (2002). Motivational Beliefs, Values, and Goals. *Annual Review of Psychology*, *53*(1), 109–132. https://doi.org/10.1146/annurev.psych.53.100901.135153

Eccles, J. S., & Wigfield, A. (2020). From expectancy-value theory to situated expectancy-value theory: A developmental, social cognitive, and sociocultural perspective on motivation. *Contemporary Educational Psychology*, *61*, 101859. https://doi.org/10.1016/j.cedpsych.2020.101859

Eccles, J. S., & Wigfield, A. (2023). Expectancy-value theory to situated expectancy-value theory: Reflections on the legacy of 40+ years of working together. *Motivation Science*, *9*(1), 1–12. https://doi.org/10.1037/mot0000275

Eccles-Parsons, J. S., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviors. In *Achievement and achievement motives* (pp. 75–146). W. H. Freeman.

Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014). Qualitative Content Analysis: A Focus on Trustworthiness. *SAGE Open*, *4*(1), 215824401452263. https://doi.org/10.1177/2158244014522633

Evenhouse, D., Kandakatla, R., Berger, E., Rhoads, J. F., & DeBoer, J. (2020). Motivators and barriers in undergraduate mechanical engineering students' use of learning resources. *European Journal of Engineering Education*, *45*(6), 879–899. https://doi.org/10.1080/03043797.2020.1736990

Fang, N., bin Daud, M. F., Al Haddad, S. A. H., & Mohd-Yusof, K. (2017). A quantitative investigation of learning styles motivation and learning strategies for undergraduate engineering students. *Global Journal of Engineering Education*, *19*(1), 4–29. http://wiete.com.au/journals/GJEE/Publish/vol19no1/03-Fang-N.pdf

Fatehiboroujeni, S., Qattawi, A., & Goyal, S. (2020). *Understanding Gaps in Student Engagement and Motivation in Online and Hybrid Mechanical Engineering Courses*. *11*(1), 1–8. https://www.onlineengineeringeducation.com/index.php/joee/article/view/36

Finnish National Agency for Education. (n.d.). *Finnish education system*. Retrieved July 29, 2024, from https://www.oph.fi/en/education-system

Fraser, K. (2014). *The future of learning and teaching in next generation learning spaces* (First edition). Emerald Group Publishing Ltd.

Fredricks, J. A., & Eccles, J. S. (2002). Children's competence and value beliefs from childhood through adolescence: Growth trajectories in two male-sex-typed domains. *Developmental Psychology*, *38*(4), 519–533. https://doi.org/10.1037/0012-1649.38.4.519

Frers, L., & Meier, L. (2022). Hierarchy and inequality in research: Practices, ethics and experiences. *Qualitative Research*, *22*(5), 655–667. https://doi.org/10.1177/14687941221098920

Fulbright Finland Foundation. (n.d.). *Higher Education in Finland*. Retrieved July 29, 2024, from https://www.fulbright.fi/studies-and-research-finland/higher-education-finland

World Intellectual Property Organization (WIPO). *Global innovation Index 2023*. (2023). https://www.wipo.int/pressroom/en/articles/2023/article_0011.html

González-Pérez, L. I., & Ramírez-Montoya, M. S. (2022). Components of Education 4.0 in 21st Century Skills Frameworks: Systematic Review. *Sustainability*, *14*(3), 1493. https://doi.org/10.3390/su14031493

Guo, J.-P., Yang, L.-Y., Zhang, J., & Gan, Y.-J. (2022). Academic self-concept, perceptions of the learning environment, engagement, and learning outcomes of university

students: Relationships and causal ordering. *Higher Education*, *83*(4), 809–828. https://doi.org/10.1007/s10734-021-00705-8

Hadgraft, R. G., & Kolmos, A. (2020). Emerging learning environments in engineering education. *Australasian Journal of Engineering Education*, *25*(1), 3–16. https://doi.org/10.1080/22054952.2020.1713522

Halverson, L. R., Graham, C. R., Spring, K. J., Drysdale, J. S., & Henrie, C. R. (2014). A thematic analysis of the most highly cited scholarship in the first decade of blended learning research. *The Internet and Higher Education*, *20*, 20–34. https://doi.org/10.1016/j.iheduc.2013.09.004

Helsinki Times. (2023, May 24). *Massive education budget cuts proposed in government negotiations – Could lead to closure of over 100 educational institutions*. https://www.helsinkitimes.fi/themes/themes/education/23624-massive-education-budget-cuts-proposed-in-government-negotiations-could-lead-to-closure-of-over-100-educational-institutions.html

Henrie, C. R., Halverson, L. R., & Graham, C. R. (2015). Measuring student engagement in technology-mediated learning: A review. *Computers & Education*, *90*, 36–53. https://doi.org/10.1016/j.compedu.2015.09.005

Hidi, S., & Renninger, K. A. (2006). The Four-Phase Model of Interest Development. *Educational Psychologist*, *41*(2), 111–127. https://doi.org/10.1207/s15326985ep4102_4

intersoft consulting. (n.d.). *General Data Protection Regulation GDPR*. Retrieved July 29, 2024, from https://gdpr-info.eu

itslearning. (n.d.-a). *Index*. Retrieved July 29, 2024, from https://itslearning.com/index.aspx

itslearning. (n.d.-b). *Testimonials*. Retrieved July 29, 2024, from https://itslearning.com/testimonials

Jensen, K. J., & Cross, K. J. (2019). *Student perceptions of engineering stress culture* [[Paper presentation]]. https://peer.asee.org/32418

Jensen, K. J., & Cross, K. J. (2021). Engineering stress culture: Relationships among mental health, engineering identity, and sense of inclusion. *Journal of Engineering Education*, *110*(2), 371–392. https://doi.org/10.1002/jee.20391

Jensen, K. J., Mirabelli, J. F., Kunze, A. J., Romanchek, T. E., & Cross, K. J. (2023). Undergraduate student perceptions of stress and mental health in engineering culture. *International Journal of STEM Education*, *10*(1), 30. https://doi.org/10.1186/s40594-023-00419-6

Kalu, M. E. (2019). How does "subjective I" influence a qualitative research question, theoretical approach and methodologies? *Global Journal of Pure and Applied Sciences*, *25*(1), 97. https://doi.org/10.4314/gjpas.v25i1.13

Kaluyu, C., & Ndiku, J. M. (2020). *Pedagogy and information technology integration, as strategies for improving academic performance in STEM subjects: A critical literature review. 11*(21). https://pdfs.semanticscholar.org/3f4a/56f3ad289512cc0e67702253226caffc906a.pdf

Kuittinen, M., & Meriläinen, M. (2011). The effect of study-related burnout on student perceptions. *Journal of International Education in Business*, *4*(1), 42–62. https://doi.org/10.1108/18363261111170586

Kyei-Blankson, L., & Keengwe, J. (2011). Faculty-Faculty Interactions in Online Learning Environments: *International Journal of Information and Communication Technology Education*, *7*(3), 25–33. https://doi.org/10.4018/jicte.2011070103

Lappalainen, P. (2011). *Can and Should Social Competence be Taught to Engineers? 1*(3), 13–19. https://www.learntechlib.org/p/207319/

Lee, Y., Freer, E., Robinson, K. A., Perez, T., Lira, A. K., Briedis, D., Walton, S. P., & Linnenbrink-Garcia, L. (2022). The multiplicative function of expectancy and value in predicting engineering students' choice, persistence, and performance. *Journal of Engineering Education*, *111*(3), 531–553. https://doi.org/10.1002/jee.20456

Lepori, B., & Kyvik, S. (2010). The Research Mission of Universities of Applied Sciences and the Future Configuration of Higher Education Systems in Europe. *Higher Education Policy*, *23*(3), 295–316. https://doi.org/10.1057/hep.2010.11

Li, M. (2022). Learning Behaviors and Cognitive Participation in Online-Offline Hybrid Learning Environment. *International Journal of Emerging Technologies in Learning (iJET)*, *17*(01), 146–159. https://doi.org/10.3991/ijet.v17i01.28715

Lin, S., Salazar, T. R., & Wu, S. (2019). Impact of academic experience and school climate of diversity on student satisfaction. *Learning Environments Research*, *22*(1), 25–41. https://doi.org/10.1007/s10984-018-9265-1

Lin, X., Huang, M., & Lin, Q. (2024). Students' expectations of instructors in face-to-face and online learning environments at a Chinese university. *E-Learning and Digital Media*, *21*(2), 160–179. https://doi.org/10.1177/20427530231156482

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.

Lizzio, A., Wilson, K., & Simons, R. (2002). University Students' Perceptions of the Learning Environment and Academic Outcomes: Implications for theory and practice. *Studies in Higher Education*, *27*(1), 27–52. https://doi.org/10.1080/03075070120099359

Maharaj, C., Blair, E., & Chin Yuen Kee, S. (2018). The motivation to study: An analysis of undergraduate engineering students at a Caribbean university. *Journal of Further and Higher Education*, *42*(1), 24–35. https://doi.org/10.1080/0309877X.2016.1188901

Martin, F., Wang, C., & Sadaf, A. (2020). Facilitation Matters: Instructor Perception of Helpfulness of Facilitation Strategies in Online Courses. *Online Learning*, *24*(1). https://doi.org/10.24059/olj.v24i1.1980

Matthews, R., Rutherford, B. N., Edmondson, D., & Matthews, L. (2022). Uncertainty in industrial markets: The COVID-19 pandemic. *Industrial Marketing Management*, *102*, 364–376. https://doi.org/10.1016/j.indmarman.2022.02.006

Matusovich, H. M., Streveler, R. A., & Miller, R. L. (2010). Why Do Students Choose Engineering? A Qualitative, Longitudinal Investigation of Students' Motivational Values. *Journal of Engineering Education*, *99*(4), 289–303. https://doi.org/10.1002/j.2168-9830.2010.tb01064.x

Mayring, P. (2014). *Qualitative content analysis: Theoretical foundation, basic procedures and software solution*. Klagenfurt. https://nbn-resolving.org/urn:nbn:de:0168-ssoar-395173

McGunagle, D., & Zizka, L. (2020). Employability skills for 21st-century STEM students: The employers' perspective. *Higher Education, Skills and Work-Based Learning*, *10*(3), 591–606. https://doi.org/10.1108/HESWBL-10-2019-0148

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies.* Department of Education, Office of Planning, Evaluation, and Policy Development. https://repository.alt.ac.uk/629/1/US_DepEdu_Final_report_2009.pdf

Mercader, C., & Gairín, J. (2020). University teachers' perception of barriers to the use of digital technologies: The importance of the academic discipline. *International Journal of Educational Technology in Higher Education*, *17*(1), 4. https://doi.org/10.1186/s41239-020-0182-x

Meriläinen, M. (2014). Factors affecting study-related burnout among Finnish university students: Teaching-learning environment, achievement motivation and the meaning of life. *Quality in Higher Education*, *20*(3), 309–329. https://doi.org/10.1080/13538322.2014.978136

Ministry of Education and Culture. (n.d.). *Universities of Applied Sciences in Finland*. Retrieved July 29, 2024, from https://okm.fi/en/universities-of-applied-sciences

Mosyjowski, E. A., Daly, S. R., Peters, D. L., Skerlos, S. J., & Baker, A. B. (2017). Engineering PhD Returners and Direct-Pathway Students: Comparing Expectancy, Value, and Cost. *Journal of Engineering Education*, *106*(4), 639–676. https://doi.org/10.1002/jee.20182

Mruck, K., & Breuer, F. (2003). Subjectivity and Reflexivity in Qualitative Research – A New FQS issue. *Historical Social Research*, *28*, 189212. https://doi.org/10.12759/HSR.28.2003.3.189-212

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods*, *16*(1), 160940691773384. https://doi.org/10.1177/1609406917733847

O'Connor, C., & Joffe, H. (2020). Intercoder Reliability in Qualitative Research: Debates and Practical Guidelines. *International Journal of Qualitative Methods*, *19*, 160940691989922. https://doi.org/10.1177/1609406919899220

Olakanmi, E. E. (2017). The Effects of a Flipped Classroom Model of Instruction on Students' Performance and Attitudes Towards Chemistry. *Journal of Science Education and Technology*, *26*(1), 127–137. https://doi.org/10.1007/s10956-016-9657-x

Olewnik, A., Chang, Y., & Su, M. (2023). Co-curricular engagement among engineering undergrads: Do they have the time and motivation? *International Journal of STEM Education*, *10*(1), 27. https://doi.org/10.1186/s40594-023-00410-1

Opintopolku. (n.d.-a). *Higher education*. Retrieved July 29, 2024, from https://opintopolku.fi/konfo/en/sivu/higher-education#:~:text=Finnish%20universities%20have%20a%20three,Bachelor's%20and%20the%20Master's%20degree.

Opintopolku. (n.d.-b). *Study Programmes—Engineering Bachelor's Degrees in Applied Sciences University*. Retrieved July 29, 2024, from https://opintopolku.fi/konfo/en/haku?koulutusala=kansallinenkoulutusluokitus2016koulutusalataso2_071,kansallinenkoulutusluokitus2016koulutusalataso2_072&koulutustyyppi=amk,amk-alempi,amk-erikoistumiskoulutus,amk-opintojakso,amk-opintojakso-avoin,amk-opintokokonaisuus,amk-opintokokonaisuus-avoin,amk-ylempi,amm-ope-erityisope-ja-opo&order=desc&size=20&sort=score

Osam, E. K., Bergman, M., & Cumberland, D. M. (2017). An Integrative Literature Review on the Barriers Impacting Adult Learners' Return to College. *Adult Learning*, *28*(2), 54–60. https://doi.org/10.1177/1045159516658013

Owens, D. C., Sadler, T. D., Barlow, A. T., & Smith-Walters, C. (2020). Student Motivation from and Resistance to Active Learning Rooted in Essential Science Practices. *Research in Science Education*, *50*(1), 253–277. https://doi.org/10.1007/s11165-017-9688-1

Pei, L., & Wu, H. (2019). Does online learning work better than offline learning in undergraduate medical education? A systematic review and meta-analysis. *Medical Education Online*, *24*(1), 1666538. https://doi.org/10.1080/10872981.2019.1666538

Perez, T., Cromley, J. G., & Kaplan, A. (2014). The role of identity development, values, and costs in college STEM retention. *Journal of Educational Psychology*, *106*(1), 315–329. https://doi.org/10.1037/a0034027

Polit, D. F., & Beck, C. T. (2012). *Nursing Research: Principles and Methods*. Lippincott Williams & Wilkins.

Porter, W. W., Graham, C. R., Spring, K. A., & Welch, K. R. (2014). Blended learning in higher education: Institutional adoption and implementation. *Computers & Education*, *75*, 185–195. https://doi.org/10.1016/j.compedu.2014.02.011

Raes, A., Detienne, L., Windey, I., & Depaepe, F. (2020). A systematic literature review on synchronous hybrid learning: Gaps identified. *Learning Environments Research*, *23*(3), 269–290. https://doi.org/10.1007/s10984-019-09303-z

Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, *138*(2), 353–387. https://doi.org/10.1037/a0026838

Robinson, K. A., Perez, T., Nuttall, A. K., Roseth, C. J., & Linnenbrink-Garcia, L. (2018). From science student to scientist: Predictors and outcomes of heterogeneous science identity trajectories in college. *Developmental Psychology*, *54*(10), 1977–1992. https://doi.org/10.1037/dev0000567

Rohde, J., Satterfield, D. J., Rodriguez, M., Godwin, A., Potvin, G., Benson, L., & Kirn, A. (2020). Anyone, but not Everyone: Undergraduate Engineering Students' Claims of Who Can Do Engineering. *Engineering Studies*, *12*(2), 82–103. https://doi.org/10.1080/19378629.2020.1795181

Rosenzweig, E. Q., Wigfield, A., & Eccles, J. S. (2019). Expectancy-Value Theory and Its Relevance for Student Motivation and Learning. In *The Cambridge Handbook of Motivation and Learning*. Cambridge University Press.

Rump, M., Esdar, W., & Wild, E. (2017). Individual differences in the effects of academic motivation on higher education students' intention to drop out. *European Journal of Higher Education*, *7*(4), 341–355. https://doi.org/10.1080/21568235.2017.1357481

Rusticus, S. A., Pashootan, T., & Mah, A. (2023). What are the key elements of a positive learning environment? Perspectives from students and faculty. *Learning Environments Research*, *26*(1), 161–175. https://doi.org/10.1007/s10984-022-09410-4

Savage, N., Birch, R., & Noussi, E. (2011). Motivation of engineering students in higher education. *Engineering Education*, *6*(2), 39–46. https://doi.org/10.11120/ened.2011.06020039

Schunk, D. H., & Zimmerman, B. J. (Eds.). (1994). *Self-regulation of learning and performance: Issues and educational applications*. L. Erlbaum Associates.

Shochet, R. B., Colbert-Getz, J. M., Levine, R. B., & Wright, S. M. (2013). Gauging Events That Influence Students' Perceptions of the Medical School Learning Environment: Findings From One Institution. *Academic Medicine*, *88*(2), 246–252. https://doi.org/10.1097/ACM.0b013e31827bfa14

Skinner, E. A. (1995). *Perceived control, motivation, & coping*. Sage.

Snijders, I., Wijnia, L., Rikers, R. M. J. P., & Loyens, S. M. M. (2020). Building bridges in higher education: Student-faculty relationship quality, student engagement, and student loyalty. *International Journal of Educational Research*, *100*, 101538. https://doi.org/10.1016/j.ijer.2020.101538

Stephan, M. (2021). *Online- und Präsenzlehre aus Sicht von Lehramtsstudierenden* [Doctoral Thesis, Friedrich-Alexander-University Erlangen-Nürnberg]. https://open.fau.de/server/api/core/bitstreams/f4a6c528-f39f-4366-8522-3b6b533a6502/content

Tayebi, A., Gomez, J., & Delgado, C. (2021). Analysis on the Lack of Motivation and Dropout in Engineering Students in Spain. *IEEE Access*, *9*, 66253–66265. https://doi.org/10.1109/ACCESS.2021.3076751

Tejedor, G., Rosas-Casals, M., & Segalas, J. (2019). Patterns and trends in engineering education in sustainability: A vision from relevant journals in the field. *International Journal of Sustainability in Higher Education*, *20*(2), 360–377. https://doi.org/10.1108/IJSHE-07-2018-0131

Tharani, A., Husain, Y., & Warwick, I. (2017). Learning environment and emotional well-being: A qualitative study of undergraduate nursing students. *Nurse Education Today*, *59*, 82–87. https://doi.org/10.1016/j.nedt.2017.09.008

Tilastokeskus. (2024). *Discontinuation of education by Sector of education, Region of education, Information and Year*. Tilastokeskus - Statistics Finland Free-of-Charge Statistical Databases. https://pxdata.stat.fi/PxWeb/pxweb/en/StatFin/StatFin__kkesk/statfin_kkesk_pxt_14pi.px/table/tableViewLayout1/

Valtonen, T., Leppänen, U., Hyypiä, M., Kokko, A., Manninen, J., Vartiainen, H., Sointu, E., & Hirsto, L. (2021). Learning environments preferred by university students: A shift toward informal and flexible learning environments. *Learning Environments Research*, *24*(3), 371–388. https://doi.org/10.1007/s10984-020-09339-6

Vermeulen, L., & Schmidt, H. G. (2008). Learning environment, learning process, academic outcomes and career success of university graduates. *Studies in Higher Education*, *33*(4), 431–451. https://doi.org/10.1080/03075070802211810

Washington, G. Y. (2019). The Learning Management System Matters in Face-to-Face Higher Education Courses. *Journal of Educational Technology Systems*, *48*(2), 255–275. https://doi.org/10.1177/0047239519874037

Webster, A., & Gardner, J. (2019). Aligning technology and institutional readiness: The adoption of innovation. *Technology Analysis & Strategic Management*, *31*(10), 1229–1241. https://doi.org/10.1080/09537325.2019.1601694

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review*, *92*(4), 548–573. https://doi.org/10.1037/0033-295X.92.4.548

Whiteside, A., Brooks, D. C., & Walker, J. D. (2010). *Making the case for space: Three years of empirical research on learning environments*. *33*(3), 11.

Wigfield, A., & Eccles, J. S. (2000). Expectancy–Value Theory of Achievement Motivation. *Contemporary Educational Psychology*, *25*(1), 68–81. https://doi.org/10.1006/ceps.1999.1015

Wigfield, A., & Eccles, J. S. (2024). The Relevance of Situated Expectancy-Value Theory to Understanding Motivation and Emotion in Different Contexts. In *Motivation and Emotion in Learning and Teaching across Educational Contexts* (1st ed., pp. 3–18). Routledge. https://www.taylorfrancis.com/books/edit/10.4324/9781003303473/motivation-emotion-learning-teaching-across-educational-contexts-gerda-hagenauer-rebecca-lazarides-hanna-järvenoja?refId=381b99ed-b96b-4f0f-bbbb-272060ed20d7&context=ubx

Winqvist, J. (2024). *Our commitment to privacy and security in Microsoft Teams*. Microsoft Pulse. https://pulse.microsoft.com/en/work-productivity-en/na/fa2-our-commitment-to-privacy-and-security-in-microsoft-teams/

Yle. (2024, April 16). *Finland Plans "Difficult but Necessary" Spending Cuts and Tax Rises*. https://yle.fi/a/74-20084026

Appendices

Appendix 1 Survey

Background 1

1. Group: Face-to-Face or Hybrid

2. My educational background before University of Applied Sciences:

- Vocational secondary education
- Gymnasium
- Both upper secondary and vocational upper secondary
- Other

3. Sex

- Woman
- Man
- Other

4. I study at the University og Applied Sciences

- 1st year
- 2nd year
- 3rd year
- 4th year or more

Background 2

5. Was mechanical engineering your primary study option?

- Yes
- No

6. I work alongside my studies

- Full-time
- Part-time weekly
- Part-time less than weekly
- Not at all

7. Answer the following statements

Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree

- Engineering studies have provided interesting learning experiences
- I have done well in my studies
- I am looking forward to my future studies
- I feel overwhelmed (excessive workload, stress, anxiety)

Motivation Part

Definition: Motivation manifests itself in the individual's actions as perseverance, goal-orientation, fighting spirit and a strong belief in something. Motivation gives rise to goal-oriented action, the intensity of which depends on how eagerly the individual strives to achieve the goals he has set. Motivation is the spark of action that tunes performance.

8. Assess your own motivation to study at the moment

- Highly motivated
- Quite motivated
- Somewhat motivated
- Little motivated
- I’m not motivated at all

Open-ended Questions

9. The three things that improve my motivation to study the most are:

10. The three things that weaken my motivation to study the most are:

11. Assess the significance of the following for your study motivation

Adds a lot, adds some, adds and does not subtract, reduce somewhat, reduce a lot

- Studying at Turku University of Applied Sciences
- Future Degree in Mechanical Engineering
- Good employment opportunities
- Cooperation with companies
- Learning new things
- Self-improvement
- Analytics of one's own progress on the course
- Studying in contact teaching
- Studying in remote learning
- Studying in hybrid learning
- Working in a group
- Independent work
- Fellow students
- Student parties
- Good grade for the course
- Failed course assessment
- Feedback on learning

- Guidance/support received during studies
- Good team spirit of the student group
- On-campus

Learning

12. Assess your own learning skills

- Very good
- Pretty good
- Neither good nor bad
- Pretty bad
- Very bad

Open-ended Questions

13. The characteristics of a good remote learning situation are:

14. What kind of support to do you need for remote learning situations?

15. Answer the following statements

Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree

- Set goals related to my studies
- I can schedule work related to my studies

Innovation Competencies

Definition:
The needs of working life and the skills required in working life are changing. Producing talent capable of innovation and innovation processes is one of the key challenges for higher education

16. Evaluate your current competence in critical thinking innovation competence on the scale below

Excellently, well, satisfactorily, requires development, poorly, I don’t know

- Uses experimentation and error analysis for problem solving
- Develop and experiment with new ways of solving problems
- Challenge the dominant situation
- Face the task from different perspectives

17. Evaluate your current competence in creativity innovation competence on the scale below
Excellently, well, satisfactorily, requires development, poorly, I don’t know

- Use intuition and your own knowledge to generate ideas
- Looking for new ways to implement ideas
- Presents new ideas
- Shows ingenuity in the use of resources

18. Evaluate your current competence in teamwork innovation competence on the scale below

Excellently, well, satisfactorily, requires development, poorly, I don't know

- Pay attention to the opinions of others and respond effectively to their comments during conversations
- Ask for feedback and comments
- Takes constructive feedback into account
- Provide and receive constructive feedback, collaboration, or assistance from a team member

19. Other thoughts

20. You can contact me for a motivation interview

- Yes
- No

Appendix 2 Interview Guide

1. Welcome and Introduction

2. Consent and Confidentiality

Before we proceed, I'd like to ensure that you understand and agree to participate. Hereby, I ensure confidentiality of your data. Your provided information will be used as data basis for my master's thesis and within the project group of project researcher XXX within the XXX research project.

Warm-up questions

Also, you have added your gender but just to be sure what are your preferred pronouns?

3. Background Information

Examining the educational background and status of the participants in their current engineering program

How is your current living situation?

4. Study background

In the survey you have mentioned that you graduated from XXX

Based on this, could you elaborate on the factors that led you to choose your current study program in engineering?

Motivation

Informal Contextualization: Motivation emphasizes the satisfaction of doing something for the sake of doing it and is the push one feels from wanting to be independent, skilled, and connected to others, which makes us do things because they make us happy and satisfied.

5. Current Motivation

All the questions listed below served as lead questions, from which spontaneous follow-up questions were generated and asked.

- Difference in Motivation since beginning and how currently?

6. Factors influencing Motivation

Negative factors

- Are there other factors that you think affect your motivation negatively?

Work-related

- You have mentioned that you work/don't work at all alongside your studies, do you think it influences your motivation to study?

Positive factors

- In your survey you have also named factors that would improve your motivation to study, in your case they were XXX - could you elaborate these for me please?
- Are there other factors that you think could improve your motivation currently?

7. Innovation Competencies

Definition Subdimension Teamworking: Ability to work effectively with others in a group.

- In your survey responses you have said about your teamworking competence - that it is mainly XXX.
- Have you had to use this competence within your studies?
- Do you think it is a beneficial competence to have for your context?

Definition Subdimension Networking: Ability to cooperate with people outside the work team who are important to the task of the group.

- Now thinking about this definition, have you had to use this competence within your studies?
- Do you think it is a beneficial competence to have for your context
- Are there study practices which slow down or hinder your teamwork or networking competences?
- What kind of practices would you need to better highlight these competences? How and why?

8. LE- Face-to-face or Hybrid

- Why did you choose to study XXX environment?
- In your program, do you primarily engage with traditional classroom settings and materials?
- How do you find your provided XXX learning environment?
- When asked about the support you would need for your XXX environment you said XXX.
- How do you perceive the impact of your environment on your motivation to study?
- Is there any additional support or adjustments that have been helpful or that might be helpful in the future to add to your motivation in XXX learning?
- You also work with the itslearning environment, how do you like this environment? How do you like the course structure?
- Now, how can your motivation in XXX learning be improved?

9. Strategies for Improvement

- You had mentioned that you look forward to your future studies but simultaneously that you to feel overloaded and XXX. Now what kind of support would you need and from whom to be more motivated for the rest of your studies?

10. Conclusion

- We are coming to an end. Thank you very much. Do you have any additional thoughts or feedback to share? Any questions?

11. Thank You and Closing

- If you something still comes to your mind, please mail me. As said in the beginning your data is handled confidentially and anonymously. In the following I will go over your transcripts and analyze the interview data and create my thesis around it. If you are interested, I can share my thesis with you once it is done.

Appendix 3 Coding Scheme

Representative Excerpt of the full Coding system

Theme	Main Category	Code	Subcode	Sub Subcode	Description	References	Key Example
Internal Motivation							
	Subjective Task Value				This category includes codes that describe factors motivating students to persist in their engineering degree, such as interest, perceived importance, task utility, and associated costs.	63	
		Intrinsic Value			This code captures the intrinsic pleasure and interest that the student derives from pursuing their tasks and studies. It includes statements about motivation from acquiring new knowledge and skills.	15	*'I mean, of course learning new things has always been fun and it's, it's interesting.'* (Mikael, hybrid, age group: 30–45)

Career Aspirations and Practical Benefits					
	Utility Value		This code includes statements about students' perceptions of how tasks contribute to achieving present and future aspirations, emphasizing the practical benefits and relevance of tasks to long-term career goals.	38	
		Career Growth	This sub-subcode refers to students' statements on career advancement opportunities, particularly for those balancing full-time work with studies. These students leverage prior work experience, seek recognition for their dedication, and aspire to advance in their careers.	15	*'The decision is that I don't want to work how do you say it on the ground floor for the rest of my life. So this is the major thing.'* (Joonas, hybrid, age group: 30–45)
			Job Autonomy	This sub-subcode includes students' statements on job expectations, such as the	6	*'But when I complete these studies,*

			ability to choose job roles and locations upon completing their degree.	*will I do something else? I don't know yet, but I mean this. Are now maybe the options or some kind of basically in the field of engineering would be.'* (Joonas, hybrid, age group: 30–45)
External and Personal Influences				
	Situational Factors		This category includes codes referring to the influence of individual circumstances and learning contexts on students' motivation, including the role of instructors.	220
		Individual Circumstances	This code addresses how various personal circumstances, such as	39

		financial status, relationships, well-being, and individual traits like time management and organizational skills, impact students' motivation. It includes statements on personal challenges perceived as unique to the student.		
	Interpersonal relationships	This code explores the impact of students' relationships with family members and partners.	7	*'But of course if we fight about something we we're supposed to do something on the weekend and then I can't because I have to study or have to work then then of course that's gonna you know yeah change or do things with my motivation.'*

					(Mikael, hybrid, age group: 30–45)
	Instructors' Role in Student Motivation		These codes refer to general statements about the role of instructors on students' motivation through their teaching methods, the support they provide, and their perceived motivation.	108	
		Course Design	This subcode explores the role of instructors' course design, encompassing statements about the organization, clarity, and complexity of course structures. It also includes reflections on the challenges perceived by students, as well as preferences regarding how exams are scheduled and the desire for variety in course structures, including online platforms such as Moodle.	30	*'Yes, it's a really good start that, but the only problem there is too that some teachers use their own kind of courses there. It's not the same for every teacher, they some do it better and some some are worse.'*

				(Onni, hybrid, age group: 30–45)
	Organized	This sub-subcode identifies instructors characterized as ‘organized,’ noting their structured approach to course content and online materials on Moodle, including clear communication of deadlines, assignments, and expectations .	20	*‘And then some good courses, I have, we have this one teacher, so he's the one who has put up all the videos and stuff. So he has very clear topics. He numbers them in like weeks.’* (Eero, face-to-face, age group: 18–30)
Institutional and Financial Support				

	Instituional Policies	This category includes codes related to comments, wishes, or suggestions about support forms provided by various entities, not limited to instructors. It encompasses references to governmental bodies, educational institutions like UAS, and other authorities that assist and guide students.	21	
	Individual Learning Approaches	This code captures student preferences for personalized learning methods and materials, highlighting desires for flexible access to course tasks and materials to better fit individual learning styles.	4	*'If the teacher allows you to do all the tests, it most of us do it because then we have the other subjects there and we can freely concentrate to them. But then we forgot about the subjects if we need it on,*

				for the exam always. But campus online is very good because I like it.' (Onni, hybrid, age group: 30–45)
Instructor Engagement and Teaching Methods				
	Instructor's Role	In this category, the codes describe students' suggestions and wishes related to their instructors and their teaching.	15	
	Feedback	This code details students' wishes for feedback from instructors, emphasizing the need for improvements in the present culture.	5	*'Mostly it's that when we are doing the exercises is good to get some positive feedback from teacher.'*

	(Matias, face-to-face, age group: 18–25)