Students' Reasons for Absence in First-cycle Engineering Education

– an Interview Study

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Summary

The importance of attendance in higher education has for decades been stressed for student performance. However, student absenteeism has in recent years been a growing concern globally – including in engineering education. Meanwhile, the educational environment has been influenced by the rise of digital learning resources, accelerated by distance education during COVID-19 pandemic. The changed behaviour suggest that attendance is not viewed as essential. This report aims to explore factors that influence first-cycle engineering students' decisions to attend or skip teaching activities at Lund University's Faculty of Engineering (LTH). Using a mix of both quantitative and qualitative methods, the research combines thematic analysis of student focus groups interviews and follow-up with survey data. Survey data is compared to quantitative existing data of systematic self-reported attendance. The thematic analysis of the focus group interviews highlights seven themes*: impact of prior study experience and expectations, learning measured by time spent, access to online learning resources, competing time commitments, social influences on attendance, experience of the teaching environment* and *self-reflection on learning strategies.* The survey shows behaviour peaks at no or almost no attendance and about 80% attendance for lectures. The findings indicate that high workloads and time constraints are main reasons for students to prioritise among possible learning activities and that they often substitute traditional in-class activities with alternative online resources. Furthermore, results indicate that the absenteeism behaviour is divided into two kinds, temporal and strategic absenteeism, where the second dominates. Students who are strategically absent describe a breaking point moment, when they question current study strategies and become absent, which is triggered by temporal absence in combination of poor teaching and high availability of alternative online learning recourses. Prior study experiences are likely influential since students express a lack of time to develop study techniques. The study concludes that student absenteeism is influenced by multiple factors, including prior learning habits, time pressure, and the availability of digital resources. Additional research is needed on how teaching activities can be adjusted to encourage students to be introduced to academic studying. The report calls for a reevaluation of the universities approach to the importance of attendance, suggesting that institutions

should focus less on increasing attendance and more on optimising learning activities to align with modern student behaviours.

Wordlist

*2F	All quotes from focus groups are indexed by number (1-3) for focus group and letter (F or M) denoting male or female.
CEQ	Course Experience Questionnaire – course evaluation survey and process used at LTH.
Degree X	One of the engineering degrees in this study (4+4 students). Degrees are often referenced to as "programs" at LTH.
Degree Y	One of the engineering degrees in this study (5 students). Degrees are often referenced to as "programs" at LTH.
GAI	Generative Artificial Intelligence. In this report referring to tools helping student learning and/or solving and explaining problems.
Introductory Engineering Course	All engineering degrees at LTH start with a degree specific introductory course.
Introductory Mathematics	The first three courses in mathematics at LTH (Calculus on One Variable part 1 (7,5ECT) and part 2 (7,5 ECT) and Linear algebra (6,0 ECT)).
Short instruction video	Prerecorded shorter videos (10-30 minutes) often given in module series over YouTube. Often the instructions follow literature that is used in courses and are not a substitute to lectures but rather supports other learning media as reading and lectures (as defined by Kay, 2014). At LTH, many students refer to such videos by a specific teacher from the Department of Mathematics, instead of simply calling them 'videos.' In this report, all references to the teacher's name have been replaced with terms like 'short instructional videos' or similar.

Lecture capture	Recorded lectures uploaded on course webpage. Recordings are either made live in front of students or more commonly entire lecture without live listeners (as defined by Kay, 2014).
LTH	Lund University – Faculty of Engineering (Lunds Tekniska Högskola)
Engineering calculation course	A non-introductory and engineering traditional course associated with hand-on calculations in typically physics or applied sciences.
Teacher name	All teacher names are anonymized as far as possible. When students mention a specific teacher, the name is replaced by [teacher name].
TekniskFysik	The website tekniskfysik.org, developed by students with the aim to share material such as lecture notes, summaries and solutions to exercises.

1 Introduction

The landscape of higher education is rapidly evolving as digitalisation enables increased flexibility and availability to learn. The structure of engineering education has for long time been settled globally. Traditionally, engineering education is known for its rigorous, hands-on curriculum with high focus on calculation, simulations and labs. In addition to high teacher-led time, students today have more recourses than ever before including lecture captures, video tutorials, online platforms and free educational online forums. Engineering students are seemingly well resourced for a thriving future.

However, during the last decade teachers at Lund University, Faculty of Engineering (LTH) have observed a decline in attendance at teaching activities, especially in foundational courses. Literature (e.g. Credé et al., 2010; Romer, 1993) has established a clear link between class attendance and academic achievement in first-cycle education. Considering this, new non-attending patterns are interpreted by many to be alarming. However, academic performance measures are not observed to decline, suggesting that attendance is not essential for academic success. This leaves some uncertainty to if previous study results still apply. More precisely it raises a critical question: Why are students opting out of lectures and structured learning activities? The declining attendance levels that have been noted in media outlets worldwide, e.g. by Grove (2024) and Otte (2024), is seemingly unexplained which suggest that there is gap between teachers and learners in their view of how learning is optimised.

Studies of the correlation between student attendance and academic achievement have largely been made statistically by comparing attendance and performance among other parameters (e.g. Bennett & Yalamas, 2013; Navas-Gonzalez, 2020; Marbouti et al., 2018). Some studies used free-text questionnaires (e.g. Hunsu et al., 2023; Fitzpatrick et al., 2011; Dommett et al., 2020) and a few used interviews (e.g. Menendez Alvarez-Hevia et al., 2020). None have addressed this growing issue in a Swedish engineering context. The purpose of this study is to explore reasons to students' propensity not to attend teaching activities in first-cycle engineering education. Revealing these motivations, we aim to give an understanding of the affects to declining attendance and give engineering institutions strategies for enhancing student learning in a new learning landscape. The project is carried out at Lund University Faculty of Engineering (LTH).

2 Literature Background

The importance of classroom attendance in engineering education has been emphasized for a long time. Romer showed in 1993 that there is a strong correlation between classroom attendance and course grades. In the study, he concludes that "it seems likely that an important part of the relationship reflects a genuine effect of attendance" and rejects all other possible explanations. Since the results of Romer, many follow-up studies have been conducted in the field of engineering and many yells for the same the conclusions as Romer (1993).

Colby (2004) shows a positive correlation between attendance and attainment in first year students in BSc, Internet Application Development, University of Central England in Birmingham. In a follow-up study by Burd and Hodgson (2006) with second-year Computer Science students at Durham University, five hypotheses were tested across five different modules over five years:

1. there will be a strong correlation between attendance and attainment

2. student attendance gradually reduces throughout the year.

3. morning lectures at 9 o'clock have the worst attendance.

4. students are less likely to attend if they know the lecture notes are available.

5. attendance rates for lectures are improving each [program] year.

The study confirmed hypotheses 1 and 5, partially confirmed 2 and 3, and left 4 unproven. The unproven and partly proven points are believed to be influenced by other major factors affecting attendance. The paper argues that student motivation is the overall driver of these correlations which suggest that attendance should be viewed as a measure of student motivation (Burd & Hodgson, 2006). Further, Meulenbroek & van den Bogaard (2013) studied 1st year civil engineering and mechanical engineering students in a third calculus course. They suggested a new formulation of the correlation hypothesis initiated by Romer (1993) and adjusted by Colby (2004) :

Hypothesis   When students fail to attend about three-fourth of the learning events, the chances of obtaining a good result are greatly diminished.

Supporting this attendance casualty theory is the meta-analysis made by Credé et al. (2010), covering 50 articles from 1927 to 2009 and 20 000 students. The high-cited report (relative to the scientific field) concludes strongly that attendance is the single most influencing factor on student performance in higher education, having stronger correlation than standardized admissions tests, high school GPA (USA), study habits, and study skills. The smaller portion of STEM or medicine discipline students, stems for a slightly higher correlation than the general student. Authors puts forward a recommendation to all students to attend lectures and concludes that the introduction of the internet does not change this correlation.

Since these early studies there have been studies both showing a non-correlation between attendance and performance (e.g. Keyser, 2019) and a correlation (e.g. Andrietti, 2014; Navas-Gonzalez, 2020; Bennett & Yalamas, 2013; Suárez et al., 2021). Furthermore, O'Brien & Verma (2019) shows a positive correlation between prior academic achievements and attendance. In literature during the last 10 years the research topic has expanded towards a broader context and different perspectives have been covered to explain the phenomenon.

One study examines how attendance is fluctuating over the semester in a degree course in Electronic Engineering, Robotics and Mechatronics at University of Malaga. The paper finds a maximum attendance in the first semester weeks and then drops continuously throughout the semester (Navas-Gonzalez, 2020).

Some universities have implemented strict attendance policies, with attendance levels around 80%. In Dehradun, India, students find a 75% attendance rule as too strict. A report by Kaushik et al. (2023) identifies long timetable gaps, long commutes, and fundamental topics that could be delivered asynchronously as major reasons for absences. Andrietti (2014) and Welsen (2021) report that attendance rules do not improve student motivation. However, Welsen (2022) notes that such rules might be sufficient to improve performance.

There may be several reasons for low attendance for the individual student. An overview of reasons found in literature questionnaires and interviews are shown in Table 1. Based on a survey study, Dommett et al. (2020) found that factors reducing chances of attending lectures were difficulty of attending (such as commuting time, work commitments, family, early mornings and late afternoons) and availability of online resources. O'Brien & Verma (2019) suggest female students, older students and commuting students have higher probability of relying on lecture captures rather than attending lectures.

Table 1: List of examples of reasons to be absent in higher education found in literature.

Reason	Reference
Quality of teaching among 1st and 2nd year students	(Méndez Suárez, 2021)
Commuting distance to learning activity among 1st year students	(Méndez Suárez, 2021)
Students view of the teaching quality of the lecturer	(Welsen, 2021)
Noone attends the lecture only if it's relevant to an assessment task	(Welsen, 2021)
Attendance does not depend on social and work commitments	(Welsen, 2021)
Time deprioritized due to heavy workload in parallel education	(Fitzpatrick et al. 2011)
Deadline or assignments are prioritized over attendance	(Khong et al. 2016)
Poor quality of teaching	(Fitzpatrick et al. 2011)
Scheduling early mornings or late afternoon (also applicable for high attending students)	(Marbouti et al. 2018)
Overlap of lecture content and information accessible online	(Khong et al. 2016)
Weather	(Khong et al. 2016)
Lectures are not found enough interesting	(Khong et al. 2016)

The availabilty of online resources is a topic of particular interest in the litterature. Numerous studies have been conducted on the correlation between availability of lecture captures and attendance, but with varying results. Morris et al. (2019) explored the lecture capture effects on various aspects including attendance and performance across disciplines. Result shows significantly but small lower attendance in STEM education when lecture capture was available. The same results are found by MacKay (2019) and Dommett et al. (2020). However, literature reviews like Nordmann & McGeorge (2018), calls for a non-correlation relationship. In an interview study, Dommett et al. (2020) suggest several reasons to students attending lectures despite available online resources, including need of routine, social aspects and better focus at campus activities. Moreover, there might be a gap between how students and teachers perceive the impact of lecture captures. In an interview study by MacKay (2019), students show positive on videos in their learning, enhancing notetaking, rewatching complex content and for preparing assignments, while teachers are focusing on risks for reduced lecture value, -attendance and -engagement. Lecture capture may also benefit students with learning support (e.g. dyslexia), supporting a more including learning environment (Robson and Kauffmann, 2022). In a statistical study, O'Brien & Verma (2019) categorisise four student behaviors:

1. '*traditional*'—high lecture attendance, low-lecture recording and high-lecture notes.

2. '*digital*'—low-lecture attendance, high-lecture recording and high-lecture notes.

3. '*minimal*'—low-lecture attendance, low-lecture recording and high-lecture notes.

4. '*phantom*'—low-lecture attendance, low-lecture recording and low-lecture notes.

It is found that prior acedemic achivment is highly correlated to current lecture utilisation behavior and that students with higher prior academic achivment had higher probability to be classified as either traditional or digital student (O'Brien & Verma, 2019).

The importance of context of performance-attendance studies cannot be stressed enough. For example, O'Brien & Verma (2019) discuss the reliability of data considering answer frequency, lack of interviewing method combinations and/or the impact of dicpline and university environment. In a chapter by Robson and Kauffmann (2022), they stress the importance of considering the study context when analysing the correlation of attendance and performance. Covering recent studies on attendance and performance in medical education, they are arguing for the importance of considering the following factors when analysing attendance-performance investigations: "type of assessment, the year of study of the students, if the course is knowledge- or application based, and whether there are practical skills aspects that need to be assessed." They suggest the examination method approach matters and proposes that in a context of knowledge-based examination as multiple-choice-questions, performance has no correlation with attendance. Furthermore, they are suggesting based on literature that different students use online resources differently. In addition to previous factors, it should therefore be noted that course modules are designed differently affecting behaviour. Also, the authors strongly suggest that availability of lecture captures does not affect performance on strong students, while weaker students make inappropriate use of the resources. Therefore, Robson and Kauffmann (2022) conclude that more guided support is needed for these students.

In complement to the statistical- and/or survey studies, qualitative studies try to explain the underlying reasons for how student make priorities (such as those listed in table 1).

Menendez Alvarez-Hevia et al. (2020) performed a case study on 1–3-year BA students at Educational Studies Programme at Manchester Metropolitan University, interviewing both students and university staff. The analysis was made thematically and

narrowed down to two main themes: 1) *key assumptions, structural and pedagogical factors* and 2) *learning and learners' matter*. The first theme covers students' assumption of influence of attendance, pedagogical elements that influence attendance, institutional arrangements, and perceptions of organisation matters. The second theme includes interactions and relationships with peers and staff; identity issues associated with attendance; agency and responsibility; and factors relating to student motivation to attend. In the study it is found that students highly value the sense of belonging to the academic environment, and when teachers add value to lectures through conversations with students and staff, hereof the last element is a factor for more sense of belonging. Furthermore, the paper concludes that absenteeism is a result of students trying to balance private life with academic life. The report ends with the conclusion that attendance is not always prioritised and valued as a direct indicator of performance.

Hunsu et al. (2023) investigated students' motivational goals, self-efficacy and task beliefs in relation to course attendance and prior knowledge in an undergraduate statistics engineering course at the University of Georgia, USA. They found that motivational factors (self-efficacy – belief to be successful, and task-value – perceived usefulness of a given task) are more valuable tools than achievement goal orientations. Furthermore, self-efficacy and task-value are more effective for attendance than prior knowledge alone.

Overall, based on our literature review the trend of increased absenteeism in higher education seems to be a worldwide phenomenon and concern. There exist both quantitive and qualitative studies, however, research is generally statistically oriented.

2.1 Framework: Student Engagement in Higher Education

A framework explaining students' willingness for attending teaching activities in higher education does not exist as of today. However, attendance is a common feature in broader conceptional definitions. One such concept is student engagement in higher education (Mandernach, 2015). Shortly explained, student engagement is about "the amount of physical and psychological energy that the student devotes to the academic experience" (Astin, 1984, p. 298). The framework of student engagement has seen increasing popularity in recent years' literature, advancing previous connected popular research topic as student retention (Tight 2020). In contrast to the disciplines of teaching practices, retention and pedagogy, student engagement explains how students are acting and learning (Coates, 2005). Chapman (2003) divides student engagement

in three main criteria: cognitive-, behavioural- and affective criteria. The *cognitive engagement* is the degree of psychological effort put into learning and the use of learning including attendance. The *behavioural engagement* refers to the degree of active participation in the learning situation. Finally, the *affective* (or emotional) *engagement* refers to students' (time) investments in and reactions to activities, peers, the teacher, and students' sense of belonging to the discipline environment. However, literature describes that a student engagement definition cannot be done explicitly since all the criteria are interfering. Also, the scope of these engagement factors is dependent on the institutional context (Mandernach, 2015; Fredricks et al., 2004; Kahu et al., 2013).

Kahu (2013) constructs a conceptional framework for identifying the broad variety of perspectives on what influences student engagement. In her literature review four main features are found: Behavioural-, psychological-, socio-cultural-, and the holistic perspective. The framework developed by Kahu (2013), explains six disaggregated elements: the socio-cultural context; the structural and psycho-social influences; engagement; and the proximal and distal consequences (see Figure 1). The engagement element consists of Chapmans' (2003) criteria. The elements are not separate matters but rather a complex of influences that interacts with each other (Mandernach, 2015). It should be noted that the socio-cultural influences are embedding all other elements since this element does not only interact with the student engagement but works as an additional layer to all other elements (Kahu, 2013). Kahu's framework puts the student engagement in the context of the university community. Robson and Kauffmann (2022) reflect that it is not pinpointing engagement in classrooms specifically, while in many literature reviews on student engagement, attendance is seen as main indicator (Robson and Kauffmann, 2022).

Over the years multiple ways of measuring student engagement have been developed – all with its pros and cons. One such method is the Course Experience Questionnaires (CEQ), which has been used by LTH since 2003. Originally developed by Rixon & Ramsden (1996), it covers evaluation of the learning experience. It addresses main topics of how students may engage in a course (Coates, 2005). Mandernach (2015) provides further examples of systematic measurement methods.
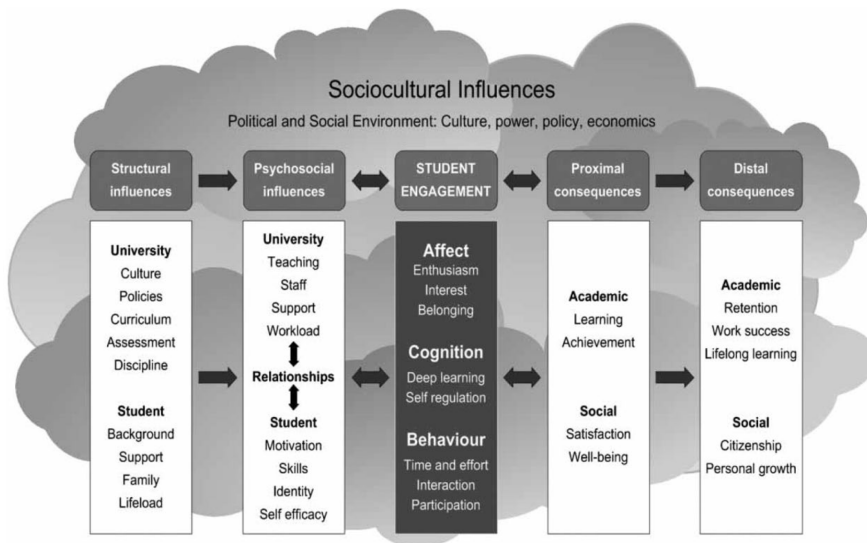
Figure 1: An illustration of the conceptual framework for student engagement in higher education proposed by (Kahu, 2013).

In the above discussed paper, Kahu (2013) also highlights the difficulties in separating the psychosocial influences on student engagement from the impact of students' approaches to learning. As defined by Biggs (1988), the most notable approaches to learning are the *surface-, deep-,* and *achieving* (or strategic) *approach*. Students with a surface learning approach primarily aim to gain credentials in the most straightforward way possible, focusing on easily measured progress. In contrast, students with a deep approach view their education as a way to state their intrinsic curiosity and thus make more connections to previously attained knowledge and/or personal experiences. Both approaches can be combined with the achieving approach, which is centres on the goal of achieving good grades through organisation and thought-out time management. While the achieving approach is more about the overall structure which students employ during their studies, the surface- and deep approach refers to how students internally process knowledge and their motivations for attaining new knowledge.

2.2 Previous case studies on student experience in STEM education

On top of prior literature connected to attendance, there have been several studies on the student experience among STEM students. To start with, Scheja (1997) describes in his PhD thesis how engineering students at the Royal Institute of Technology in Stockholm refer to learning as matter of time. Three main themes were developed from interviews: 1) students are experiencing time pressure, 2) students have difficulties in prioritizing, and 3) students are experiencing a lack of understanding of the course content. One recurring topic in the interviews is that students express being in/out of phase with their studies [SWE: "att ligga i/ur fas"] (Scheja, 1997). Similar results are found in a Finnish study among bioscience students 10 year later where results shows that time management control is crucial for academic achievement. Furthermore, social support and self-regulation skills are reported to enhance the outcomes (Rytkönen et. al. 2012).

At LTH, projects have been made on surface and deep approach to learning in introductory courses for first year students. In a survey from 2011, results show that students in their first semester seem to shift their learning approach from a deep learning approach prior to academic studies towards a more surface approach to learning after one year (Malm & Roxå, 2011).

2.3 Context of Study

LTH is a faculty at Lund university and has engineering-, architecture-, design- and technical educations in a diverse number of disciplines. The engineering degrees have common courses arranged into four study periods. Two periods (of 10 weeks each) make one semester. There is one autumn semester and one spring semester (30 ECTS each). Most commonly, each study period consists of two parallel courses (modules) worth 7,5 ECTS each but exceptions exist in the first cycle of engineering.

First-cycle engineering education at LTH is characterised by fundamental courses in mathematics, thermodynamics, mechanics, programming, and/or chemistry. Courses are often taught in large scale lecture rooms and with stream-lined teacher-assisted exercises. Exercises are usually signified by exercise booklets, a weekly number of exercises and time slots with teacher-assisted activities during which students can ask questions to course personnel about specific booklet exercises or theory in general. Additionally, students are encouraged to participate in Supplemental Instruction (SI) activities weekly, group discussions organised by students (see e.g. Malm et al., 2018).

The first semester in a five-year engineering degree, there are typically four courses over two study periods. The first study period normally consists of a course in *Introductory Mathematics* (first calculus out of three) and an *Introductory Engineering Course* specific to degree program (e.g. civil engineering). Study period 2 is typically characterized by a second course in *Introductory Mathematics* (number two out of three) and a fundamental calculation course (physics or mathematics). Most courses do not have an explicit requirement for a passing grade in more fundamental courses and blocking courses are rare. Reexams are planned to around easter for both study period 1 and 2.

At LTH all finished courses are evaluated by students with CEQ (Course Experience Questionnaire). The questionnaire was empirically developed by Rixon and Ramsden (1996) based on six key learning process factors: good teaching, clear goals, workload, assessment, independence (not used at LTH) and generic skills. Borell (2008) gives a background to LTH's 26 questions version of CEQ. LTH version also includes a self-estimation of attendance on a scale 0-100 with options 0, 20, 40, 60, 80 and 100, where 100 is full attendance.

Higher education in Sweden has in recent years experienced strong digitalisation (accelerated by the pandemic), but also Swedish school system. A wide array of digital integrated learning platforms has been developed. YouTube, streaming services and other informative video content has emerged as important information services for the youth (i.e. Kay, 2014; Barnes et al. 2023). In Sweden, more than 60% of people born in the 00's has used YouTube daily in 2022 and 2023. Learning and inspiration are two of the main reasons youths use YouTube (Internetstiftelsen, 2023).

2.4 Research Questions

In this project, the aim of the study, to explore factors that influence first-cycle engineering students' decisions to attend or skip teaching activities, is further developed into five specific research questions.

- How do the students define teaching and attendance?
- What are the students' stated pros of not attending lectures and how does it matter to their learning?
- When do the students decide whether they should attend or not and how well is this decision thought out?
- How do the students strategically decide to not attend teaching activities?
- How well do attendance patterns align with the student engagement framework?

3 Methodology

Both qualitative focus group interviews and quantitative methods, including analysis of existing attendance data (CEQ) and a follow-up survey are used. The research process was partly iterative.

3.1 CEQ-data

The LTH CEQ database covers all credit course evaluations since the academic year of 2003/2004. Due to the systematic evaluation approach, data can be aggregated in various ways across faculty. Also, data was collected from Proplan, an inhouse software system used for course administration at LTH. This data contains course level indexing. For all statistical data, python code was developed for data preparation including filtering, merging, and aggregation.

The two data sets were merged on course level. Only engineering courses were relevant for this study, thus courses from the department of *Architecture and Built Environment* and the subunit "Industrial Design" of *Department of Design Sciences* are removed. This filter matters marginally since these units are associated with high degree of mandatory attendance. It can be discussed if additional interdisciplinary courses should have been removed from the data set, but after initial analysis they were found not to be significant to results.

The aggregation process of overall attendance is done through weighted averages, where individual course's values are summarised and weighted based on number of answers. There is no regard to number of credits per course in the aggregation. There are two reasons behind this. Firstly, the number of credits does not necessarily correlate with hours of teaching activities (attendance) and secondly potential course quality key figures should not be deprioritised/prioritised due to number of credits.

3.2 Qualitative study and analysis method

Focus group interviews differ from individual interviews in that interaction between participants is encouraged around a specifically focused topic (Gibbs, 2012). In focus groups participants can discuss, complement and comment on what is said compared to ordinary one-person interviews. One advantage is that discussions are dynamic, and synergies can be found. Shared ideas may generate new insights to participants that can help reflection and deeper understanding. For this project focus group were considered useful for its' possibility to enable participants to observe and reflect on their own past behaviours through sharing with others, which may start insights that otherwise would not be shared in individual interviews. Another benefit is that focus group interviews run lower risks to repeat the already stated and instead expand and deepen the shared understanding. When participants listen to each other focus can be shifted to contrasting views, other perspectives or topics of interest.

3.2.1 Participants in Focus Groups

First- and second year engineering students from three different engineering degrees (hereafter called degree X, Y and Z) were contacted during the first half of autumn semester to ensure a mix of student cultures, degree application demand and disciplines. Students were invited via learning management system (Canvas), via class group chats and one group was informed by their professor. A project description and sign-up form highlighted a focus on students with low attendance, though high-attending students were also welcome. Both in-person and online interview options were given. This process generated one student. A follow-up message clarified the definition of attendance to "participation in teacher-led on-campus activities in student schedule" and relaxed the low-attendance focus. This increased number of participants to 13 students after messages via Canvas and via one-way social group chats.

Students were divided into three focus group interviews: 4x2 for degree X, 5x1 degree Y and no degree Z. Blending of degrees was not chosen since it might lead to students comparing their courses rather than discussing attendance. All students who volunteered to participate were welcomed, and students ranged from those who only attended compulsory tasks, to students who attended everything. In total, elven students were from year 1 and one from year 2. Five out of 13 were females. There was no selection basis, although gender ratio is mirroring overall degree gender ratios at LTH.

3.2.2 Interview questions for focus groups

Interview questions were open ended and in a semi-structured format. In this way, follow-up questions could be used if certain topics needed to be clarified, however interviews followed a relatively strict time plan and question load. Interview questions were initially developed by student assistants Samuelsson and Regnér and were inspired by previous studies on the same topic (for example Welsen, 2021; Fitzpatrick et al., 2011; Sloan et al., 2020) together with previous experiences as students. The interview questions were then discussed in the full group before they were piloted in a test interview with one student.

The first part of the interview questions focused on why students had applied to the program, their expectations (and if they were met) and first impressions. Next, students were asked to recommend next year's students how to study. After this, interviewees were asked to draw on a paper how their attendance had varied over time during the autumn and give an estimation of future attendance in ongoing courses. Discussions followed about why attendance varied during the course and why it varied between students. In the last part of the interview, students were asked to draw on printed schedules to show both which teaching activities they have chosen to attend, and at what times of the day they studied on their own. A complete list of the interview questions is found in *Appendix 1*.

The interviews were conducted by the two student authors, one who led the interview and one who took notes and picked up loose threads at the end. All interviews were in-person, held in Swedish and recorded. The interviewees were encouraged to interact with each other during the interview, for example by asking questions and saying if they agreed or not. Interviews were transcribed verbatim by the student authors who led the interviews.

3.2.3 Interview Analysis

A thematic analysis of the interviews was done according to the work of Braun and Clarke (2006). First, transcriptions from all three interviews were read through separately and notable citations were coded to identify themes through manifest analysis. A sentence or part of a conversation from the interview was deemed notable if it expressed something by itself connected to university, courses, or attendance. Non-complete sentences and ambiguous sentences were also not deemed notable.

Thereafter, a discussion where the identified citations and themes were compared ensued, and a joint list of themes was decided on. The transcriptions were read though separately once again, and the citations were fit into the new themes. The discussion

about themes was repeated to make sure all comments relevant to our research questions were included, and finalised themes with an accompanying list of relevant citations were decided on. Some quotes were not relevant for the themes and was thus not included.

3.2.4   Ethical Considerations

All participants signed a form of consent before the start of the interview, acknowledging that they were properly informed about the study, had right to send questions afterwards and the right to withdraw their participation at any time. The consent form is found in *Appendix 2*. The interview recordings are saved in a safe environment, only available for the research team. In this report and in all participating student names, naming of study resources, course names, teacher names, program names and indirect attributes (such as schedules) are removed or anonymised to prevent teachers and responsible staff to feel attacked without possibility to address possible claims. One exception is the math discipline since it is impossible to describe first year engineering education without distinguishing mathematics. The *Wordlist* in this report preface, tries to describe use of exchanged names. Our intention is that no teacher can be identified throughout this report as it does not aim to analyse individual courses but engineering education.

3.3 Follow-up Survey Method

At the end of the thematic analysis of the interview discussions, certain questions arose where quantitative answers were preferable. These questions were combined in a paper-form survey (*Appendix 3*). The follow-up survey aimed to answer the following questions:

1. Is there any difference between estimating attendance on a CEQ-scale and attendance on a continuous scale?

2. What is the general attendance pattern for lectures and teacher-assisted exercises?

3. How big impact has sickness leave on general attendance?

4. What activities do students include in the concept of 'teaching'(Swedish: "undervisning")?

5. Follow up on key reasons for not attending teaching.

6. Follow-up for attitudes towards teacher-assisted exercises and lectures respectively.

The survey was handed out to all attending 1ˢᵗ year students in degree X and Y at the first and third lecture respectively in semester 2 (study period 4). This was carried out three months after the interviews. The form was anonymous, and it was made clear that no one needed to answer if they did not wish to. The answers were manually transcribed.

4 Results

In this section we present the findings of our study. We start by presenting the attendance rates of students as measured by the self-reported CEQ-survey. Then follows a presentation of the findings from the thematic analysis of the focus group interviews and our reflections on these findings. Finally, we present the outcomes of the follow-up survey.

4.1 Attendance Rates at LTH According to CEQ

The plot seen in Figure 2 shows how students at LTH have answered the question: *To what extent have you participated in the various course activities?* when filling in their course evaluation form (CEQ). Note that the results cover LTH engineering courses overall and not the degrees studied in this report in particular. The CEQ data indicates a clear break towards less attendance as estimated by students from the year 2020/2021 (Figure 2). While attendance appears high at around 80%, this figure represents only a small fraction of the student population. Typically, only a limited number of students respond to the survey, and these respondents are likely the most frequent class attendees. We believe the CEQ overestimates the results, as will be discussed later in this report.

Moreover, attendance data is presented for *Department of Mathematics*, as a special case in Figure 3. Alike Figure 2, plots are for all LTH engineering students including degree X and Y. In the plot, the G1-curve include all introductory mathematics courses given by the department. The LTH curve in both Figure 2 and Figure 3 (black line) are used as a reference value. It should be noted that the academic year of 2020/2021 was heavily influenced by distance learning due to the COVID-19 pandemic.
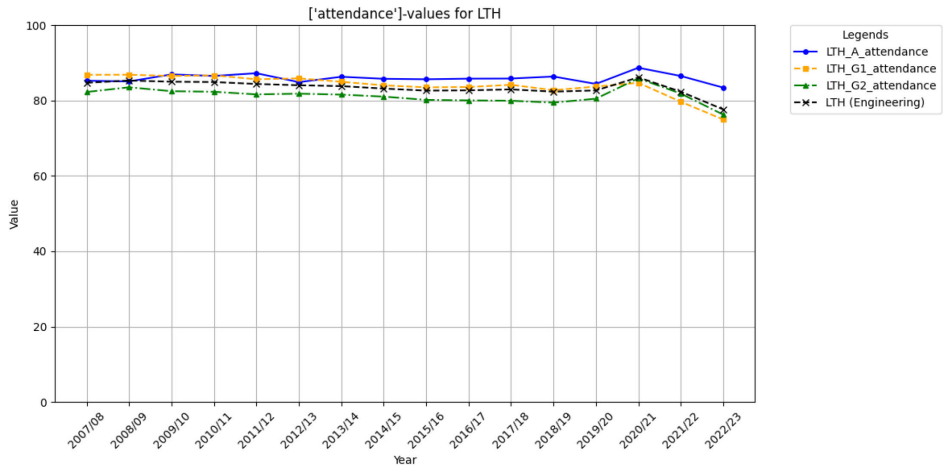
Figure 2: Self-estimated attendance among LTH students between academic year 2007/2008 to 2022/2023. The four lines indicates: G1 – undergraduate basic level, G2 – undergraduate continuous level, A – advanced level, LTH (engineering) – overall attendance at engineering courses.

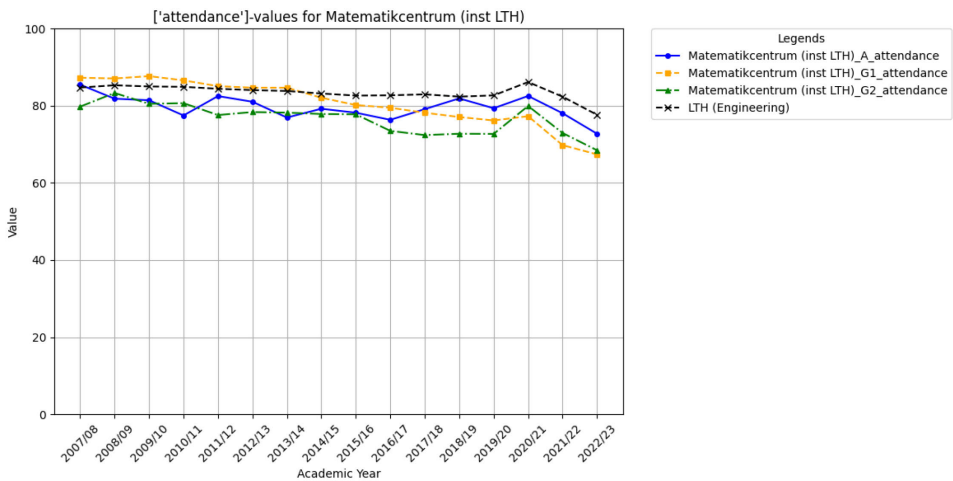

Figure 3: Self-estimated attendance among engineering students taking courses at the Department for Mathematics between academic year 2007/2008 to 2022/2023. The four lines indicates: G1 – undergraduate basic level, G2 – undergraduate continuous level, A – advanced level, LTH (engineering) – overall attendance at engineering courses.

4.2 Thematical Analysis of Student Focus Groups

In the student focus group interviews, seven themes were identified:

- Impact of prior study experience and expectations

- Learning measured by time spent

- Access to online learning resources

- Competing time commitments

- Social influences on attendance

- Experience of the teaching environment

- Self-reflection on learning strategies

An illustration of all themes and an overarching grouping is found in Figure 4. The first group of themes ("impact of prior study experience and expectations" and "learning measured by time spent") can be described as a background filter as these themes concern how previous education experience are thought to influence expectations and mental models about attendance. The second group consists of external course context factors ("access to online learning resources" and "competing time commitments"), which includes scheduling issues and if information is available online beyond campus teaching. The third group concerns the course experience but is focused on campus environment ("social influences" and "experience of the teaching environment"). This includes teacher interaction and influences of belonging and friendships. The last theme, "Self-reflection on learning strategies" considers how students reflect on their learning during studies and how this affect behaviour. This theme is partly based on all other themes but should be viewed as a separate theme.
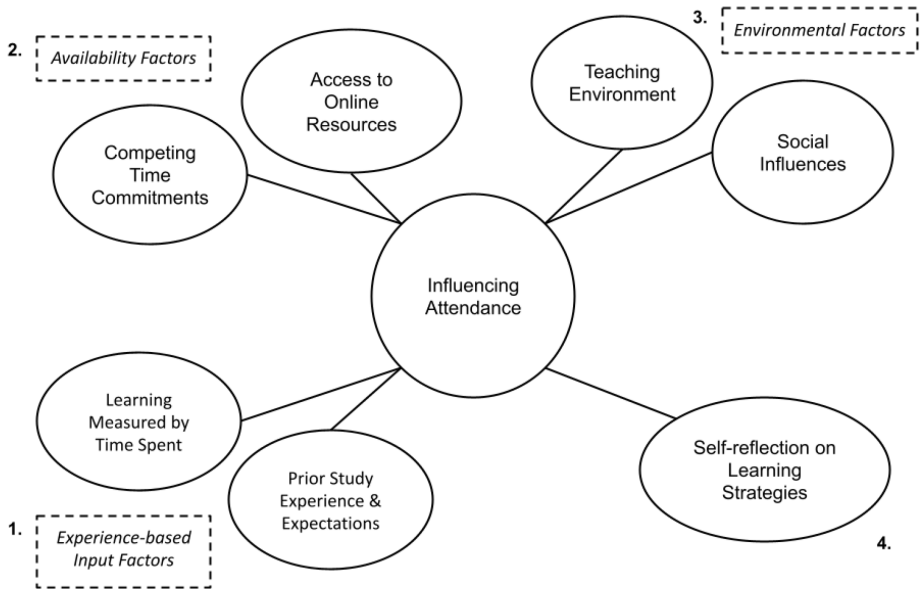
Figure 4: An illustration of the eight themes found in the focus group interviews grouped in four categories. 1). Factors concerning how students' previous experiences of studies influence attendance (themes: "prior study experiences & expectations" and "learning is measured in time units"), 2) course context factors ("availability to online recourses" and "competing time commitments", 3) the experience of the campus environment and -life ("experience of teaching environment" and "social influences") and 4) how students reflections during studies influences behaviour (self-reflection on learning strategies)

In the following presentation of the themes, we exemplify themes by quoting from the focus group interviews. The first number after each quote refers to focus group number and the second letter refers to if the student is female (F) or male (M).

4.2.1 Impact of Prior Study Experiences on Expectations

This theme consists of three aspects: expectation of engineering studies, beliefs of what is good for learning and lastly behaviors that are formed due to prior experience.

Most students interviewed had no prior higher education experience. Consequently, their expectations are largely shaped by their expectations and indirect perception about the university. Many interviewees expected more complex tasks, and a faster pace of study compared to high school. Most students mention these expectations had been met, however, some note that although they were mentally prepared, they were surprised by the quantity of the cumulative course content.

All students said that they had an initial positive attitude toward attendance when starting university and they interpreted attendance as essential for success. For example, on the question "what advice would you give new students in your engineering degree?", a typical answer was "start by attending lectures and participate in everything from the beginning". This attitude also emerged when study techniques were discussed. The students seem to start with a study technique that favors attendance in all teaching sessions.

> The study technique was quite challenging initially to figure out how to study. I attended a study technique lecture which was quite helpful. And then, I continued as in high school, attending all classes. And the teachers in the classes have advised us to read the book beforehand, which I've done, and I think it has worked. So, I've stuck with that somewhat traditional approach. (1M)

The 'traditional approach' refers to high attendance as a standard study practice and the attitude appears to be influenced by the mandatory attendance policy in Swedish high schools. Finding a suitable study technique is challenging for students after just a few weeks at university. Many do not reflect on their study methods, feeling there is little time for experimentation, and thus continue with the strategies they used in high school. In one of the focus groups the following conversation emerged about how they learned to study the way they study for the moment:

> For me, it's like I haven't tried anything else because in high school, I practically had no study technique. And there were hardly any requirements to have one. It went well for me anyway. So, I haven't had the chance to try many different things. I think it's a bit too late to experiment with things now because I only attend lectures and try to work on it the same day, instead of postponing and watching short instruction videos. And then I'll see how it goes. (3M)

> And kind of the same for me. I haven't really had a study technique before. There haven't been those very high demands in high school or elementary school. Back then, it was just attending lectures or classes, listening to what's happening, and then you understand a lot there, and then you just apply it. Now it's a bit harder in university because now you must complement it with a lot of self-studies beside lectures, because it's not just sitting in lectures because usually, there's so much that you go through, and you don't have time to hammer in any knowledge. (3M)

> Throughout high school, I got a significantly better study technique in three years because I learned right away that I prefer to sit and study alone, and that's where I learn, not in lectures. (3M)

These students describe strategies they developed in high school. Two had no formal study technique, while the third was accustomed to studying alone. Moreover, several students relate their study techniques with a trial-and-error strategy. When students perceive that the studies are going okay, they are hesitant to continuously test new study techniques. We will delve deeper into this topic later in the report.

Additional to prior university studies, this theme includes experiences during ongoing studies. Student perceptions develop quickly, both individually and in groups. Some students described behaviours or opinions as if there was a collective agreement, even among those who didn't know each other. In the following quote, a student compares how the interest varies in two courses.

> Introductory Engineering Course also feels much more useful to us because I don't think we'll use much of the math we go through until later, maybe in the third year or something like that. So, it doesn't feel very relevant right now, whereas the Introductory Engineering Course is much more or, well, more relevant for us and more interesting. (3M)

In this quote, there's a perception that an initial mathematics course won't be useful for the student, affecting the student's motivation. Additionally, by using 'us,' the student suggests that this view is shared by the entire group, a sentiment the other interviewees support, even though they did not know everyone personally. The interviews revealed that students' judgments about different learning components often lead to specific behaviour patterns. For example, due to one or a few negative experiences at exercise activities, students now prefer to study alone.

> I feel that I study best when I'm alone and not when I'm with people because then I talk to them. So, exercise activities [teacher-assisted] probably won't be a go-to. (2M)

> I attended some exercises occasionally, but I found it too noisy and chaotic in there, so I prefer to stay home alone instead. If I want music, I can have it, and if I want silence, it's silent because I go to a quiet study room. (3F)

> I stopped attending exercises when I noticed that I wasn't focusing there at all. And when I started studying more independently, it got a bit better. But I still attended lectures. (2F)

These students all share a personal preference against the concept of teacher assisted exercises, resulting in consistent absence. Also, they sound convinced in their behavior.

Furthermore, many students prefer to avoid studying when they are tired, particularly during early mornings, as they see little value in attending sessions when their energy is

low. This supports that students avoid teaching activities they don't see as beneficial to their learning.

> Then you get very tired if you have two lectures in a row or something, which can happen. And then, if you get up early in the morning and feel tired, it will kind of sabotage a bit for the rest of the day. So, then it becomes harder to study because you feel less motivated. (3M)

Absenteeism seems to be influenced by personal limits, which vary between students. For some, it means not going to campus; for others, avoiding early mornings, social environments, or procrastination. One student noted that study-related stress led them to return to familiar habits. In that case, the student found studying at home liberating.

In summary for this theme, it is found common that there exist expectations and perceptions about how engineering studies should be conducted. Often these expectations (both individual and in groups) are based on experiences from high school, but new perceptions are also formed within the student group. A common expectation is that attendance is good for learning although conflicting individual preferences tend to grow stronger during studies such as 'better studying alone' and 'preferring learning when not tired'.

4.2.2   Learning Measured by Time Spent

The most consistent aspect among all students during the interviews, was the *importance of time* when it comes to learning. This theme 'learning measured by time spent' summarizes students experience of not having enough time and how this time management works.

When the interviewees should recommend new students how to pass exams, almost everyone mentioned the importance of using time efficiently. Several students instinctively mentioned that a lot of time was needed to pass the courses, and the answers reigned on a spectrum from *"If you spend enough time, you will actually be successful [in regard to passing the course]" (3M)* to:

> I really believe that you need to feel what is right and find your own thing. Because it is easy to get pulled along with everyone else and think that I need to attend the exercises since they, or the people I hang out with, do it, but that you find how you want to use your time. Because it really is about using your time. (2F)

While the first-year student below believes that sufficient time guarantees success, the second-year student emphasizes the need for efficient time use. The importance of

efficient studying is a recurring theme throughout the report. Students consistently noted the need to stay *'in phase'* with teaching plans to succeed. In one discussion, they explored the concept of being in phase, which is very descriptive:

> It's easier said than done but being in phase during the course.
>
> What do you mean by being in phase?
>
> We get exercises to each lecture which the teacher believes are relevant and usually there's not too many, maybe 4-8 exercises.
>
> Now there are a lot.
>
> Yes, now there are a lot.
>
> Like 25.
>
> But last course it wasn't too many, maybe up to 10, and then you could just do those exercises and if you do them on time, which is kind of impossible during the introduction period, but afterwards, the second month. If you are in phase there and are in phase when you start doing old exams, then it should be fine. And then you also notice what you know and what you don't know. (1M & 1M)

In another interview, a student mentioned being in phase when talking about what was needed to pass the course: "A lot of time. It's two math courses with quite high pace so you need to be in phase. And if you're not always very efficient when studying it takes a lot of time" (2M).

Several students mentioned an overwhelming amount of learning material, which hindered them to properly learn everything within available time. For example, one student said: *"I would have liked to revise the basics to a higher degree, but I feel like I don't have any time to revise because I have to move on"* (2F). This, once again, highlights the expectation to be in phase, and that being in phase but not fully understanding previous material is seen as better than thoroughly understanding but not being in phase. One student, when asked about her impression of a new course after the first lecture, expressed:

> You only have a certain number of hours each day and then you need to maximize them. And then I feel like those two hours were thrown away, and I don't know. Because I want to attend as they [older students] say it's a hard course, but if I feel like he [the teacher] only steals my time I'll stop attending because of that. But otherwise, I would have attended if you had an unlimited number of hours. (1F)

All students, regardless of attendance habits, were keenly aware of the need to manage their time effectively. Everyone was acutely aware of how much time they spend on studying. This is highlighted when students compare two alternative learning methods, as the learning is discussed in terms of perceived efficiency or learning per time spent.

> Then I realized, what am I doing? I can read the pages in the book in 1/3 of the time and probably understand twice as well. So, I did a little calculation there and realized that it was better to be at home. (2M)

In summary, time is a very common topic in the focus groups when discussing their studies. The often-used term "to be in phase" means to learn content-wise what is expected. Time is commonly seen as a limit for a student's learning and therefore students seem to be very careful about how they are spending it.

4.2.3 *Access to Online Learning Resources*

A recurring theme among all focus groups is the access to additional learning materials beyond what is offered to students in teaching activities, exercise booklets and course literature. More precisely, alternative resources mentioned are instructional videos, online search engines, student shared solution websites and mathematical standard solution websites. For several of the courses that students refer to, there exist recorded videos that partially or almost entirely mirror the course lecture content. These are particularly popular to use. It turns out in the interviews that this affects students' considerations for participating at lectures.

Students find several advantages in the video format, including a slower or faster perceived pace compared to campus lectures. The ability to pause the videos plays a significant role, as highlighted in the following quote:

> It's like crazy high tempo for 2 hours and you need to struggle to keep up and take notes and then a lot of the focus is on taking the notes instead of gaining understanding. So, to sit at home or something similar, watch a video and pause to write an example, to do what they talk about in the video, it makes a lot of difference. (3M)

Also, there are differences in how students perceive different types of video formats. Some videos are recordings of entire lectures from the COVID-19 pandemic, while others are shorter learning modules uploaded in playlists. However, there seemed not to be an agreement of which video type is the better.

> So, for me, who has not attended many lectures, short instruction videos have become some kind of teaching activity and sometimes I think his videos have a very good

explanation and sometimes I think [teacher name]'s videos [lecture capture] have good explanations, but it's a bit of both. Sometimes [teacher in the short instruction videos] is more concise in what he says so the videos are shorter, so you don't have to watch 45 minutes to understand a small concept. You can choose which video you want, learn about it, so it's a bit of a mix there. (3M)

The above quote also addresses the aspect of time efficiency, which is another advantage highlighted by the students. By substituting campus lectures by watching videos students argue that they save time. One reason for this may be that it's easier to navigate through lecture series themselves but also as one student explains is that recorded material can be more spot on compared to lectures. Students also seem to appreciate being able to compare how different teachers explain the same subject, which this quote highlights:

Particularly previous lecture materials such as PowerPoints or recorded lectures have been very useful because if you're in a lecture or I mean within both electrical engineering course and math course, if you don't really understand anything there you can go back to previous years and then you might find that they formulate it in another way. So, you get much more understanding, and you can go back to it. So having it available is very nice. (3M)

The advantages students bring up in the focus groups mostly relate to the video format, though sometimes more pedagogical reflections also come up. One student notes that the video format allows them to pause after 20 minutes and then work on calculation tasks.

Because I feel that when you watch the videos [lecture captures], when it's [teacher name], then he goes quite fast. He goes through something, and it never stops, it just goes on and on and on. So, if you then had some task that you can sit and solve for two minutes, it also gives the opportunity for someone who doesn't want to solve it to write down the remaining things because I have cases where I pause the video because I have to write, I write quite slowly, and actually being able to do that can be a good alternative. (2M)

Besides the benefits of videos over campus lectures, several students notes that they were already familiar with the video format in the learning environment. For example:

I've been watching videos for a long time, and I did that in high school too and I think that's very good. And there was actually a overlap with [the LTH-professor's] videos [already back then]. (2M)

All students in the focus groups were familiar with video learning, and no one opposed learning from videos instead of campus education. In addition to videos, interviewees

motioned other online resourses. Some say that it is easier to google math solutions than attending a teacher-lead exercise session.

> I've been to a few exercise sessions but even if I sit there, I'd rather bring up "TekniskFysik" or something else where I can look up what I don't understand. Because if I need to sit and wait for three others to get help and then I'm going to get help, I waste 15 minutes. (3M)

> The programming teacher [in high school] was quite boring and there are so many resources online in programming. If you have a problem, you just google it and there are hundreds of answers to people who have the same questions, so I just think it's better. (3M)

The reason often put forward by the student when using these digital services, are once again the limited amount of time. However, teaching assistant-led exercise sessions are not described as totally interchangeable. Some students mention that they prefer to discuss more difficult exercise problems (which are harder to find answers to online) with other students:

> What I've stuck to is that I know that the usual exercises don't really work for me. Sitting in a room and someone else answers questions, that's not really my thing. Especially not because, you know, "TekniskFysik" exists and most things can be googled, like Wolfram Alpha and everything is there. But on the other hand, difficult questions for higher grades that we go through in SI, I think are very nice, so what has worked for me and when I have learned is during exam weeks when I notice that it actually works and that I mostly study by myself and then before exam weeks, my study group sits down and goes through more complicated math problems. (1M)

However, this reasoning may only be applicable for students with ambitions to understand a course at a higher level than passing. To pass a course, another student reasoned that the material online is enough.

> We have quite a lot of resources: short instruction videos for example and PowerPoints, and then I feel that some lectures covered the same thing. It's enough with just the material online and that's also a reason why I didn't attend the lectures later, or after two weeks. But I think there are many more resources, and you can manage it on your own. But I have quite big problems with procrastination, so it also became difficult, you had to do a lot on your own. If you're in a lecture, then you're in sync in that way. (1F)

Finally, during the focus groups for Y-students, a distinction emerged as to why students were more inclined to attend the course in Introductory Engineering Course to a greater extent than a course in introductory mathematics. Several students referred

to the fact that when there was a lack of relevant recourses online, they seemed more inclined to attend the teaching.

> In Introductory Engineering Course, if you're not at the lectures then you must search quite a bit on the internet to find something similar, to learn, so it feels a bit more mandatory than just math lectures. (3M)

X-students used the similar reasoning for their courses *Introductory mathematics* and *Introductory Engineering Course*. But based on their discussion, it seemed that *Introductory Engineering Course* was deprioritized for the same reason as mathematics for Y-students.

> I was also a little more present in math [lectures] than *Introductory Engineering Course*. But it feels like math was the one you could do without lectures more in the sense that everything [all learning material] is online. But it's good of course. (1M)

To sum up this theme, it has been seen that interviewed students are using complementary and/or exchangeable digital learning materials – prerecorded videos in particular – a lot in their studies. Lack of time is a common reason for this use. Some students believe they can pass courses using only alternative resources. Different programs appear to prioritize and use alternative resources differently as the combination of parallel courses plays a role.

4.2.4   Competing time commitments

There are several non-academic activities that compete for students' time, causing them to deprioritise attending teaching activities. One such activity is part-time work. Both students with positive and negative attitudes towards attending classes, expressed that attending work was more important than attending classes. For example, one student said: "*Yesterday afternoon I had to work so I didn't attend that [lecture]. But if I hadn't had work I probably would've been there*" (2F). Prioritizing work over attending teaching activities was also observed in students who volunteered for a student association. One student, who previously had high attendance, now expected it to drop due to her new role.

Additionally, physical exercise and mental health were prioritized over attendance. This could include training: "Some days the Introductory Engineering Course-lectures were scheduled late, until 5, and then I couldn't attend. I had training." (2F) and visiting family: "And then on Friday I'm going home to Stockholm, so I'll miss an exercise session" (1M).

Another frequently mentioned competing activity was sleeping in the morning and/or studying late at night. This was seen among students with both high and low attendance. For example, two students with high attendance said: "I would say that I've attended everything, maybe missed some early morning lectures" (1M) and "I attended almost everything in the math course, maybe if there was something at 8 AM I skipped it because it's early" (1F). On the same theme, one student with low overall attendance expressed that early mornings were the reason to the non-appearance:

> For me it was the morning lectures. I'm always really tired in the morning so sitting through a lecture, and especially the second half of a lecture, can be really, really hard. So, I haven't managed to attend many of them, which is like all of them. But that's the reason for my low attendance. I've chosen to stay at home and watch videos instead. (3M)

Similar sentiment was expressed by a student in another interview, where he said that his productive hours of the day did not align with the times when teaching activities were scheduled.

> I think that many of the hours I study are often later in the day, and I sometimes like to study into the night. And personally, I've always found it easier to study at night. So, it becomes awkward with lectures that are quite early; I usually don't feel very well when it's very early. And then it becomes natural that I study further into the nights and can enjoy the sun in the morning. (2M)

The same student, who lived further from the university and was dependent on public transportation to get there, also expressed being unable to attend due to cancelled buses and trains: *"2M: I commute from Helsingborg. And the trains rarely work so it becomes some hours [of absence] here and there"*. Other students who commuted also spoke of morning lectures being even harder to attend as they had to leave home an hour earlier than their peers.

> I attend lectures which are later in the day since I commute. Sometimes it doesn't feel worth leaving at 7 just to attend a lecture where you feel that you know it. So, things [teaching activities] that begin early I've missed a lot. (1F)

While most students who mentioned competing activities referred to non-teaching activities, some also reported not attending certain classes because they needed the time to study for other classes with more pressing deadlines.

> And we've had a lot of labs and preparations for labs outside of what's scheduled so there has been a lot of time that went towards that, so the lectures I chose to put when I've had the time for it. (3F)

In summary, this theme is about students prioritising other time commitments than attending teaching activities to fit their life puzzle. During the focus groups such mentioned reasons were work, student engagement, visiting family, physical exercise, enough sleep, non-standard circadian rhythms, commuting, commuting delays and other close study deadlines.

4.2.5 Social Influences on Attendance

During the interviews, no direct questions about social aspects were asked. However, several students still brought up the subject in relation to their attendance and study habits. This theme can be further explained by the two subthemes: *the social need* and *the feeling of uncertainty and chaos*.

Social Needs

This subtheme is about how campus teaching is viewed partly or fully to fulfill the students' social needs. Several students expressed that it is boring and unhealthy to only study at home, and that attending lectures was a way to meet people. For example, one student said: "*It's not healthy to only sit at home and study, so today I attended the lecture just because I wanted to meet some people and then we sat here and studied* "(2M). Another student went even further in a discussion about what students heard from each other and how that affected if they wanted to attend or not. The student said that he would attend solely for the purpose of being social, and that he did not expect to learn the coursework from the lectures:

> It's the lack of hearing anything that makes me want to attend scheduled teaching and for me that is because of the social aspect. It's not very fun to be a digital nomad and just watch videos all the time. So that is something I'm planning on changing. But when it comes to learning and my education, the videos and the book will still be my go-to. (2M)

On the other hand, another student expressed that if a lot of social interactions were taking place outside of the educational context, the social aspect of teaching activities could feel like a burden, and thus not attending seemed the better alternative:

> You are also involved in other things and meeting people there. So sometimes the social batteries have run out and then I just want to get through the lecture on my own, and not talk to anybody. (2F)

In cases where social needs and educational needs conflict, one student expressed that they prioritized their social needs. This issue might be irrelevant for students with a large social network within the class, but for students with few friends in the class –

perhaps due to not participating in the introduction period – it could be crucial. One student mentioned that she missed classed on purpose so that she could study with her friends who were pursuing other engineering degrees. "*I commute to Lund quite often but not to participate in lectures or exercises. I study alone at campus and hang out with old friends*" (1F).

Some benefits of having course comrades include making studies more enjoyable and helping students feel more comfortable in the learning environment. Several students expressed that they would not attend if they did not have friends within the degree as having friends is what makes it enjoyable to be there. Another student expressed that exercise sessions, which she felt were uncomfortable and chaotic, were fine to attend if she did so with her friends. Thus, the social aspect not only makes the studies more enjoyable but also benefits the comfort and safety the students experience during the teacher-led exercises.

> I just feel like it's very bright and very noisy and not nice to be there. And if you go there with other people sure, but if you go there alone, I have often been made to feel stupid by the teachers and then I get stressed when people ask really specific and well thought out questions that I don't even understand, and then I feel bad from the external influence kind of. (2F)

In summary, many students attend lectures to fulfill their social needs, finding it unhealthy to study solely at home. Having friends within the degree program makes studies more enjoyable and creates a comfortable learning environment. Conversely, some students prefer studying alone when social interactions outside the educational context become overwhelming.

Uncertainty and Chaos

During interviews, first-year students describe several stressors that arise during the first semester of a five-year engineering degree. Much of the study environment is described as unfamiliar, for instance the study tempo and study routines. However, other aspects of university studies are also highlighted. One student finds the freedom new: *"What felt a bit strange to me was that up until high school, you've always been in a classroom, on lessons and such, but here it's very free. So, I've been at home a lot. I can study well then."* (3M) Another student mention more practical details with his studies:

> The difference is that you must keep track of everything yourself. Registering for exams and all those little things, registering for lab sessions, and so on. I missed that a few times. (1M)

The students anticipated engineering studies to be more difficult, despite finding them already challenging. What seems truly difficult is establishing effective study routines until gaining sufficient experience. One student expresses the first few months of studies as: "*I have very poor study technique and it's just because I feel a little overwhelmed by how much [course content] there is...*" (2M). Also, it seems common among the students to feel uncertain about the expectations for passing and students appear very stressed before the first examination weeks. The unfamiliarity of preparing compulsory tasks on time and unknown amount of time needed for exam preparations are two factors mentioned. Some students mention feeling stressed about passing exams, having heard that many students failed in previous years. Additionally, two students express an uncertainty about whether they have chosen the right program, emphasizing the importance of feeling a sense of belonging to their education.

The study situation for these students is not only characterized by study-related challenges but also by changes in their private lives. For many students, studying in Lund also means moving away from home for the first time and entering a new environment with limited connections to previous social networks. Some students describe this as a significant source of stress, emphasizing that the social context plays a crucial role in their success and avoiding failure.

> For me, it was very stressful when I came here, you didn't know anyone and you had to find accommodation and all that, so I felt a little better by seeing people around me. I think I would have panicked if I had just sat at home with the videos. - And then you could also find a sense of community in that everyone, or many, agreed that it was fast-paced and that there were basic things you needed to refresh again, so that was also nice. (2M)

However, consensus among the focus groups seems to be that most students gradually succeeded by finding their routines, and for some, despite an absence from scheduled teaching.

In summary, students' everyday lives during the first semester are characterized by uncertainty and chaos in relation to their studies and life situations. According to the students, social support appears to be an important factor in reducing this uncertainty.

4.2.6   Experience of the Teaching Environment

When specific courses and teachers were discussed during the interviews, students focused on three main points: how advanced and in-depth the explanations were, what tempo the lectures and the course held, and how well the teacher lived up to the student's expectation of what a teacher should do. The students exclusively measured the teachers according to their personal preference of level and tempo.

The optimal level of explanation was primarily connected to exercise questions and examples during lectures, not the general explanation of theoretical concepts. In a discussion about the first lecture in a new started course, two students said the following:

> But also, that he had a lot of examples, which I actually think is good, but here it was like "here is the formula" and then lots of examples with that. Meanwhile in math it's more explanatory and about understanding. Rarely any examples, which is sometimes bad in the other way, but now I felt like I could've just read the book and completed the exercises by myself. It was really unnecessary, and I probably won't continue to attend. (1F)

> The examples are at the exact same level as well, and that was the weird thing. It's the exact same exercise he just switched the numbers. And then three times over. (1M)

As observed, examples perceived as too easy can make lectures feel unnecessary, leading one student to stop attending altogether. Later, the same student noted that exercise sessions are only valuable if the learning problems are explained by a teacher in a way that is neither too advanced nor too simplistic.

> I think that the exercise sessions on the math course were quite rewarding (…). Like you can't ask your computer or dad, you must ask them. But you needed to ask the right teacher. [Teacher name] is maybe too smart, he's like "don't you understand that" while someone else is too stupid and gives you the wrong answer. But if you find the right one, I think the exercise sessions have been rewarding. (1F)

In a different interview, a student made a similar comment about the level of explanation by different teachers at exercise sessions. The student prefers student explanations rather than teachers since other students explain at a preferable level.

> [The exercise teachers in *Introductory Engineering Course*] were also students and I thought they were skilled; I received very fast and good help. I think that the math exercise sessions were almost a little bit worse as they [the exercise teachers] were

educated mathematicians and sometimes they have a hard time explaining at a level I understand. (2M)

The ideal level of instruction often appeared to be shared among students, both within the interview group and across different focus groups. For example, different groups who discussed the same teacher often expressed similar thoughts and feelings about the teacher's explanation level. In contrast, there was a much wider range of opinions regarding the ideal pace of lectures. Some students felt the lecture tempo was too fast, while others found it too slow. One student, among several, mentioned struggling to take notes during lectures due to the fast pace: "*In the end I just took a bunch of pictures. I took like 30 pictures. I made notes after the lecture. "(*1F) After this lecture, the student told us she stopped attending the lectures, for just reading the presentation slides instead.

The third aspect that students often linked to their likelihood of attending class was the teacher's personality and mannerisms, particularly how well these aligned with the students' expectations of a good teacher. This included factors such as whether the teacher was engaging or dull, comfortable in the classroom, and appeared knowledgeable about the subject. The following two quotes illustrate this:

> I think that *Introductory Engineering Course* truly is just reading from a PowerPoint, it's straight from the PowerPoint. And then I understand that you [pointing at another student] read it at home and especially when they only read the words. There's no point in being there. But in the math's course he writes on the blackboard with chalk. And sure, the tempo is high, but I think you follow along in a different way. And he is passionate about the subject. They are probably that in *Introductory Engineering Course* too but I wouldn't say that it feels like it. (1F)

> There's an exercise teacher who I think is really bad. I think he is a year above us and he can be pretty uninterested kind of and doesn't invite you to ask him or offer help as he sits there in a corner with his computer and when you go to him, he says, "okay I'll look at the exercise" and you have to wait 15 minutes to maybe get a solution. Which you could have googled instead. But others I think are great. They come to you, look at the exercise, explain it, you can ask questions and then you really get understanding. It's really good. (3M)

Two students who discussed their teacher, even concluded that they did not have any trust in his knowledge of the subject, because of him leading exercise sessions in a previous course.

> The lecturer we have feels unsure, a bit new. I think he's new. Also, because we have him as an exercise teacher in *Introductory Mathematics* and he didn't know anything. He had

his answer sheet, and a thick paper with the answers to every exercise but if you asked something he didn't know the answer. Or he kind of only know the answer. (1F)

No, you don't have the same confidence in him. (1M)

No, there's no confidence. (1F)

Lastly, a few of the students mentioned different teachers who they believed to be unkind or made them feel stupid when asking questions. In all instances of this being mentioned, it appeared to have a significant impact on the students and was something they remembered as negative experiences which reduced the likelihood of them attending teaching activities with that same teacher again. One example of such interaction is the one below, where the first student said this as an explanation of why he stopped attending the lectures in a course.

We switched lecturer in the middle of course, and the one we got after the switch, I didn't like his way of teaching. It felt like he didn't really understand himself and instead he just read from the PowerPoint, and he wasn't very good at answering questions. (2M)

And pretty rude as well. (2F)

Yes, he was. It was one time when a girl who sat a couple of chairs from me asked a question and he laughed at her and carried on, and that wasn't good. (2M)

Students evaluated courses and teachers based on the depth of explanations, lecture pace, and teacher's personality. While the ideal level of instruction was generally agreed upon, opinions on lecture tempo varied widely. Additionally, the teacher's demeanour impacted students' likelihood of attending classes.

4.2.7   Self-reflection on Learning Strategies

The final theme explores what we recognised from the interviews as how students make reflections and considerations in relation to learning and attendance. As the reflection process need to be based on some experience, this theme must be understood in relation to all other previous themes found in this report. However, in this theme we focus on the reflection process, how it happens, when it happens, and its' consequences explained by students. It should be defined as a separate theme as students evaluated their learning progress very often and in connection to different already explained themes.

In general, much of the daily and weekly planning were described to be based on what they have not done yet and how they need to prioritize learning these areas. This planning was observed to typically be guided by a comparative analysis, where two or more alternative decisions were weighed against each other and evaluated. We interpret the students as learning is an optimization problem with time as the limiting factor.

First, to understand what the students consider a valuable learning situation, we ask the students *how* they *actually* have learned the course content. On this question, we receive relatively distinct answers. Many students quickly respond that they learn the course content by doing exercises or solving old exams. They also seem to agree that the exam weeks (no scheduled teaching activities for 1,5 week) has contributed the most to their learning.

> With math, I felt [that I learned] when doing exercises because sometimes it could be very theoretical-heavy during lectures, but then when you had to solve problems, it became clearer. (2F)

> I feel like that was at the case studies, where you got to apply things and when I read in the book, that's when I learned basically everything. Except maybe examples. [...] Lectures were very theoretical-heavy, but you still learned, and then everything clicked during the exam period when you tested your memory a bit and had everything at once. (2M)

These quotes give an understanding of looking back on their learning, students refer to doing calculations. Thus, students seem to note that they should prioritize doing exercises for their learning. However, *how* they approached the exercises is not clear from the interviews.

Another aspect that emerges in the interviews is that only a few students provide specific examples of actual study techniques when asked for examples. Only a minority describe a learning process involving some form of study technique. Instead, many responses include activity-based strategies as in the quotes above; strategies focused on decisions such as whether to attend lectures rather than on how to learn the material. It seems that the strategies are centred on participation in certain activities rather than on methods for learning theory. Some students explicitly state that they do not use effective study techniques. However, all express a desire to have adopted a successful technique, citing reasons such as fear of trying or lack of time to implement one.

> I also maybe would have wanted to find a more concrete study technique. I tried various things during the exam period. I usually learn quite well by writing myself, so I tried writing down important definitions and such. Then reading before the lectures, reading what they're going to cover and flipping through the book a bit. (2F)

Regardless of whether students mean they have a study technique or not, they often use an activity-based strategy. This can be noted in the students' discussions about how they evaluate activities against each other. Hence, many of the students' self-reflections on learning are comparison based. There exist many examples of students in the focus groups who justify their systematic absence, by comparing potential activity outputs for a given time frame. Here follow three examples from each focus group how this manifested:

> I attended the lectures in the beginning of the first week in [engineering calculation course], then I realized that each lecture generated about a 1/3 of an A4 page, and that's not enough for me to do the tasks, so I didn't feel like it worked for me in that course. That's why my attendance was like 0% in all lectures there. So, then I did everything online instead and in the other course almost 100%. (3F)

> My start was like at the top, and I felt like I wanted to try everything. Try exercises, try SI [student-led discussion activity]. But I noticed quite early that exercises weren't for me, and morning lectures I felt like if I forced myself to attend, then it was like I attended the lecture, but the rest of the day was ruined a bit. So, I strategically chose to skip them. (1M, [fig. C])

> And then why I don't attend the lectures: I feel that if I go and maybe keep up a bit but get distracted, then I get very tired when I come home, and then I don't get any studying done. And then it's a very poor use of my time. So, if I spend the equivalent time by just going through it on my own, then usually I manage most things. (2M)

These ways of explaining absenteeism were very frequent during the interviews and based on conversations when the students were explaining what they had done the current week, these decisions were made on a daily basis.

Apart from decisions and reflections on daily basis, there were reflections on their long-term strategy versus the learning outcome too. One such long-term strategy is being systematically absent from lectures and teaching sessions. It emerged from interviews that this decision was considered carefully by the students. A common theme for the typical systemically absent student is that they seem to have undergone a study phase where they had questioned their current approach to studies. For example, one student encourages new students to question their study habits early on in their semester.

> Start by attending the lectures and be present for everything from the beginning. But then it's also important to think "does this really work for me?" Because you might be sitting there spending 8 hours on pure lecture time every week, but it gives you nothing and you need to supplement just as many hours afterwards because you haven't understood what has been covered then you can spend that time on much more

important things. Because I realized that [teacher name]'s lectures didn't work for me. Because I needed to supplement just as much as if I hadn't been there. And that's why I went to short instruction videos instead. Even in next mathematics course, which I also had [teacher name] in, and those exams I passed without a problem. So, it's also important to think about "how does this work for me" and not just attend the lectures because someone said you should do it. (3F)

The other students in the focus group nodded in recognition and understanding of this situation and similar ideas were supported across focus groups. Students emphasize in various ways that it is valuable to adopt an alternative study strategy, rather than following the traditional teaching structure. And by learning from the following quotes, the earlier on the better.

I would say that you shouldn't feel that you have to do something just because it's part of your "curriculum" and that if you, for example, don't want to attend the lectures and don't get much out of them and quickly realize that it's not a good use of my time, it's two hours, and instead focus on solving the tasks and use the videos as support to do that. So that you actually keep up with the task schedule. (2M)

I was thinking about [term] teaching more like how much I learn, and my thing has been how much I think I have learned. And then here in the beginning [pointing at drawing] I thought, oh I was at all the lectures, I learned a lot, I thought, this is going well. Then I realized that I probably didn't. It's easy to fool yourself and think that just because you've completed certain tasks or maybe understand the tasks, you think you've learned, but you really haven't. So, then I had a little dip and felt that I needed to ask myself, do the lectures give me anything? How do I really learn it? Because then I noticed during the beginning of the exam period that I probably didn't know as much as I should know. And then my understanding increased a lot when I stopped cheating and really went through the stuff thoroughly. (2F)

Furthermore, some of the students are very encouraging to recommend other to change strategy, which can be summarised with "And then to dare, if you feel that a certain teaching style doesn't suit you, to dare to take the step and do something else, something new."(2F) Most of the systemically absent students seemed pleased with their decision (at least up until the interview approximately one month after the decision). In the following quote one student explains that she got more efficient when she stopped attending lectures.

I have then taken the step to learn the next math course myself and it has worked very well. I feel that I am more efficient and with planning too. Really look over what do I need to do and when should I do it because you also have other things, more enjoyable things, you should do so you must plan so you get some balance. (2F)

Also, this quote is an example of that time management is pointed out as one of the big benefits of skipping teacher activities and among interviewed students, better time management control is highly desirable. Additionally, very interestingly, two of the interviewed students said that they were in this phase of questioning of their study behaviors in this very moment.

> I started attending all scheduled teaching, but I think I'm at the breaking point now that I feel like the math lectures aren't very rewarding. I think that if I'm going to use my time better, I can probably use the time on my own and learn it on my own. But I'll probably still feel what's happening so then maybe I'll take a look, but then maybe I'll leave too, I don't need to sit through the whole lecture if I feel it is not very rewarding. (2F)

In this case, this 'breaking point' seems to be a very uncertain phase for the student. Also, the breaking point seems to be initiated by an experience that it is not rewarding to attend lectures compared to studying on your own. A unique detail in this quote is that the student considers only to be present half of the lecture if it does not seem valuable. In previous discussions with systemically absent students, they seemed to attend either everything or nothing. During the focus groups, we do not listen to any student who strategically choose to attend only each second lecture and using alternative recourses for the other parts.

Another student, who has so far attended all lectures, claims that it is better to adjust strategy at course start rather than somewhere along the way.

> I felt like that 'it is best to quit [stop attending] while you're ahead, so that I don't get influenced too much of it'. (2M)

The rest of the focus group nods recognizing, which suggest that sticking to plan is better than changing the strategy. However, this is not always possible. Absence caused by illness is a common subtheme to how students have got to the point where they do not find the lectures rewarding. The students in the following quotes describe that it was very difficult to catch up after falling behind the lecture schedule:

> I had a fairly high attendance the first week because I wanted to stay on track. Then I got sick and missed some important lectures, mainly in math. So, I didn't really get the understanding in some subjects. I couldn't study for about a week to a week and a half. Then I struggled to catch up, so I attended lectures afterwards, and then I noticed that I couldn't quite follow because it built on what was taught earlier on, so for the past few weeks, I've had to do a lot of self-studies to catch up on what I missed. And to gain the understanding that I lacked, so I haven't been able to attend lectures or exercises as much. (3M)

> We had some repetitions at the beginning of Introductory Mathematics, and then I felt like I didn't have the energy for it. And then I stopped going a bit. And then I got sick too, so I fell behind, and then I felt a lot like "if I'm behind, I won't understand what they're saying in the lectures, so there's no point in me going." So, it was quite a lot of staying at home because I thought I wouldn't learn anything since I was so far behind. Then I worked my way back a bit. And started going to lectures a bit, and then towards the end, I also stopped going to those lectures. (3M)

In addition to illness, one student describes procrastination be the reason why she first fell behind lectures. She shares the same experience that it feels difficult to understand the lectures when trying to catch up.

Almost every student we interviewed seems to have reflected on their study habits and as a result concluded systematic absenteeism could be a solution. But as one student explains, it doesn't necessarily have to be the conclusion all students draw when falling behind and he repeatedly understrength how self-discipline could be one factor.

> I can imagine that it might have to do with everyone having different ways of handling it. Either you can do like I did, stop attending lectures and catch up at home, which I wouldn't recommend, or you can attend every lecture because you think: "now, I must be very active and catch up". So, for some, it [attendance rate] may go up when falling behind, and for others, it goes down. (3M)

Overall, the students give a perspective of being very keen on understanding the courses' content. It is not typically about a low interest to learn or giving up. In fact, their questioning reaction and commonly followed by systematic absenteeism, often stems from the fact that they do not understand the course content and want to spend more time with it. The high importance of understanding can also be seen in students considering lectures and teaching exercises to be "unnecessary" when understanding is not encouraged.

> They often said that in *Introductory Engineering Course* exercises when talking to the exercise leaders, they were old students, they just said "just do as the formula says, it doesn't matter much, just do as it says, you don't need to understand what it is." Don't question it. (1M)

Additionally, students find teaching unnecessary when the teaching activity does not give the student any extra perspective for better understanding other than what already is stated in the accessible course materials or understanding is not necessary for passing the exam. Next two quotes gives an understanding of why students find poor teaching unnecessary to attend.

I think *Introductory Engineering Course* is just reading from a PowerPoint, it's straight from PowerPoint. And then I understand you [1F] that then you read it at home and especially when they read it verbatim. No point for me to be here. (1F)

Sometimes you notice that your mind starts wandering because you think, 'I already know this,' then maybe 10 minutes pass, and you realize you don't know it after all, but by then they've already lost you, and you think, 'Why am I sitting here?' or 'I already know this.' People picked up the exercise book and started working instead, and then it feels pointless. I'd rather be somewhere else. If it's something I already know, I don't need to sit there. (2K)

In summary, the final theme describes that students reflect a lot about their study habits and learning. The common goal for the students is the willingness to fully understand the concepts in the course and a frustration when they do not understand. Several students explain their systematic absence was decided after they questioned their activity-based learning strategy. This can be seen as a breaking point in their study habits.

4.2.8   Focus group interviews – final notes

In this section, lose ends and other comments that do not fit in the themes discussed.

An unknown variable in the interviews is the students' actual course passing rate. However, some students indicate that they believe they passed the exams, while others express concern about their results (which were not published when focus groups 1 and 2 were conducted).

The students had low attendance to various extents. Some students were only having low attendance for teacher-assisted exercises while others neither showed up at lectures nor at teacher-assisted exercises. Some students only had low attendance in one of the courses, which signals that decisions are made strategically in relation to specific courses. Among all the courses discussed, only one was described as a course with high attendance.

Towards the end of the interview, students were asked "Do you know anything that may change your willingness to attend teaching activities?" Not all students answered this question, and some students picked up the thread earlier on. Common areas were:

- Variation in lecture hours (typically move 8-10 lectures to 10-12) (group 1 and 3)

- Better alignment between lectures, teacher-assisted exercises and booklet exercises (1 and 2). Make lectures more similar to teacher-assisted exercises (2)

- More questions to students during lectures and increased student interaction (1, 2)

- Increased clarity of requirements for certain grades during teaching. Particularly remove teaching about areas only relevant for higher grades and derivation not required to memorize (1, 2, 3).

- Lower course intensity in semester 1 (spread it out over a longer period) and give me an infinite number of hours for learning (1, 2)

Furthermore, all focus groups were uncertain how to define teaching (Swedish: undervisning) when we asked what the interviewees think when they hear the word "teaching" some confusion was sensed as students asked for clarifications. Consequently, all focus groups came up with different definitions and the third focus group could not agree upon one definition. In focus group 1 they agreed that teaching was everything in their schedule. Many students included lecture captures and short instruction videos in their definition and particularly if they did not participate in campus lectures. Teacher-assisted exercises was not always included as it was described as "*The exercise sessions I see more as support rather than teaching.*" (3M)

In focus group 2 everyone agreed on defining teaching as:

> Teaching, for me at least, is when I see that there is some kind of resource, external or not oneself, that helps one to acquire knowledge, I think. (2F)

This would include lecture captures, other internet sources, friends and literature. In summary, no consensus was found among the students what they included in their picture of teaching. This result was a driver for conducting the follow-up survey.

4.3 Survey results

A few months later a follow-up survey was conducted with groups of students enrolled in the same degree programs as the focus group participants. In this section, the survey results are presented. Some of the survey questions cannot be used due to methodological errors.

In several survey questions students were asked to estimate their attendance rate in a specified recently finished course (see survey questions in appendix 3). One question concerned physical lectures and results are shown in Figure 5. Students from program X commented in the survey that the specified course had in-person lectures given by a lecturer, although recorded lectures from previous years were also available. For this program, the attendance pattern in Figure 5 creates a u-shape where the same number of students attended all lectures as the amount who attended none. For program Y, the course did not offer in-person lectures to the same degree. Y-students commented that they were encouraged to watch pre-recorded videos before having in-person lectures with heavy focus on solving exercises rather than new theory. For program Y, students may have interpreted the definition of lectures as either *only being present at in-person lectures* or *being present at in-person lectures <u>and</u> watching videos*. Nevertheless, result is tilted towards minimal attendance although about 20% answers 80-100% attendance.
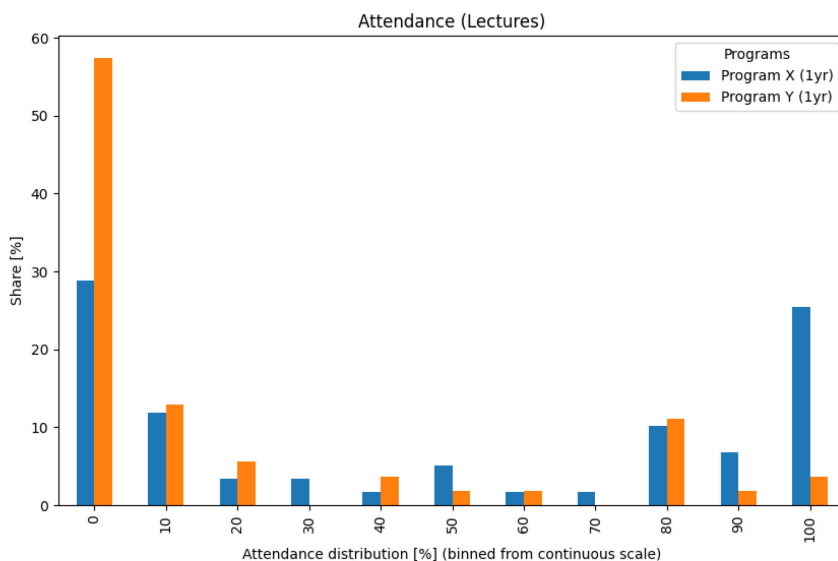

Figure 5: The students' self-estimated attendance rate for scheduled **lectures** in their last finished course. Results are binned to tens from a 0-100 continuous scale where 0 represents no attendance and 100 full attendances. Number of respondents are 63 (X) and 59 (Y).

In addition to lectures, the same question was asked but for teacher assisted exercises and the results are shown in Figure 6. The u-shaped attendance pattern found for lectures (Figure 5) cannot be seen when looking at attendance at exercise sessions. It is seen that a considerably high share of both students from program X and Y did not attend exercises. The figure shows a L-shape attribute.
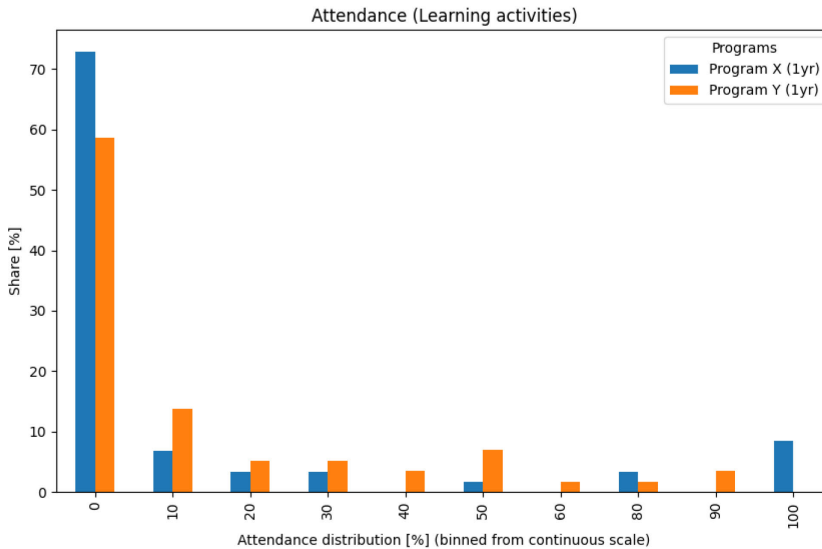

Figure 6: The students' self-estimated attendance rate for scheduled **lectures** in their last finished course. Results are binned to tens from a 0-100 continuous scale where 0 represents no attendance and 100 full attendances. Number of respondents are 63 (X) and 59 (Y).

Before addressing the questions in Figures 5 and 6, students were asked to estimate their overall attendance, considering all course elements. Theoretically, the overall attendance should align with the combined results from specific answers regarding lectures and teacher-assisted exercises. This comparison could provide insight into whether students tend to over- or underestimate their total attendance. The calculation was based on the scheduled hours for each student's respective educational format, with responses weighted by these hours. However, the differences between overall and weighted attendance are minor and statistically insignificant. That said, there is a trend where weighted attendance falls slightly below the estimated levels for attendance rates between 60-100%. This pattern could indicate a tendency toward overestimation.

Additionally, in an unpublished study (Nilsson, 2024) conducted at LTH, self-reported attendance in the CEQ (with a low response rate) was compared to self-reported attendance in brief in-class surveys (with a high response rate) among the same

engineering student group. The study aimed to investigate whether CEQ data reports higher level of attendance than what truly occurred in the course. The results indicate that students responding to the CEQ reported higher attendance compared to those who completed in-class surveys. This suggests that the students who respond to the CEQ after the course are those who attended the teaching sessions more frequently. Consequently, the CEQ attendance data appears to be inflated.

Our survey also investigated what the students were including in the term "teaching" (Swedish: "undervisning"). The following was asked in question 3:

> Which of the following options do you consider part of "Teaching"? Please select all options that have applied at any point during your education at LTH.

The result is presented in a bar plot in Figure 7 and it is seen that almost all students included traditional lectures. About 75% considered seminars, teacher-assisted exercises, laboratory work and recorded lectures with course teacher to be included. Noticeable is that 60% included other videos, 30% included self-studies and 7% included "everything I learn is teaching". No student has chosen to include a non-listed element in their definition. In summary, a large variety of combinations of answers were received as different students appeared to count different things as teaching. The variance in results is for some alternatives big between the X- and Y-students, which should be considered for validity. Although the number of respondents is low (121 students: 63 (X) and 59 (Y)).
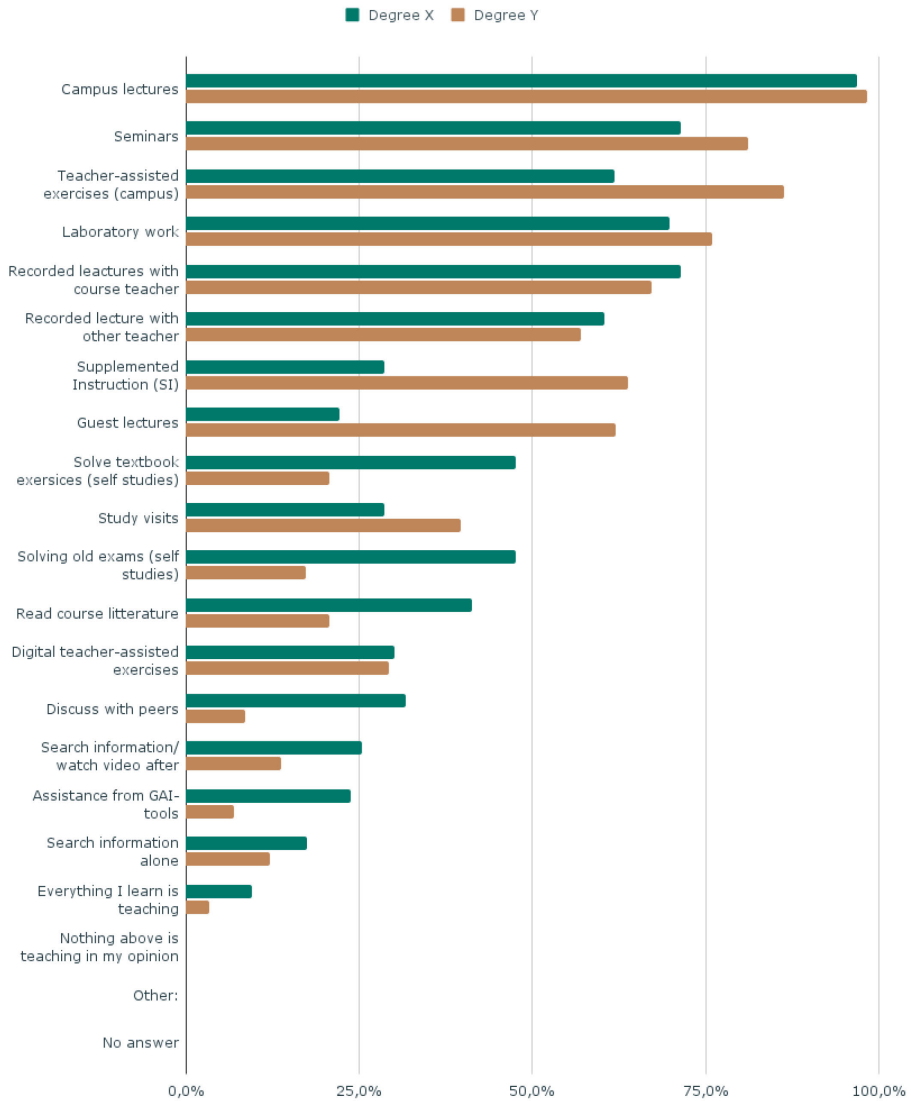
Figure 7: Share of students that included suggested course elements in the term "teaching" (SWE: "undervisning"). All respondents answer the question, and none proposed an own definition.

5 Discussion

The aim of this report was to examine why students chose to be absent in engineering education and how these students are studying instead. The main results have been gathered from the focus group interviews with first- and second-year students and was complimented with a survey. In the focus group interviews, eight main themes were found. In Biggs' (1993) model of learning and teaching (the so called 3P-model) three perspectives can be used to understand the teaching process: the presage, process, product. In presage (predictive variables), Biggs include student's characteristics (prior knowledge and motivation) and teaching context (objective, assessment, teaching, ethos etc.). The process variables are student's approach to learning (e.g. deep/surface) and Product consists of learning outcomes. Since we see similarities with the main themes found in the current study, we decided to use the model as a way to categorise and present our findings from the thematic analysis. In this context however, the learning outcome rather consist of understanding studying strategies including attendance.

In Figure 8, the themes are sorted according to 3P-model. The presage stage (1) is the initial attitudes towards university studies which includes prior study experiences and expectations (which overlaps with Biggs' student characteristics factor) and learning measured by time spent. The process step (2) is interpreted as the environment in which students are approaching decision of study strategy or the students' description of their studies. Here we include learning experience factors (learning environment and social context) and external course context factors (access to online learning resources and competing time commitments). Finally, the outcome factor in product stage is the reflections and behaviours that this leads to (self-reflection on learning strategies which may lead to absenteeism). In the following discussion section, we return to and discuss our research questions.
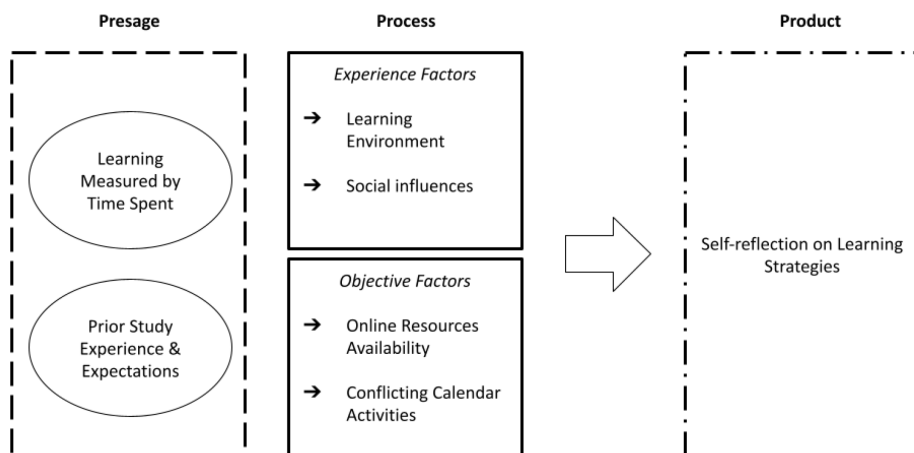
Experience Factors

→ Learning Environment

→ Social influences

Learning Measured by Time Spent

Prior Study Experience & Expectations

Objective Factors

→ Online Resources Availability

→ Conflicting Calendar Activities

Self-reflection on Learning Strategies

Figure 8: Main themes in focus groups, analysed according to Biggs (1993) 3P model.

How do the students define teaching and attendance?

In this report all participation in teaching activities has been defined as attendance. Such activities could be both at campus and online (must be live events). However, students did not agree on how to define teaching (Swedish: "undervisning"). One student, that mostly did not attend any lectures, claimed that everything she learned is teaching – including reading course literature. Similar results were found in the survey where for example a notable amount of the students is counting videos as teaching (Figure 7).

Since the definition of teaching among students seems debateable, attendance should be understood as a relative concept. There is an apparent risk of a student claiming high attendance if they watched all the videos corresponding to the course content, even though they missed all the lectures. Therefore, one should pay attention to this vagueness when analysing self-estimated attendance rates in CEQ. However, the term 'attendance' is not explicitly used in CEQ, but "participation in this course", which further increase vagueness. Nilsson (2024) shows that students attending teaching activities fills in CEQ in larger extent. Overall, what in fact is measured in CEQ is therefore unclear. Yet, the successive decline for something closely related to attendance in CEQ (as seen in Figure 2), disregarding absolute numbers, cannot be interpreted as anything else than a trend for decreasing belief of the importance of attendance among students.

Access and abundance to informative videos are probably one big factor for the confusion of the teaching definition, but there is also a cultural aspect in this. We

understand from the interviews that students are very familiar to video format and online learning, but they do not explicitly make us aware of their positive attitudes towards videos for learning during interviews. The online learning during the COVID-19 pandemic may give one explanation to this bias, but videos were used by students at LTH before that. Also, it is indicated by Internetstiftelsen (2023), the trend of increased usage of YouTube is growing among alpha generation in general. It is therefore reasonable to believe that videos may provide familiarity and a sense of safety to some students during the uncertain early stages of university studies. And this use of online resources is most probably here to stay. With this reasoning, attendance is only one of several strategies for learning, where students can choose from a smorgasbord of activities and recourses. This complicates the concept of teaching and a unison definition in the student perspective.

What are the students' stated pros of not attending lectures and how does it matter to their learning?

A central theme from the interviews was that students felt they did not have enough time to properly learn the material as outlined in the teacher's plan. While it was initially expected that this could be attributed to the advanced level of education, the interviews suggested that the degree of difficulty was not the primary factor contributing to absenteeism. Instead, it appeared to be the cumulative course content, which some argued was due to curriculum overload. In this context, students described seeking ways to save time without making significant changes to their study methods. For example, a student who attended lectures may begin to watch pre-recorded lectures at home, which saves the time needed to commute. The time saved by not commuting may appear insignificant from an outside perspective, but it underscores how pressing the issue of saving time is. Saving time is the most common reason to not attend teaching activities.

Moreover, students value the feeling of being 'in-phase' very highly. The term is explained by students as to be done with the exercise schedule or follow the study plan set up by the teacher. By skipping teaching activities, students argued that time is made available for being in-phase. Also, some students needed more time for revisioning course material. Interviews implied that success meant both being in-phase and pass the exams – two factors with high time constraints. With that in mind, it is probably correct to interpret that time is the limiting factor for student learning. Other possible factors could be teaching quality, difficulty level, etc., but time is unhesitatingly the most dominant. Due to these challenges time management seems very important for student success. These findings are very similar to the results found by Scheja (1997) in his interview study of Swedish engineering students at the Royal Institute of

Technology, KTH. Scheja concludes that students experience time pressure connected to their studies, and the concept of being in-phase is frequently mentioned in the same context as in this study. However, the response to being out of phase differs between the students at KTH in 1997 and the students at LTH more than 25 years later. The KTH students speak of having parallel courses where the exams are at different parts of the year, and they prioritize courses where the exam is closer in time. Once the KTH students de-prioritize a course, they appear to completely disregard it, both by not attending and by not doing exercises on their own, until the exam in the parallel course is completed and they can pick up the previously disregarded course again. In comparison, the students at LTH have parallel courses with exams during the same week, and they appear to instead deprioritize certain course activities in one or both courses to have time to study for both exams. While the difference may be due to the different program structure, it may also be due to readily available digital recourses today, which did not exist in 1997.

With time management being of such high importance, some cultural points of view can be noted. Most of the students appeared to make no difference between study techniques and study activities. For example, students often mentioned being in phase or attending all lectures when study techniques were asked for. Several reasons could explain this phenomenon. Some students mention that they have not used a successful study technique in the past since it was not needed in high school. Additionally, it was not uncommon to hear students say that they did not have time to try or figure out study techniques as it takes time. Instead, study strategies (deselecting teaching activities and/or down-priorities of learning contents) seemed to be of superior value to students.

In the light of time management, many students find a reason to stop attending teaching activities, but students are mentioning additional advantageous aspects. One benefit is the freedom experienced by students when planning their student life – combining studies and other activities. This seems to lead to a sense of control. For example, students mention circadian rhythm, studying with friends, physical exercise, and studying at home. Additionally, the video format solves some of the challenges students seem to have in campus education such as speed, selection of optimal teachers' explanations, study pauses when tired and/or alternating video with textbook exercises. This should also be seen in the perspective of '*uncertainty and chaos*'. The social need, which was found both to hinder and enable learning, is easier to control when deselecting time commitments. These findings have similarities with the study by Menendez Alvarez-Hevia et.al. (2021), which concludes that absenteeism sometimes is the result of students not managing to balance all their commitments and needs.

Finally, the quality and benefits of the video format, along with other alternative information platforms, make it easier for students to opt out of campus-based teaching.

Some students explained that the learning material in many courses could be found online (regardless of if it is uploaded on course learning platform or not). Only in a few cases students described that information was difficult to acquire from other sources than from university teachers. It seems reasonable to believe that these factors (together with the generative AI breakthrough) have substantially eased the student's possibility to collect sufficient information and quality answers to textbook exercises without any campus attendance.

So how do these study behaviors matter to students learning? In the literature background support was found for both correlation and non-correlation between attendance and grades. O'Brien & Verma (2019) support non-correlation as they found an absent category of students (digital student) performing better than traditional students. This report supports their conclusions. The CEQ attendance curves decline; but at the same time, passing rates have not been reported a concern. Additionally, interviews show that absent students can be very devoted to their studies and be pleased with study results. This suggests that even absent students perform (getting passing grades) in engineering education. Some teaching are focusing on surface knowledge and/or as students complain that teaching did not require deep understanding. According to Robson and Kauffmann (2022), it is generally sufficient to achieve this through memorization and repetitive behavior, without requiring attendance. The behavior described by engineering students in this study aligns with these findings.

However, from a larger perspective, one should differentiate between performance and learning. In context of surface- or deep approaches to learning, one may wonder what really defines non-attending students. Interviews suggest that some study techniques and activities requiring more time but fostering deeper understanding are overlooked in favour of time-efficient study methods, a finding consistent with observations by Malm and Roxå (2011). During the interviews, students expressed themselves not having time to revise during and having to move on with the material before thoroughly understanding it. Often, this was expressed when comparing studying in high school, where the time for revision was plenty, to studying at university. Students also expressed that there was a difference between studying just to tick off math problems from their to-do list and studying to understand the material. This difference is like the definitions of surface- and deep approach to learning by Biggs (1988). The difference in learning approach is also noted by Scheja (1997), where students differed between "studying to understand" and "studying to pass the exam". According to the students, the difference originated in a lack of time, as it was seen as more time-consuming to study in a way which resulted in deeper understanding of the material. The same is expressed by the students in this study.

One way of interpreting the interview results is that students are deselecting teaching activities since they are looking for a deeper learning approach. The outcome is, however, not necessarily a deep learning approach, and as O'Brien and Verma (2019) suggest, absent students vary in their success at planning and following their own daily goals. So, for the learning outcome there seems to be risks and rewards. No tools, nor guides are given students being absent and factors such as self-efficacy and discipline are reasonably affected as suggested by Hunsu et al. (2023) and Robson and Kauffmann (2022). Since students describe assessments in low-attendance courses as requiring only surface knowledge and memorization, with no other skills being examined, it seems plausible that a low-attendance strategy can lead to high performance if learning traps are avoided.

When do the students decide whether they should attend or not and how well is this decision thought out?

In the focus group interviews we asked students to sketch their current week and mark all the teaching activities they have participated in and all hours they had or planned for self-studies. In this exercise it was possible to note that many of the students had not made up their plans for the week. Some lectures for example were just marked with "maybe". Also, we found that some students were planning on skipping some lectures due to job, physical exercise, volunteer work, illness, morning tiredness etc. We have termed these reasons for absence as 'temporal absence,' as they represent temporary patterns that do not frequently occur for every individual. In the case of sick absence, one question in the survey showed sick leave to be about 5-10% (non-significant numbers) on a daily basis. All temporary absence patterns are roughly estimated to make up 10-15% of all absences per activity. Interviews suggest that some competing time commitments are known and planned for, while others (which probably is a substantially big part) are decided in the evening or even in the very same morning. This is particularly common for early morning teaching.

In addition to temporary patterns, this study also identifies strong *systematic* absenteeism patterns. These can be caused by different reasons, for example: "teacher-assisted exercises are not for me", avoiding early morning teaching activities (due to lack of sleep or commuting time), work, team training on specific days or "the lectures are not for me". However, it is important to note that the phenomenon of systematic absenteeism does not equal participating in any activity, even though that type of student behavior does exist. Systematic absenteeism was more widespread among the interviewed students than temporary absenteeism. From one perspective, it is more interesting to discuss, as this phenomenon is likely a relatively new development in higher education.

Our findings show that students seem to have a strong conviction in their systematic absenteeism strategy. So, despite students describing having a lack of successful studying techniques, their decisions are well thought through, but also rather complex for others to understand.

The combination of prior knowledge, experience and expectations of students when entering a course, their prioritizations during the course, and how their reality looked regarding the course, culminated in how they experienced the process of learning within the course. The most distinct aspect regarding the process of learning is that students did not distinguish between the course and the teacher. Students are solely talking about teachers when discussing the course and learning process, and when comparing two courses they often end up comparing the teachers, not the learning material.

On top of equating the course with the teacher, students were also very quick to form an opinion of the teacher and thus the whole course. In some instances, teachers were not even given a full lecture before the students had made up their mind about whether to continue to attend or not. The dislike or discomfort required for a student to stop attending appears to be very low, especially for students who have previously successfully managed courses where they had low attendance. This is in line with theories in behavioral sciences, where for example Homans (1961) describes rewarded behaviours tend to be repeated.

To answer the question, decisions regarding temporary and systematic absenteeism are made in different ways. Temporary absence appears to be decided on short notice, whereas systematic absenteeism follows an established pattern. This pattern seems to be based on relatively limited time and experience. While students often express strong conviction in their decisions, exceptions do occur.

How do the students strategically decide to systematically not attend teaching activities?

Systematic absenteeism can be divided into two subgroups: time dependent absenteeism and activity-based absenteeism. Time dependent absenteeism appears when students systematically decide that within certain hours of the day, campus teaching is not attended (not course dependent). The other subgroup consists of students strategically deselecting all teaching activities (course dependent). This subgroup is believed to be larger considering extended absenteeism at teacher-assisted exercises (see Figure 6). Within this subgroup some students are strategically not attending lectures nor exercises despite high initial willingness to attend (as seen as *impact of prior experience and expectation* themes). Also, absent students express that they appreciate teaching activities even if not attending them. The decision could be

seen as two contradictory beliefs: 1) you need to be time efficient and 2) you need to follow the teacher's recommendations.

This inner conflict leads to a questioning of the current study strategy. What this study adds, that cannot be found in the literature, is a phenomenon that we call the *breaking point.* It can be described as a forced pause and self-reflection on a student's current learning process, which may lead to behavioral change (strategic absenteeism). The idea of the breaking point is supported by the u-shaped attendance pattern among students in Figure 5. Very few students seem to aim to be 50% present at lectures. Thus, the breaking point emerges as an everything or nothing behavior.

An illustration of the breaking point timeline is presented in Figure 9 (visualizing semester 1 in engineering education). The figure shows an initial period of high attendance leading up to the breaking point. The breaking point is normally triggered by an event as described in the *self-reflection on learning strategies'* theme. Triggers could be illness (or other involuntary absence), procrastination, reflection that the student is learning too slowly, or not seeing teaching as meaningful in relation to time spent. Here, staying home sick (estimated 3+ days) is a surprisingly common trigger among the students that describes strategic absenteeism behavior in interviews. Staying home sick is just a trigger and not the full explanation but combined with the feeling of learning too slow, the student reaches the breaking point that leads to strategic absenteeism.

Some students never experience a breaking point, while other students experience it multiple times. Thus, the illustration in Figure 9, is just an aid for describing the process. After a breaking point students make a strategic decision for their coming studies in a specific course. Relating this to O'Brien and Verma (2019), a strategy of not attending can be both more and less successful. Moreover, Robson and Kauffmann (2022) explain that not everyone has enough experience and tools for succeeding with a video-based strategy only.

Finally, from a time perspective, it is believed that the breaking point can be moved forward and back in time. This would suggest that measuring average attendance for a course can be dependent on both the number of students not attending and how early on students started to not attend. The phenomenon of the breaking point may explain findings such as attendance continuously decreasing throughout semester as shown in Navas-Gonzalez (2020). Also, the dropping CEQ attendance rates could be explained by the breaking point successively being triggered earlier in in time. As described above, the abundance of online learning material could be one factor that eases the process of earlier and earlier breaking points, however, further studies on this correlation are needed.
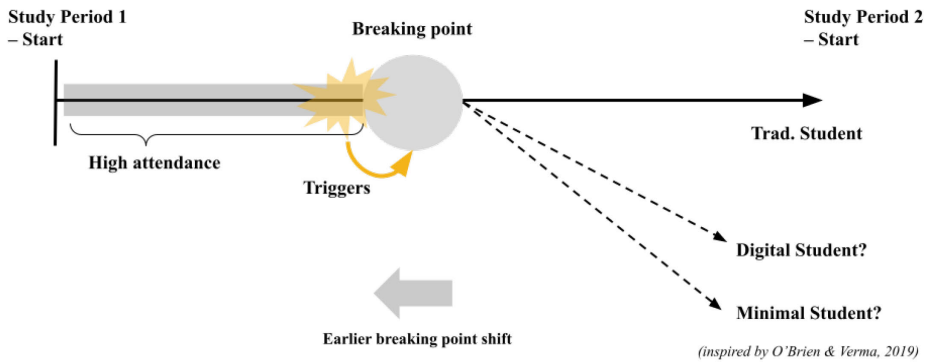
Figure 9: Suggested timeline framework for students choosing strategically absenteeism.

How well do attendance patterns align with the student engagement framework?

With this research question we sought to understand whether the attendance behaviours among engineering students can be explained through the affect, cognitive and behavioural dimensions described in the student engagement framework (Chapman, 2003; Kahu, 2013).

The framework is most strongly associated with the **behavioural dimension**, which includes participation in academic activities. However, it is easy to mistakenly not distinguish attendance and participation. Robson & Kauffmann (2022) describes that many guides for improving student engagement is based on suggesting what teachers can do differently in the classroom. The interpretation of engagement and participation historically has thus resulted in the view that attendance is essential for improving engagement. However, this report clarifies that students may have high participation despite low attendance. Also, other behavioural aspects of students' engagement as interaction and effort are very hard to observe. Interactions are seemingly, in this study, exchanged from student-teacher interaction to student-student (*social influences* theme) or student-computer interactions (*access to learning recourses*). Consequently, it could be questioned if absenteeism necessarily means that interaction decreases?

The findings in this report also align with other criteria in Chapman's framework. Their decision-making and time management skills, based on their perceived value of different activities, could correspond to the **cognitive engagement** dimension.

However, it is reasonable that a strategic approach (involving low attendance) might shift students from a deep approach to a surface approach to learning (Malm & Roxå, 2011). This shift is heavily influenced by the need to optimise strategies relative to time constraints. According to the framework, this suggests lower engagement. Nevertheless, it is important to note that digital students may indeed manage to keep a deep approach to learning, thanks to a non-attendance optimising behaviour. Thus, low attendance should not necessarily be interpreted as indicative of a surface approach to learning and lower engagement.

There are multiple examples of the **affective dimension** – students' attitudes to learning and sense of belonging – in the interview results as well. Belonging is found in the theme uncertainty *and chaos* and the willingness or interest to understand in the *self-reflection on learning strategies'* theme. A sense of belonging was found among absent students as it was observed that non-attending students found each other. Also, some students attended lectures for just the social aspect. Also, some students expressed frustration that some assessments and teaching activities were not perceived to encourage understanding, which students perceived as non-engaging.

Kahu (2013) suggests that student engagement is not classroom specific, but rather on a global scale, the results of the university community, societal politics and visions. However, previous literature centralizes participation as one of few observable factors. In fact, all behavioral dimensions have traditionally been seen as observable by teachers: interactions by receiving questions from student, attendance, effort by quality outcome, time spent by seeing students working or attending. However, none of the students said that they stopped attending teaching activities because they did not want to or needed to learn. Quite the opposite, students were indeed engaging in the behavioral dimension but by other means. On the other hand, challenges associated with strategic absenteeism include lower student engagement, procrastination, social exclusion, failing exams, and learning traps. However, we do not know if these features only are found among absent students. Overall, there were many signs that the absent students had several features associated with high student engagement. Based on our interviews we find it impossible to argue that attendance is sufficient as an indicator for student engagement.

5.1 Final remarks

Two programs participated in the focus groups. The differences in what the students said were minimal, but the approaches were somewhat different. The interviewers noted in discussions immediately after the interviews that students in degree Y had a lower interest in studying, seemed less concerned with achieving higher grades, and were more bothered by their fellow students compared to those in degree X.

As shown in Figure 3, the department of mathematics fundamental courses (G1) has a more distinguished declining attendance trend in CEQ compared to engineering overall. Our analysis of the focus group interviews aligns with this attribute. Reasons to this specific trend cannot be explained, however we can, based on the discussion, say that it is more likely that students in subjects with a typical high degree of access to online learning recourses, who sense a high degree of time as the limiting factor to learning, and who experience a high degree of traditional engineering teaching in combination with assessment methods which do not disfavor a strategic approach, fall an increased risk to lower attendance (but not necessarily engagement).

While students mentioned the benefits of absenteeism, this strategy also has drawbacks. Although this study did not focus on these, our interviews suggested challenges like procrastination, social exclusion, failing exams, and learning traps. It would also be interesting to follow how absent students are coping with studies further on in their education and their overall performance on an advanced level. Overall, more extensive research is needed around student learning in relation to absenteeism.

6 Limitations

This study was limited to a very few students in two engineering degrees. Three degrees were initially chosen but students were only participating from two degrees. All three degrees were chosen in respect to collect a diversity of perspectives regarding academic discipline and student culture. As student cultures associated with different programmes are considered strong it is possible that there could be perspectives not noted from the data in this study. In further studies, expanding to wider range of engineering degrees could provide a more elaborated understanding of the phenomenon of absenteeism.

Originally the study was planned for two focus groups for each program class, however, the scarcity of volunteers tightened degree Y to only one focus group. Using only one focus group for program Y is a disadvantage as rare opinions may have unproportional large impacts. Especially if a such student takes up a lot of space in a group of people. However, by comparing focus group 1 and 2 from degree X, a lot of the themes were very similar between the two groups. Additionally, the follow-up survey was used to complement focus groups, which supported the results.

Furthermore, results and implications have some limitations. The results found stem only from first year students. Both CEQ answers and common LTH experience yells for higher overall attendance in advanced courses. However, the activity load is known to be significantly lower. Additionally, students in higher years probably would have experienced more varied pedagogical approaches in courses. We do not know how the level of students in our data affect study behaviours. Based on our results students may choose strategic absenteeism with more ease, or according to the student engagement framework students may be more engaged to get academic achievements, success, social stability and interest, which are generally found among older students. The evolution of a student groups' study behaviours would be interesting to follow in further studies.

We had limited access to complete databases in this study. Data for passing rates would have enabled deeper and broader CEQ-analysis as well as error estimations. The benefit of already pre-processed data is that it is more manageable.

Finally, the used CEQ data can be aggregated onto department levels following the same aggregation key as used in the methodology. Some departments may be particularly interesting; however, such detailed investigations are beyond the scope of this research, albeit it might reveal exceptions to general patterns.

7 Implications

In a situation where salaries and all other external costs are rising and student attendance at non-mandatory teaching is falling it is natural for faculty, and departments, to question what priorities to make. The question here is not a matter of grades; so far LTH hasn't experienced a visible drop in grades and throughput although, based on this report, there are some students managing absence better and others worse. Some students have challenges with sick leave which could trigger the breaking point for systematic absenteeism. One question to raise in the future may be how LTH can better catch up/ support students that are absent from teaching activities when being home and sick.

Time management seems to be central to students' view on success. One problem with having large proportions of absent students is the fact that some do not have the tools and discipline to manage studying alone. A culture of not attending may affect the somewhat weaker students more. This is an area for further research. Time management and general life management could be encouraged and/or educated by the university to help students to make smart decisions. In previous studies done by Welsen (2022), this was purposed to increase attendance.

Our results indicate that absent students generally want to attend but they do not find it valuable enough. Most of the strategic absent students choose 'better' alternatives. Consequently, we need to start considering what kind of teaching we spend resources on. From our perspective, every teacher should consider how to enhance and develop teaching activities with the available tools and materials, aiming to support extensive learning rather than merely reproducing content that students can acquire on their own. Teaching activities that were relevant 20 years ago are not necessarily relevant these days and this shift needs to be considered. Special considerations may be needed for traditional teacher-assisted exercises at LTH.

University teachers have been using scheduled teaching activities since they provide: a good way of informing students, raising and answering questions, "holding the course together", showing role models and setting the pace on the course. It would be alarming if these aims could not be met. On the other hand, ample evidence suggests traditional lectures are not the best arena for student learning (Wieman, 2014; Araujo, 2021).

Attendance is thus not necessary for student success in knowledge-based assessments. Optimally lectures help students to raise interest and to get enough motivation, input and information to work actively with the course content between the teacher-led learning activities. Lectures are strongly associated with university teaching, however all learning activities that lead to deeper understanding or skill development should be considered, developed, and prioritized.

An issue that is raised by this report is the somewhat poor adjustments for students in their transition from high school to higher education. Maybe this transition can be facilitated to a higher extent than today, so that students do not tackle their studies in the same way as in high school? Just informing them seems not to be enough, since there seem to be a lot of unconscious perceptions and expectations of how to study. Study skills and awareness of effective learning strategies have significant potential for improvement before students first engage in higher education.

This study did not cover the perspective of the teachers but based on what we know about teachers' views of common teaching activities, a conclusion of this work might be that there is a gap between teachers' and students' views on education, which seems to grow bigger when students choose to study in other ways than intended. We have seen the following possible gaps:

- The view of what teaching is. Some students consider only lectures as teaching while some define it as every moment of learning. Maybe not a big problem per se but it may lead to the goal of teacher-led activities stays unclear to students and may have consequences for how questions about teaching in surveys to students are understood and responded to.

- The goal of the course and the views of learning. Teachers often aim for their students to gain deep understanding, critical thinking and complex knowledge or skills. While students, rather, seem to focus on what they can manage within a certain time period, which is a study strategy that certainly not always is in line with the teachers' intentions.

Identifying these gaps leads us to suggest four different suggestions for how to of improve teaching (when applicable):

1) **Enable student metacognition**
   Find ways to enhance student's awareness of their thinking processes about their own learning and study skills, their metacognition. Instead of letting the student continue to think about what tasks or exercises they completed within a certain period of time we need to increase the thinking that involves what they actual learned, together with critical thinking skills and other skills that might be required. Another strategy could be to give students better conditions

to establish robust study habits before more challenging courses start. This would give students time to acclimatize and try out some study techniques and improve them, which was seen in this study not exist among all students.

2) Communicate the purpose of teaching activities

Teachers' communication within a course to clearly set the purpose of the specific teaching activities that are given, to clarify for students why resources are spent on certain activities and how the students are supposed to gain leverage from it. It is essential to find ways to communicate this beyond just telling it and to continuously monitor how students are benefitting from these activities.

3) **Improve the CEQ questions**

Improve the CEQ-survey to include a better definition of attendance (when asking for attendance the current English formulation is: "To what extent have you participated in the various course activities?") which maybe are even more fuzzy than the concept of "teaching" or "teaching activities". A suggestion could be "*To what extent have you participated in the **scheduled** teaching activities?*"

4) **Review assessments**

Make sure assessment (both summative and formative) is aligned with the course goals. In cases where student strategies do not seem to be enough to gain the competences (knowledge and skills) needed, a) the assessment methods should be reviewed. Then b) create teaching activities that clearly lead to the deeper knowledge and skills development needed and, c) referring to point 2) above: make sure to clearly communicate the purpose of those teaching activities.

8 Conclusion

This report aimed to explore the reasons why first-year engineering students choose not to attend teaching activities. By conducting focus group interviews, we identified seven themes: *impact of prior study experience and expectations, learning measured by time spent, access to online learning resources, competing time commitments, social influences on attendance, experience of the teaching environment* and *self-reflection on learning strategies.*.

This report reveals that reasons behind absenteeism are complex and divided into temporary and systemic behaviour. The observed increasing absenteeism in engineering education is in this study found to largely being driven by strategic decisions rather than simple disengagement. Students prefer initially to participate in teaching activities, however high study pace drives many students to prioritize by substituting in-class attendance with digital learning. Online learning recourses are perceived more flexible which enables a controllable time management for many students. The behavioural change from in-class to digital learning, which is denoted by a breaking point, is eased by higher availability and more extensive experience of alternative learning materials, such as short instructional videos and recorded lectures, than has been found in previous studies. Inefficient and poor teaching (according to the students) in combination with staying home due to illness, procrastination or other involuntary absence, seem to act as triggers for strategic absenteeism. Prior experiences from high school also play a critical role, as students carry established study habits (with often poor study techniques) into university without considering how applicable these are for the academic environment.

The report also finds that the term teaching (Swe: "undervisning") is ambiguous as a variation of discordant definitions are found among students. Therefore, it is recommended to use more describing terms when discussing teaching activities with students.

Given these findings, the traditional perception that high attendance is important for performance should be reconsidered. In modern engineering education, teachers should focus on enhancing and developing teaching activities that lead to deeper understanding or skills development. According to our recommendations this can be done by I) improving students metacognition and support students to develop effective

study techniques early in their academic journey, II) improving communication of purposes of each teaching activity, and III) reviewing course assessments so that students need to choose study strategies that develops skills and competences necessary for course goals.

In conclusion, reasons to absenteeism in engineering education is a complex issue and reveals out-dated perspectives on student engagement and student learning. Instead of addressing low attendance, teachers should focus on the broader context of how to adapt and optimise teaching methods and assessments to meet modern learners.

9 Further studies

As the current study engaged first-year students it would be interesting to explore possible differences between first- and third-year students. It would also be interesting to follow how decisions, strategies and cultures in the first year of education influence studying habits in 3rd year of study and in relation their academic achievements. Moreover, it would be interesting to follow which students disrupt their studies (digital or traditional students?) and for what reason.

Another area for future research is the possibility of background patterns among students who decides to be more strategically absent. Are there any differences between gender, age, parents' academic background, commuting time, etcetera? Lund university has a responsibility for widening student recruitment.

The study only touches upon new tools students are engaging with. It would be interesting to explore how these tools are used and more specifically how generative AI tools are used. Questions of how GAI applications are used by engineering student and their possible influence on student absenteeism would also be a future area of research.

Furthermore, it would be interesting to summarise examples of successful and less successful in-classroom teaching activity approaches for calculation intensive fundamental courses. This could help teachers to evaluate and discuss course activity planning.

Acknowledgements

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Appendix 1

Frågor och plan för intervjun

Inledning (10 min):
Hej och välkomna! Dela ut sallader
Namnrunda, (klass?), hur mår alla idag?
Innan vi börjar - Inspelning, info om studien, skriva under medgivande. Frågor?
Försäkra om att deras lärare inte kommer veta vad de har sagt, allt kommer anonymiseras
Det finns inga rätta eller fel svar! Vi är bara intresserade av att höra så många olika perspektiv som möjligt kring närvaro och frånvaro. Om någon annan säger något får du gärna spinna vidare på tanken, eller säga att något annat gäller för dig.
Start inspelning
Namnrunda
Har ni några tidigare erfarenheter av studier på universitetet? (*Tänker att det kan vara bra att veta lite om sabbatsår, är det någon som pendlar, är det någon som är äldre, etcetera*)

Intervju (55 min):
Varför valde ni att läsa till civilingenjör i XXX?
Ni har nu läst en hel läsperiod, hur motsvarar den tiden era förväntningar från innan ni började?
- Och om man bara tänker på studierna: hur har det motsvarat era förväntningar (mer eller mindre att göra, bra eller sämre lärare, svårare eller lättare, etcetera)?

Nu i läsperiod 1, hur lärde ni er saker rent praktiskt? *Studieteknik!*
- Hur lärde ni er att göra så? *Varifrån kommer studievanor?*

Tänk er att jag börjar på ert program nästa år, vad ska jag göra för att klara kurserna i LP1? *Vad är poängen med kursen, vad behöver man göra för att uppfylla det?*
När ni tänker på undervisning i ditt program, vad tänker ni på då?
Ni ska nu få ta en liten stund för att rita upp hur er närvaro i undervisningen har varierat under förra läsperioden. (Alla ritar upp, papper och pennor finns på bordet)

Vi ska nu gå varvet runt och så ska ni få berätta hur er närvaro har sett ut och varför.

Nu när vi fått höra era olika perspektiv och erfarenheter, vad säger vi om detta? Varför skiljer sig eran närvaro åt?

Hur upplever ni att eran närvaro i undervisningen har skiljt sig åt mellan kurserna? *Lite beroende på hur de har ritat så kan man ju låta dem förtydliga i grafen, ex med olika färger på pennorna*

- Varför tror ni det är så? *Vilka faktorer i undervisningen påverkar om ni vill närvara?*

Denna vecka börjar ju en ny läsperiod med nya kurser. I de nya kurserna ni ska läsa nu, **vad tror ni krävs av er för att bli godkända?** *Studenternas syn på upplägget och kraven*

Deltog ni på första föreläsningen i kursen? *Tänker att det är viktigt att veta om vi vill kunna veta om något läraren säger påverkar närvaro*

Ni ska nu få förlänga x-axeln på era grafer och ta en minut för att rita hur ni tror att er närvaro kommer se ut denna läsperiod.

Beskriv vad ni har ritat, varför tror ni att er närvaro kommer se ut så? *Finns det något de prioriterar i stället för undervisningen?*

Om ni jämför hur ni tror att er närvaro kommer se ut denna läsperiod med hur den har sett ut förra läsperioden, finns det några skillnader och vad beror de på? *Vad skiljer kurserna och hur påverkar detta närvaron?*

Om ni tänker på de två nya kurserna som börjar nu, finns det något ni varit med om eller hört, antingen från läraren, kursare, äldre studenter eller någon annan, som gör att ni vill närvara mer eller mindre vid undervisningen? *Vad påverkar viljan att delta positivt/negativt?*

Finns det något som hade kunnat förändras som hade ökat er vilja att närvara vid undervisningen? *Intressant att koppla till studieteknik, men mest för deltagarnas skull. De ska känna att de har något att säga till om.*

Slutligen vill vi be er fylla i hur ni tror att er närvaro kommer se ut denna vecka. Vi har skrivit ut era scheman från time-edit, och ni får fylla med färgpennor om ni tror att ni kommer delta vid undervisningen eller inte. Grön = Kommer delta, gul = Ej bestämt än, röd = Kommer inte delta

Om ni kollar på den undervisningen som ni har fyllt i med röd eller gul, vad gör att ni inte vill delta? *Vilka faktorer? Finns det generella trender?*

Ni ska nu få ett nytt schema med alla dygnets timmar varje vecka, och där ska ni få fylla i de timmar ni tror att ni kommer studera självständigt.

Varför har ni valt de tiderna? Om ni har fyllt i självstudier i stället för undervisning, varför väljer ni hellre att studera på egen hand? *Varför prioriterar man bort undervisningen?*

Avslutning (10 min):
Den som skriver säger till om det finns några lösa trådar att plocka upp igen!
Finns det något mer ni känner att ni vill säga?
Påminna om att allt de säger är anonymt, skulle man ha några frågor kan man kontakta oss! Vad kommer hända nu? Ny intervju senare?
Tusen tack för att ni ville delta, er input är värdefull!

Appendix 2

Vad påverkar studenters närvaro i undervisningen på civilingenjörsutbildningar?

Detta medgivandedokument sparas i fem år

Forskare för studien:
Sandra Nilsson, Universitetsadjunkt i datavetenskap, Centre for Engineering Education (CEE), sandra.nilsson@cs.lth.se
Klara Bolander-Laksov, Professor i högskolepedagogik, Stockholm Universitet – Centrum för Universitetslärarutbildning, klara.bolander.laksov@edu.su.se
Jesper Samuelsson, Studentamanuens CEE, jesper.samuelsson@lth.lu.se
Stina Regnér, Studentamanuens CEE, stina.regner@lth.lu.se
Mer om oss: https://www.lth.se/cee/om-cee/personal/akademisk-personal/

Jag har läst informationsbladet och projektet har förklarats för mig. Mina frågor har besvarats till min tillfredsställelse. Jag förstår att jag kan ställa ytterligare frågor när som helst.

Jag samtycker till att delta i en ljudinspelad intervju.

Jag förstår att:

- Jag kan dra mig ur denna studie när som helst före första intervjutillfället och all information som jag har lämnat kommer att returneras till mig eller förstöras.
- Alla personuppgifter (inklusive inspelningar) jag tillhandahåller kommer att hållas konfidentiell för endast studentamanuenserna ovan och kommer lagras i lösenordsskyddade filer till och med juni 2024.
- Resultaten kan användas för akademiska publikationer och konferenspresentationer.

- Anonymiserade transkriptioner och intervjumaterial kommer att hållas konfidentiella för forskarna ovan och kommer att lagras på obestämd tid i lösenordsskyddade filer.
- Mitt namn kommer inte att användas i rapporter och största försiktighet kommer att iakttas för att inte avslöja någon information som skulle kunna identifiera mig.

Jag vill ha en transkription av mina meningar i min intervju   Ja o   Nej o

Jag vill ha en kopia av den färdiga rapporten till min mailadress nedan.   Ja o   Nej o

Signatur intervjudeltagare _____

Namn intervjudeltagare   _____

Datum : _____

Mailadress (valfritt) _____

Appendix 3

Denna enkät är en del av ett projekt vid Centre for Engineering Education LTH om ingenjörsstudenters studievanor. Dina svar är anonyma. Vid frågor, eller om du önskar mer information om studien, var vänlig vänd dig till Stina Regnér: (xxx @lth.lu.se)

Ungefär hur stor andel av undervisningen i *specifik kurs* har du deltagit i?

•	•	•	•	•	•
0%	20%	40%	60%	80%	100%

Hur många läsdagar i läsperiod 3 (exklusive tentaperioden) behövde du stanna hemma på grund av sjukdom?

•	•	•	•	•
<1 dag	1–3 dagar	3-5 dagar	5-10 dagar	Mer än 10 dagar (2 veckor)
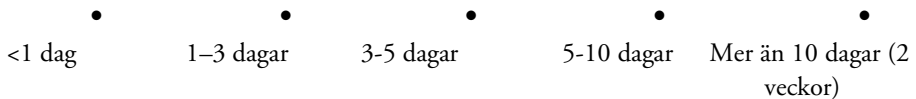
Vilka av följande alternativ ingår i begreppet "Undervisning" för dig?
Var vänlig välj alla alternativ som har stämt in någon gång hitintills under din utbildning vid LTH

- Fysiska campusföreläsningar
- Inspelade föreläsningar med samma föreläsare som håller i kursen
- Inspelade föreläsningar med en annan föreläsare (ex. *namn på lärare*)
- Fysiska övningar
- Digitala övningar
- SI
- Att lösa övningar på egen hand
- Laborationer
- Seminarium
- Gästföreläsningar
- Studiebesök
- Att läsa kurslitteratur
- Att diskutera med andra studenter

- Att själv söka information
- Att söka information/titta på video efter uppmaning av lärare
- Att ta hjälp av AI
- Att lösa extentor
- Allt jag lär mig ser jag som undervisning
- Jag anser inte att något av ovanstående är undervisning
- Annat:

Vänd blad, tack!

Ungefär hur stor andel av den **schemalagda** undervisningen i *specifik kurs* har du deltagit i? Gör ett kryss!

0   20   40   60   80

   100
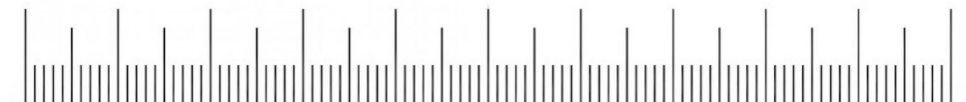
Ungefär hur stor andel av **schemalagda** övningar i *specifik kurs* har du deltagit i? Gör ett kryss!

0   20   40   60   80

   100

Ungefär hur stor andel av **schemalagda** föreläsningar i *specifik kurs* har du deltagit i? Gör ett kryss!

0   20   40   60   80

   100

Vad var dina **huvudsakliga** skäl till din eventuella frånvaro från **schemalagd** undervisning i *specifik kurs* *?* (**välj max 3**)

- Jag närvarade på allt/nästan allt
- Pendling
- Sjukdom
- Schemakrockar med annan undervisning
- Engagemang i studentlivet

- Deltagande i studentlivet
- Träning eller övriga fritidsrutiner
- Jobb
- Föreläsningar passar inte mig
- Övningar passar inte mig.
- Jag går inte på schemalagt innan klockan 10 för då är jag trött
- Jag vill inte lämna min studieplats
- Vill ej uppge
- Annat:

Vänd blad, tack!

Följande två sista frågor handlar om dina generella upplevelser vid LTH.

Vilka av följande påståenden beskriver bäst din relation till **föreläsningar** i sal? (välj **max 3**)

- Jag brukar gå på fysiska föreläsningar
- Jag tycker att föreläsningar i sal är värdefulla för mig
- Jag föredrar inspelade föreläsningar framför campusföreläsningar
- Jag föredrar att hitta information på annat sätt än att gå på campusföreläsningar
- Mina vänner går inte på föreläsningar så det gör inte jag heller
- Jag går inte på föreläsningar innan klockan 10 för då är jag trött
- Jag går inte på fysiska föreläsningar eftersom 45 minuter är för lång tid att koncentrera sig
- Annat:

Vilka av följande påståenden beskriver bäst din relation till **övningar** i sal**?**
(välj **max 3**)

- Jag brukar gå på fysiska övningar
- Jag tycker att övning i sal är värdefulla för mig
- Jag upplevde att jag pluggade effektivare på andra sätt än på övningar
- Mina vänner går inte på övningar så det gör inte jag heller
- Jag pluggar hellre själv än att sitta på övningar
- Jag går inte på övningar eftersom jag inte trivs i den fysiska miljön
- Jag går inte på övningar eftersom övningsledarna inte brukar vara bra på att förklara.
- Jag går inte på övningar eftersom övningsledarna är otrevliga
- Jag går inte på övningar eftersom det tar för lång tid att få hjälp
- Jag går inte på övningar eftersom det inte finns plats i salen
- Jag går inte på övningar innan klockan 10 för då är jag trött
- Jag går inte på övningar eftersom jag inte behöver hjälp
- Jag skippar övningarna för jag har alltid gjort det och det fungerar bra
- Annat:

Why aren't students showing up for class?

Many teachers at LTH have asked themselves this question since we can see a clear negative trend: the number of students attending campus lectures and structured learning activities in undergraduate courses is declining year by year. Since student attendance has long been recognised as a key factor for student success, it comes as no surprise that educators are concerned about this growing trend. During the academic year 2023/2024, we therefore set out to investigate the issue by interviewing first-year students who have chosen not to attend their classes.

This study explores the main underlying reasons why students decide not to show up for class and challenges the traditional link between physical attendance and good learning results. The report offers valuable insight into student study behaviour and examines the implications for engineering education. We hope that readers will gain a fresh perspective on the concept of attendance – one that helps us rethink and refine teaching strategies to better support learning in engineering programmes.