

Article

# The Possible Impact of Department Teaching Culture on Teaching Styles of New Teachers: A Case Study of a Swedish University Department Focused on Engineering Education

Younes Mohammadi <sup>1</sup>, Peter Vinnervik <sup>2</sup> and Davood Khodadad <sup>1,\*</sup><sup>1</sup> Department of Applied Physics and Electronics, Umeå Universitet, 90187 Umeå, Sweden<sup>2</sup> Universitetspedagogik och lärandestöd (UPL), Umeå Universitet, 90187 Umeå, Sweden

\* Correspondence: davood.khodadad@umu.se

**Abstract:** Understanding the influence of teaching culture (tradition) within academic departments is crucial for new teachers navigating the complex landscape of higher education. This paper investigates the possible impact of the department's teaching culture on the pedagogical approaches of new teachers, forming their teaching style, concentrating on insights gathered from interviews with experienced colleagues in a Swedish university department with a focus on engineering education. By exploring the department's teaching traditions and identifying potential challenges faced by new teachers, this study offers valuable insights into enhancing teaching styles and fostering student engagement. Drawing upon both experiential knowledge and insights from pedagogic literature and courses, the authors provide practical strategies to overcome obstacles and promote operative teaching practices. Ultimately, the outcomes of this study aim to empower new teachers to create enriching learning environments that promote student motivation, engagement, and overall academic success, aligning with the findings of existing literature on pedagogy and student learning outcomes.

**Keywords:** teaching culture; new teacher; challenges; teaching style; enhanced and constructive learning; work–life balance; engagement



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## 1. Introduction

Operative teaching practices are fundamental in higher education for creating engaging and enriching learning environments. Central to this endeavor is the examination of departmental teaching cultures, which significantly influence the pedagogical approaches adopted by faculty members, which can form their teaching style. Department culture can be defined as the conditions which may support, inhibit, and affect its faculty members in terms of research and teaching [1]. Teaching style is defined as “consists of a teacher’s behavior and the media used to transmit data to or receive it from the learner” [2] or as “the consistent behaviors exhibited by teachers during interactions with students throughout the teaching and learning process” [3] as well as “the implementation of philosophy; containing evidence of beliefs about, values related to, and attitudes toward all the elements of the teaching-learning exchange” [4] and generally as “approaches, activities, and techniques which a teacher uses in front of a class” [5]. Additionally, studies show how teaching culture and style within a department can impact student learning outcomes [6–10]. Literature also underscores the pivotal role of school culture and leadership in shaping teachers’ responses to institutional and situational constraints and professional growth [10,11]. Understanding the professional world of teachers, especially new teachers, is crucial for better meeting their needs, expectations, and commitment to ongoing professional development. Findings from various studies suggest that new teachers often strive for personal and professional acceptance, developing coping strategies to navigate the complexities of their roles [12]. Integral to this process are department culture and leadership, which significantly influence teachers’ learning and socialization, especially during the induction phase

of their careers [13]. Although the significance of the induction phase and the need for support for new teachers are acknowledged, they frequently find themselves managing their responsibilities alone, without sufficient guidance and mentorship [10]. Despite this recognition, there is still a lack of attention given to the distinctive challenges encountered by new teachers, who often navigate the complexities of their profession in isolation amidst constantly evolving educational environments. Several studies have explored the influence of faculty or departmental cultures on teachers, including those by [14,15]. However, these studies have provided a broad overview. For instance, in [15], the focus is primarily on the collaborative teaching aspects experienced by novice teachers, rather than addressing all facets. Consequently, there remains a notable gap in the literature concerning a thorough investigation into how a department's teaching culture, particularly one rooted in engineering, may affect the teaching style of new teachers across multiple dimensions.

It becomes evident that gaining deeper insights into the professional world of new teachers holds immense value. By better understanding their needs, expectations, and commitments, meaningful opportunities can be provided for their continuing professional development. Consequently, this study seeks to contribute to this understanding by exploring how the teaching culture within a Swedish higher education department, specializing in teaching engineering programs, shapes the teaching styles of faculty members. The study places particular focus on the experiences of new or beginner teachers. Understanding the intricacies of teaching culture within a department is crucial for new teachers navigating the complexities of higher education pedagogy. By exploring the prevailing norms, values, and practices shaping teaching within a department, teachers can gain valuable insights into operative teaching strategies and potential challenges they may face in their teaching endeavors.

In the following sections, we will detail our methodology in Section 2, present the results and findings from interviews regarding pedagogical values in Section 3, discuss the challenges encountered by new university teachers, propose potential solutions, and draw conclusions with implications for teaching practice in Section 4. Finally, Section 5 will provide the paper's conclusion.

## 2. Data and Research Methodology

In our qualitative exploration of the teaching culture within a department, we employed a thematic analysis methodology, drawing upon the framework outlined by Braun and Clarke [16,17]. Braun and Clarke propose that their framework is a fundamental qualitative method that serves as a cornerstone for acquiring essential skills applicable across various analyses.

Our case study focused on a Swedish university department specializing in teaching engineering education, encompassing fields such as electrical, electronic, medical, mechanical, civil, and energy engineering. The data needed for the research was provided as conduction. Initially, we conducted semi-structured interviews with four lecturers from various engineering programs at both bachelor's and master's levels, spanning disciplines like electrical, mechanical, and civil engineering. These interviews, lasting between 30 and 60 min each, were conducted with participants selected based on criteria including their youthfulness, availability, and willingness to engage in the study. On average, the respondents possessed seven years of teaching experience. The interviews were scheduled in advance and held at locations convenient for the participants.

To provide a clearer profile of the participants, their socio-demographic characteristics are detailed in Table 1.

**Table 1.** Socio-demographic characteristics of the participants.

Participant ID	Gender	Age	Teaching Experience (Years)	Academic Rank	Group	Educational Background
P1	Male	38	6	Associate Prof.	Mechanical Engineering	Ph.D. in Mechanical Engineering
P2	Male	44	5	Associate Prof.	Electronic and Communication Engineering	Ph.D. in Electronic Engineering
P3	Male	39	4	Associate Prof.	Electronic and signal processing Engineering	Ph.D. in Electrical Engineering
P4	Male	43	14	Lecturer	Civil and Energy Engineering	M.Sc. in Civil Engineering (Ph.D. candidate)

During these interviews, to prepare the needed data, we posed a series of questions covering diverse aspects of the teaching culture within the department. These questions were formulated based on insights gleaned from pedagogical resources, particularly those provided through academic development courses at the Swedish university known for fostering a constructive learning and teaching environment. Topics addressed in the interviews included learning activities, course examination and evaluation practices, collegial educational discussions and professional/academic development courses, collaborative teaching and feedback practices, perspectives on teaching, addressing pedagogical challenges, cultivating an optimal learning environment, departmental characteristics, student engagement, technology integration in teaching, pre-course research practices, and views on leadership in teaching.

Following the interviews, we meticulously documented the responses provided by the participants. Subsequently, we transcribed these interviews to ensure accuracy and facilitate analysis. Upon transcription, we undertook the coding of the interview data, systematically categorizing responses based on recurring themes and concepts emerging from both our predefined questions and participants' responses. We then situated these identified themes within the context of relevant educational and pedagogical literature. Moreover, to bolster the reliability of our findings, we adhered to measures such as intercoder agreement, wherein multiple coders independently analyzed the data, ensuring consistency and validity throughout the analysis process.

Throughout the study, we adhered to ethical research standards [18], including obtaining consent from all participants and upholding fundamental ethical principles. This commitment included maintaining open communication, demonstrating a long-term dedication to the research, and safeguarding the complete confidentiality of all participant information.

### 3. Results and Pedagogical Insights: Understanding Departmental Culture through New Teacher Perspectives

After gathering data from interviews, this section presents the findings of the data analysis alongside pedagogical implications. These findings provide insights into the department's teaching culture from the perspective of a new teacher, aiming to identify potential teaching challenges. Altogether, the findings encompass 13 diverse topics, as outlined below.

#### 3.1. Learning Activities

The respondents provided insights into the various learning activities employed within the department. Theoretical lectures constitute a fundamental aspect of the teaching approach, employing diverse resources such as PowerPoint slides, short educational videos sourced from platforms like YouTube, and traditional whiteboard notes. Moreover, teachers incorporate practical examples during lectures, bridging theoretical concepts with real-

world applications and industry relevance. This multifaceted approach aims to enhance student comprehension and engagement with the course material.

Lab work represents another integral component of the teaching methodology, encompassing both experimental tests and computer simulations. Through hands-on laboratory sessions, students have the opportunity to apply theoretical knowledge to practical scenarios, aiming to reinforce their understanding and skill development. Additionally, project work plays a significant role in the department's pedagogical framework. By assigning industrial-based projects to student groups, teachers promote collaborative learning [19] and provide opportunities for students to tackle real-world challenges in their field of study [20]. Working within small groups fosters teamwork and enables students to benefit from diverse perspectives.

Furthermore, the inclusion of optional exercises, typically presented at the end of each lecture, intended to serve as a motivational tool for students. These exercises, which indirectly relate to final exam questions, encourage active participation and reinforce learning objectives [21]. Overall, the combination of theoretical lectures, lab work, project work, and optional exercises reflects the department's commitment to providing a comprehensive and engaging learning experience for students.

### 3.2. Course Examination

The examination process within the department encompasses various assessment methods aimed at evaluating student learning outcomes effectively. Lab work and project work are assessed based on a graded scale, Fail (U) or Pass (G). This evaluation approach allows instructors to assess students' practical skills and their ability to apply theoretical knowledge to real-world scenarios. Additionally, the inclusion of both lab work and project work in the assessment process reflects the department's emphasis on hands-on learning and practical application [22].

The final written exam serves as a comprehensive evaluation tool, offering multiple grading levels to distinguish student performance. Grades range from Fail (U) to Pass with Distinction (G5, over 85% of possible points), with intermediate distinctions such as Pass with Merit (G4) and Pass (G3—50% of possible points). This grading is broad enough to stay in the same group of grades if a student makes some small mistakes. Therefore, the department's examination strategy encompasses a balanced blend of assessment methods, including practical assessments, written exams, and tiered grading criteria. This holistic approach to assessment ensures that students are evaluated comprehensively across different dimensions of their learning journey [23].

### 3.3. Course Evaluation

Summative course evaluations serve as a pivotal feedback mechanism within the department, facilitating instructors in gauging the perceived effectiveness of their teaching methods and the overall quality of a course. The course evaluation questions were carefully designed to elicit feedback from students regarding their learning experiences and perceptions of the course. They cover various aspects such as course content, teaching approaches, and overall satisfaction. Typically comprising 5 to 15 questions, the evaluation aims to provide a comprehensive understanding of the students' perspectives. An essential component of the evaluation is a specific inquiry concerning the amount of time students have devoted to the course, which indirectly reflects the course's quality. Emphasizing the significance of time investment underscores the department's commitment to delivering rewarding learning experiences.

Conducted near the conclusion of the course, the evaluation allows students to provide feedback based on their holistic experience throughout the term. This timing ensures that feedback is pertinent and timely, empowering teachers to make informed adjustments for future course iterations. Furthermore, the evaluation process incorporates opportunities for students to provide written comments, enabling them to express their thoughts and

suggestions freely. This aspect enriches the feedback process by offering additional insights and perspectives that may not be captured through structured questions alone [24].

In addition to the structured questions, students are allowed to write comments, providing valuable qualitative feedback. This open-ended approach encourages students to express their thoughts, concerns, and suggestions candidly, enriching the feedback process with nuanced perspectives and insights [25,26].

### *3.4. Educational Discussions*

Educational discussions are vital for fostering continuous learning and professional development within the department. They provide a platform for faculty members to exchange insights, share best practices, and stay updated on emerging pedagogical trends. These discussions include frequent lunch pitches focusing on pedagogical subjects, offering an interactive space for exploring innovative teaching methods and learning from peers. New teachers are supported through assigned mentors who provide personalized guidance in navigating teaching challenges.

Additionally, dedicated pedagogical consultants offer ongoing support and guidance to faculty members, promoting continuous growth in teaching practices. Monthly meetings between program coordinators and teachers facilitate collaborative discussions on curriculum development and pedagogical innovations. Annual gatherings between student representatives and teachers provide valuable feedback for course improvement, while pedagogy seminars offer opportunities for professional development. Overall, these discussions contribute to a culture of collaboration and improvement in teaching practices.

### *3.5. Collaborative Teaching and Evaluations*

Collaborative teaching and evaluations represent a dynamic approach employed within the department to enrich the learning experience and promote comprehensive student engagement. This collaborative framework leverages the collective expertise of multiple teachers to deliver courses and assessments, thereby enhancing the quality and effectiveness of education delivery.

A notable aspect of collaborative teaching is the integration of two to three teachers in some courses, facilitating a diverse and multifaceted learning environment. By leveraging the unique strengths and teaching styles of each teacher, collaborative teaching endeavors to provide students with a well-rounded educational experience. Moreover, dividing the course content among multiple teachers ensures comprehensive coverage and depth in the course material, which in turn can enhance student comprehension and retention [27].

Furthermore, collaborative teaching practices extend to collaborative evaluations, wherein teachers jointly assess student performance and provide feedback. This collaborative approach to evaluation not only aims to ensure objectivity and fairness but also to foster a multidimensional assessment process that captures diverse perspectives and insights. By engaging in collaborative evaluations, instructors can gain valuable insights into student progress and tailor their teaching approaches accordingly.

Moreover, the department recognizes the value of integrating external perspectives into the learning process and often invites guest speakers at the end of courses. These guest speakers, typically experts in their respective fields, offer valuable insights, real-world applications, and cutting-edge research ideas, thereby enriching the educational experience and providing students with a broader perspective on course concepts.

### *3.6. Perspectives on Teaching*

The perspectives on teaching within the department reflect a commitment to fostering an engaging and interactive learning environment while prioritizing student-centered approaches and ongoing professional development [21]. One prevalent viewpoint emphasizes the importance of staying updated on current developments in the field of education. Teachers recognize the dynamic nature of their profession and prioritize continuous learning to ensure relevance and quality in their teaching practices. Additionally, a strong emphasis

is placed on developing a comprehensive understanding of course content, driven by personal interest and thorough research prior to course delivery. This proactive approach enables teachers to deliver high-quality instruction and effectively engage students in meaningful learning experiences.

Moreover, the perspective on teaching highlights the significance of adopting a two-way learning approach, wherein both teachers and students actively contribute to the learning process. This collaborative exchange fosters critical thinking and encourages teachers to remain open to new ideas and perspectives [28]. By embracing student questions and feedback, teachers not only impart knowledge but also continuously refine their own understanding and teaching strategies.

Furthermore, teaching is viewed as a means of supporting students' learning journeys by implementing active learning activities and promoting interactive engagement. Teachers' aim is to provide a dynamic and participatory learning environment where students are actively involved in the learning process. This student-centered approach emphasizes the importance of focusing on students' actions and experiences rather than solely on their academic achievements or characteristics. Additionally, teachers are seen as leaders who guide and inspire students, fostering a supportive and empowering learning environment that promotes academic success and personal growth [21].

### 3.7. *Anything Unthinkable (Addressing Pedagogical Boundaries)*

In examining the perspectives of teachers within the department, several pedagogical boundaries have emerged as essential for maintaining a conducive and respectful learning atmosphere. These boundaries, deemed "unthinkable", are considered imperative to safeguarding the integrity of the teaching–learning dynamic and ensuring student welfare, which are outlined below.

*Maintaining professional distance:* Teachers recognize the significance of avoiding an "unreasonable distance" between themselves and students. Such detachment can impede effective communication, hinder student engagement, and compromise classroom management. By fostering supportive relationships while upholding professionalism, teachers can create an environment conducive to trust, respect, and collaborative learning.

*Preventing discriminatory practices:* The prohibition against discrimination and unfair treatment reflects the department's commitment to fostering an inclusive and equitable learning environment. Discriminatory practices not only contravene principles of fairness and justice but also erode student trust and confidence. By actively promoting diversity, equity, and inclusivity, educators can nurture a sense of belonging and empower all students to thrive academically and personally.

*Respecting personal privacy:* Teachers underscore the importance of respecting privacy boundaries, particularly concerning personal matters such as gender, religion, and other sensitive topics. Intruding into private domains can undermine student autonomy, dignity, and comfort, potentially leading to discomfort and disengagement. By honoring personal boundaries and fostering a culture of respect and sensitivity, teachers can create a safe and supportive learning environment where students feel valued, accepted, and empowered to participate fully in their educational journey.

*Fostering an optimal learning environment:* Responses underscore the importance of creating a conducive and supportive learning environment where students feel empowered to engage actively with course material and participate in classroom discussions. One common strategy highlighted is the effort to establish a friendly and inclusive class environment, which, based on the experiences of both the interviewees and the authors of this study, has been shown to improve student engagement and learning outcomes. This involves cultivating a sense of camaraderie and mutual respect among students and teachers, which encourages students to feel comfortable asking questions and challenging the teacher when necessary. By fostering open communication and promoting a culture of respect and collaboration, teachers create an atmosphere where students feel valued and motivated to actively participate in their learning journey.

Additionally, respondents emphasize the importance of providing students with a clear understanding of the course's significance and relevance from the outset. By explaining the importance of the course during the first lecture, teachers set the stage for meaningful engagement and underscore the relevance of course content to students' academic and professional development. This helps students recognize the value of their learning experience and fosters a sense of purpose and motivation in their studies.

Moreover, there is an emphasis on the importance of incorporating regular breaks into the teaching schedule to support student well-being and cognitive functioning. By implementing 10 min breaks every 45 min and offering students the option to request breaks as needed, teachers prioritize students' physical and mental health while optimizing their learning experience. These breaks provide students with opportunities to recharge, refocus, and process information, ultimately enhancing their overall engagement and retention of course material.

Consequently, by prioritizing the creation of a friendly and inclusive learning environment, emphasizing the significance of course content, and supporting student well-being through regular breaks, teachers effectively facilitate student learning and promote academic success. These strategies align with best practices in pedagogy and contribute to the cultivation of a rewarding learning experience for all students [21].

### *3.8. Distinctive Features of the Engineering-Based Department*

One respondent highlights the department's commitment to offering engineering-based courses that prioritize problem solving and hands-on learning. This teaching culture is characterized by practical exercises and project work, which provide students with opportunities to apply theoretical knowledge in real-world scenarios. Additionally, the department emphasizes the importance of enhancing practical understanding through industry visits to companies such as Volvo, Hitachi Energy, ABB, Komatsu, and the local energy utility company. These visits offer students valuable insights into industry practices and help bridge the gap between academic learning and practical application.

On the other hand, other respondents underscore the department's focus on connecting course content to real-world problems, ensuring that examples provided by teachers are relevant and applicable to students' future careers. Moreover, the department encourages lecturers to enroll in pedagogy courses to continuously improve their teaching methods and organizational skills, reflecting a commitment to ongoing professional development. Additionally, the department facilitates knowledge dissemination and promotes a culture of continuous learning through the department's newspaper, which provides teachers with news and pedagogy materials every month.

### *3.9. Student Engagement*

There is an emphasis on the importance of fostering open communication between students and teachers to promote student engagement. Students are encouraged to interact with teachers during breaks, providing valuable feedback and sharing their thoughts after solving exercises. Additionally, the availability of teachers beyond course periods, whether in their office or via email, ensures that students have access to support and guidance when needed. This approach to student engagement prioritizes accessibility and encourages active participation in the learning process.

Similarly, there is a highlight of the department's commitment to gathering feedback from students to enhance student engagement and improve the quality of teaching and learning. By collecting feedback from representative students at the end of each lecture, the department ensures that student voices are heard and their opinions are considered in the course development. Moreover, the department encourages students to share their thoughts after solving exercises or engaging in group activities, fostering a collaborative learning environment where student perspectives are valued.

Furthermore, the department promotes student engagement by inviting students to present material closely related to the course content. This not only provides students with

an opportunity to contribute to the learning experience but also offers valuable insights for the development of future courses. By actively involving students in the teaching and learning process, the department cultivates a culture of engagement, collaboration, and continuous improvement.

Overall, the department's approach to student engagement is characterized by open communication, feedback collection, and active involvement of students in the learning process. By prioritizing student voices and creating opportunities for meaningful interaction, the department fosters a supportive learning environment where students are empowered to succeed and thrive.

### *3.10. Integration of Technology in Teaching at the Engineering-Based Department*

The responses show the department's proactive use of technology to enrich the learning environment and support student success. Video discussions recorded on challenging course topics serve as valuable supplements to classroom instruction, accessible to students via the university-wide Learning Management System (LMS). These resources offer additional opportunities for self-directed learning and clarification of complex concepts. Furthermore, virtual meeting platforms like Zoom and Teams are employed to address student inquiries beyond regular class hours, promoting real-time communication and support.

In addition to offering video discussions and virtual meetings, the department also utilizes technology to record teacher lectures, which are then shared through the LMS. This proactive approach ensures that students have access to course materials even if they miss a class or need to review content at their own pace. By providing consistent access to recorded lectures, the department enhances learning experiences and offers valuable study aids for all students. These initiatives collectively reflect the department's commitment to leveraging technology to enrich the learning environment and support student success.

### *3.11. Perspectives on Course Evaluations at the Engineering-Based Department*

The respondents emphasize the pivotal role of course evaluations in refining teaching methodologies and enriching the learning experience within the department. The department views course evaluations as an opportunity for formative assessment, aiming to assess teaching effectiveness and meet students' learning needs effectively. By actively soliciting feedback from students, teachers gain valuable insights into the strengths and weaknesses of their teaching methods, facilitating continuous improvement. Moreover, the emphasis on analyzing feedback to enhance positive aspects of the course and address areas for improvement underscores the department's commitment to iterative refinement and excellence in course delivery. Furthermore, the department prioritizes the utilization of course evaluations as a catalyst for course refinement and enhancement in subsequent iterations. By leveraging student feedback as a guide for course development, instructors can implement targeted changes to improve the overall learning experience. Emphasizing actionable feedback over general or personal comments underscores the department's dedication to leveraging evaluations effectively to drive meaningful improvements in course design and delivery.

### *3.12. Pre-Course Research Practices at the Engineering-Based Department*

Respondents shed light on the research practices undertaken by teachers at the department before the commencement of courses, showcasing their commitment to ensuring the delivery of relevant and active instruction. Two sets of perspectives emerged among the interviewed teachers.

The first set highlights a comprehensive approach to pre-course research, emphasizing the importance of assessing student background knowledge and reviewing previous academic performance to tailor instruction to individual student needs effectively. By consulting with previous teachers and reviewing student grades, instructors gain valuable insights into students' prior learning experiences, allowing them to identify areas of strength and areas requiring additional support. Additionally, the focus on staying abreast

of the latest developments in various course topics and publishing relevant insights in pedagogy-based journals demonstrates instructors' dedication to incorporating cutting-edge research and best practices into their teaching. Furthermore, the practice of reading pedagogy-based case reports underscores teachers' commitment to addressing common instructional challenges through evidence-based strategies and approaches. In contrast, the second set emphasizes research primarily focused on preparing well-functioning lab work examples and incorporating current market demands into the course curriculum. This approach highlights teachers' efforts to ensure that course content remains relevant and aligned with industry trends, thereby enhancing students' preparedness for real-world applications. By researching how to develop practical lab exercises and integrate up-to-date content, instructors demonstrate their commitment to providing students with hands-on learning experiences that reflect the demands of the professional landscape.

However, both perspectives underscore the importance of pre-course research in informing instructional practices and enhancing the quality of education provided at the department. Whether through assessing student backgrounds, staying informed about the latest pedagogical trends, or incorporating industry insights into course design, teachers demonstrate their dedication to delivering high-quality instruction that meets the evolving needs of students and prepares them for success in their academic and professional endeavors.

### 3.13. Perspectives on Leadership in Teaching

The teachers within the specific department highlight the pivotal role of leadership in teaching, emphasizing strategies used to foster student success and create a supportive learning environment. Teachers underscore the importance of leadership in achieving learning outcomes through diverse instructional methods. They provide clear goals and career guidance, helping students to navigate their academic journey and align their learning experiences with future aspirations. Additionally, teachers adapt teaching styles to accommodate diverse learning preferences, fostering inclusivity and engagement. Providing constructive feedback further demonstrates leadership, guiding students' academic progress and facilitating ongoing improvement.

Moreover, operative leadership ensures the attainment of learning objectives through diverse instructional approaches, creating a supportive and welcoming learning environment. Emphasizing critical thinking showcases teachers' commitment to promoting higher-order thinking skills and nurturing intellectual curiosity among students. Additionally, leading by example reinforces positive values and fosters a culture of integrity in the classroom.

In summary, these perspectives underscore the multifaceted nature of leadership in teaching, encompassing aspects such as goal setting, instructional innovation, feedback provision, and ethical leadership. By embracing a holistic approach to leadership, instructors can effectively guide students toward academic success and contribute positively to their personal and professional development.

## 4. Exploring Potential Challenges Faced by New Teachers: Practical Recommendations and Insights

Transitioning from the broader exploration of teaching culture within the department and the self-reflection of the study's authors, this section now focuses on eleven specific challenges that new teachers may encounter. The department's shift from traditional teaching to a more dynamic teaching culture involved several key changes, as follows:

*From lecture-centered to student-centered:* Traditional teaching often relied on lengthy lectures with limited student interaction. In contrast, the new teaching culture encourages interactive lectures, where students actively participate through discussions, questions, and group activities.

*From individual autonomy to collaborative practice:* While traditional teaching saw teachers working in isolation, the new approach promotes collaboration among faculty. Regular meetings, team teaching, and shared resources help build a cohesive teaching community.

*From rote learning to critical thinking:* Traditional methods focused on memorization and regurgitation of information. The new teaching culture emphasizes critical thinking, problem solving, and application of knowledge through practical projects and case studies.

*From static to adaptive teaching methods:* Traditional teaching methods remained largely unchanged over time. The new approach encourages continuous adaptation and improvement, integrating feedback from students and peers to refine teaching practices.

Despite the department's implementation of various initiatives to support faculty members, such as regular lunch pitch discussions (involve a 15-minute presentation by one of the employees within the department, followed by a question-and-answer session while enjoying lunch), pedagogy courses, collaborative teaching, and mentorship programs, certain obstacles may still arise for new teachers before they can avail themselves of these resources. In this section, we, a group comprising both new and experienced teachers, identify and discuss these challenges. We offer practical recommendations based on our own experiences as a guide for new teachers navigating the pedagogical landscape of the department.

#### 4.1. Shyness

Shyness can pose challenges for new university teachers, impacting their ability to effectively engage with students and create a conducive learning environment. Research suggests that shyness is often linked to feelings of anxiety and social withdrawal, which can affect classroom management and vocabulary outcomes [29,30]. To empower teachers to overcome shyness and foster positive relationships, a range of strategies can be employed as follows:

*Interpersonal interaction and collaboration:* The teaching profession demands face-to-face interpersonal interaction and communication skills. Factors such as positive self-image and perceived popularity have been identified as significant predictors of shyness among teachers [31]. Establishing healthy relationships with students, colleagues, and university personnel is essential for fostering a conducive learning environment. Teachers who feel happier and more socially connected tend to be more efficient and contribute positively to their surroundings and society. Encouraging peer support and collaboration among teachers creates a supportive environment for sharing experiences and coping mechanisms. Actively participating in department meetings, engaging in one-on-one conversations with colleagues, and practicing preparedness before sharing thoughts are effective strategies to build confidence and overcome shyness barriers.

*Customized active learning:* Implementing customized active learning approaches can help mitigate the impact of shyness. By incorporating interactive teaching methods and encouraging participation through varied instructional strategies, teachers can create inclusive learning environments conducive to overcoming shyness barriers.

#### 4.2. A Lack of Obvious Literature for the Highly Practical Course (Necessity to Take a Lab/Project-Based Approach)

When faced with a lack of literature for a highly practical course demanding a lab or project-based approach, new teachers have viable strategies at their disposal. One operative approach involves adopting a lab/project-based methodology, which enables students to actively engage with the subject matter while applying theoretical knowledge to real-world scenarios. Through hands-on activities, experiments, and projects, teachers can nurture critical thinking, problem-solving skills, and deeper understanding among students [32,33]. Moreover, supplementing the curriculum with case studies, industry examples, and guest lectures enriches the learning experience and provides practical insights. Collaboration with industry partners or research institutions provides valuable experiential learning opportunities. Moreover, strategies like flipped learning can help optimize course duration

and provide students with more time for practical activities. This method has been found to positively impact student learning and course satisfaction [34]. Lastly, teachers can explore remediation strategies utilized by colleagues in similar contexts [35]. By sharing and implementing successful remediation approaches, teachers can address students' learning needs and bolster the practical aspects of the course.

#### *4.3. Failing a High Number of Students*

Efforts to understand the factors contributing to student failure, such as lack of effort or motivation, can guide teachers in developing targeted interventions. Research on the role of effort in school achievement highlights the importance of addressing student engagement and perseverance in academic tasks [36]. By encouraging students to exert effort and providing support to enhance their motivation, teachers can help students to overcome challenges and improve their performance.

Seeking support from university resources, such as coaching, mentoring, and behavior support planning programs, can be beneficial in addressing disruptive behavior and academic difficulties among students [37]. Collaborating with colleagues and educational specialists can provide new teachers with valuable insights and strategies to effectively manage classroom challenges and support student success. Considering the use of analytics systems to support higher education students can help teachers identify at-risk students and provide targeted interventions to address their academic needs. By leveraging data-driven insights, teachers can personalize their approach to teaching and learning, thereby improving student outcomes and reducing the number of failing students.

#### *4.4. Leadership Roles*

Aspiring to foster an engaging and enriching classroom environment, new university teachers can take proactive steps to enhance their leadership skills next to their role as teachers. Drawing insights from the established literature on teacher leadership, it becomes evident that strong leadership is pivotal for maximizing student development [38]. Therefore, new teachers embarking on leadership roles can greatly benefit from structured pedagogy courses, where explicit instruction in leadership strategies is provided [39]. Additionally, the importance of personal growth and identity development in assuming leadership responsibilities, which highlights the multifaceted nature of leadership development, should be emphasized [40].

Navigating the transition into a leadership role can be facilitated by following a four-phase proposed model [41]. This model serves as a guiding framework for new teachers, assisting them in preparing for leadership roles and effectively managing the associated challenges. Moreover, the significance of enhancing teachers' autonomy, communication skills, and cooperation awareness within university settings to foster leadership development is of importance [42]. By embracing these principles and actively engaging in pedagogical enhancement activities, new university teachers can establish themselves as active leaders in the classroom, ultimately contributing to the holistic growth and development of their students.

#### *4.5. Recognizing Individual Participation of Students within Group Work or Team Assignments*

To mitigate the challenge of recognizing individual participation in group work, fostering a positive relationship between students and teachers is paramount. Encouraging friendly discussions and interactions, especially during break times, can establish rapport and open lines of communication. Such informal engagements provide opportunities for students to express their thoughts, concerns, and contributions, allowing teachers to gain insights into individual involvement within group settings [21].

Moreover, the active monitoring of students during work activities enables teachers to observe firsthand the dynamics of group interactions and identify individual contributions [43]. By attentively supervising group sessions, teachers can assess each student's

level of engagement, problem-solving skills, and collaborative efforts, thereby facilitating a more nuanced evaluation of individual performance.

In instances where multiple groups are involved, leveraging the expertise of Ph.D. students or researchers as dedicated supervisors for group work can further enhance individual recognition. These supervisors can provide guidance, support, and feedback to students, ensuring equitable opportunities for all individuals to showcase their abilities and contributions within the team context.

#### *4.6. Hard to Answer/Official/Legal Requests from Students*

Dealing with hard to answer or official requests from students requires educators to exercise patience and prudence in their responses. Rather than hastily consenting or declining these requests, teachers should take a step back and consider the implications of their decisions. Seeking guidance from course coordinators, program coordinators, colleagues, and legal resources available at the university can provide valuable insights and support in handling complex requests.

It is essential to recognize that consenting to students' requests may seem like the easier option, as refusal can potentially damage the teacher–student relationship and threaten the student's faith. However, teachers must prioritize educational principles, pedagogic goals, and institutional policies when making decisions. Refusal should be grounded in valid reasons, clearly communicated to students, and supported by relevant guidelines or regulations. Refusing students' requests is a common occurrence in academia, and teachers should be prepared to engage in follow-up discussions and negotiations [44]. By maintaining transparency, professionalism, and empathy in their interactions with students, teachers can mitigate potential conflicts and uphold the integrity of their teaching practices.

#### *4.7. Best Learning Activities*

Designing the best possible learning activities involves incorporating diverse and interactive elements to enhance student engagement and comprehension. Teachers should add variety to their teaching techniques to reduce the amount of mismatch that occurs between teaching style and student's learning style [8,45]. Utilizing multimedia resources such as funny slides, videos, and animations connected to course lectures can create a dynamic and enjoyable learning environment. Real-world problem-solving examples, practical projects, and seminars offer opportunities for hands-on learning and application of theoretical concepts [21,45].

Connecting lab work examples to software simulations as voluntary activities provides additional opportunities for students to reinforce their understanding and skills. Recorded video discussions and solution manuals cater to different learning preferences, offering flexibility and accessibility to course materials. Seeking continuous feedback through formative evaluation allows educators to adapt and improve their teaching methods based on student input.

Ending lectures with simple questions encourages student participation and reflection, fostering a culture of continuous improvement and self-assessment. By creating a supportive learning environment that encourages active participation and exploration, educators can optimize learning outcomes and student success.

#### *4.8. Enhanced Well-Functioning Learning Process*

To optimize the learning process effectively, it is imperative to implement various strategies. Firstly, allowing students adequate time to reflect and pose questions during lectures encourages active participation and deeper comprehension. Employing a moderate pace of speech, coupled with changes in voice tone and body language, enhances communication effectiveness. Demonstrating politeness, respect, eye contact, and attentive listening to student inquiries fosters a supportive learning environment and bridges the gap between students and teachers. Acknowledging the potential for boredom during lengthy lectures, integrating active learning techniques like reading handouts, and incorporating

unplanned breaks can reinvigorate student engagement. Moreover, maintaining open channels of communication and promptly addressing student queries both in and out of class is essential for proactive course management. Lastly, focusing on clarifying fundamental concepts that may be unclear to students ensures a solid foundation for continued learning.

#### 4.9. How to Enhance Efficiently Student Motivation and Engagement?

To efficiently enhance student motivation and engagement, a multifaceted approach can be adopted. Firstly, clearly outlining learning outcomes at the outset of each session provides students with a roadmap for their learning journey, fostering clarity and purpose. Linking lecture content and exercises to final assessments by showcasing previous exam questions incentivizes active participation and problem solving. Introducing non-addressed questions, answering them, and revisiting them in subsequent related lectures reinforces learning and encourages attentive listening. Acknowledging student knowledge and progress boosts confidence and motivation. Reviewing previous lecture material at the start of each session aids in knowledge retention and continuity. Providing timely feedback on assignments facilitates ongoing improvement and engagement. Utilizing recorded video discussions/solutions offers flexibility and accessibility to students. Additionally, allocating extra time for students to enhance their skills demonstrates a commitment to their development. Creating a safe, supportive, and friendly classroom atmosphere encourages active participation and inquiry. Sharing personal experiences and responding to questions with openness and encouragement fosters a conducive learning environment. Encouraging peer learning promotes collaboration and knowledge sharing, enriching the learning experience for all students. By implementing these strategies, educators can effectively cultivate motivation and engagement among their students, leading to enhanced learning outcomes and student satisfaction [21].

#### 4.10. Dealing with Overactive Students

Overactive and highly distractible students can pose significant challenges in the classroom, impacting teachers' self-efficacy and the overall learning environment [46]. These students may exhibit behaviors that disrupt the flow of lessons and make it difficult for other students to focus. Managing such behaviors can be a potential stressor for teachers, affecting their confidence and the overall classroom atmosphere [47]. Therefore, teachers must have beneficial coping mechanisms to maintain a positive and productive learning environment. For this purpose, teachers can employ several strategies, as follows:

*Enhance teacher self-efficacy:* Teachers must prioritize enhancing their self-efficacy when dealing with challenging behaviors from overactive students [46]. This includes fostering a positive attitude towards their teaching abilities and building strong relationships with all students, including those prone to overactivity.

*Understand emotional and behavioral difficulties:* Remind themselves that overactive students learn differently [48] and overactivity is one of the dimensions of psychopathology [49]. This understanding helps in effectively identifying and addressing overactive behaviors in students. Teachers can then tailor interventions to provide fruitful support [50]. Moreover, it has been observed that students with overactivity, such as ADHD, respond positively when treated equally to their peers [48]. Embracing the label of ADHD as a strength rather than a negative can also contribute to fostering a positive learning environment [48].

*Implement classroom management strategies:* Teachers can create a conducive learning environment by establishing clear rules and procedures [51]. This includes setting clear expectations and providing regular reminders, especially for students prone to overactivity [52]. Additionally, utilizing operative time management techniques is essential to maintain focus and engagement among overactive students [51].

*Strategies for engaging students with overactivity:* Teachers can engage students with overactivity by giving clear expectations and rules, providing regular reminders for reinforcement. Employing strategic praise for students following rules and instructions, including those with overactive behaviors, can also be efficient [52]. Additionally, establish-

ing routines and maintaining patience is crucial, as students with overactivity often benefit from predictability [48,52].

*Collaborative approach:* Sharing operative strategies with colleagues who work as teachers is crucial for supporting overactive students in the classroom. Additionally, seeking guidance from the course coordinator on handling such challenges can provide valuable insights and support. It is worth noting that one of the authors has firsthand experience with similar situations, and the solutions presented here are partly derived from their successful experiences and perspectives, supported by the existing literature.

#### 4.11. Achieving Work-Life Balance for New Teachers

Maintaining a healthy work–life balance is essential for the well-being and effectiveness of new teachers. In practice, meeting the needs of all learning styles demanded in each class period is unrealistic [45]. Studies have highlighted the inherent conflicts faced by teachers in balancing family and professional commitments, leading to emotional dissonance, stress, burnout, and negative health consequences [53,54]. To alleviate these challenges, the following self-care strategies play a crucial role [55,56]:

*Physical health:* Prioritizing physical health through adequate sleep, regular exercise, and a balanced diet is essential for improving emotional well-being and resilience. Establishing consistent sleep patterns, engaging in relaxing bedtime routines, and avoiding substances like alcohol and caffeine before bedtime contribute to better sleep quality.

*Social connections:* Maintaining positive social connections can have long-term effects on mental health, whereas chronic social isolation increases stress levels. Actively seeking social interactions and avoiding isolation can mitigate stress and promote emotional well-being.

*Cognitive training:* Cognitive training techniques help to manage negative thoughts and emotions, thereby reducing stress levels. By replacing negative thoughts with positive ones and identifying and labeling emotions, individuals can modulate negative emotions and decrease stress responses.

*Work-life balance strategies:* To re-establish control over work–life balance, teachers can audit their priorities, establish clear boundaries, and allocate time effectively to align with personal and professional aspirations. Addressing specific issues such as long-hour cultures and excessive workloads is crucial for maintaining a healthy work–life balance.

To complete Section 4, it is crucial to highlight that in today’s educational landscape, teachers from all disciplines, especially newcomers, need to possess adequate knowledge of environmental and climate change issues. The first and third authors of this study, both with backgrounds in electrical engineering, have already conducted research on how climate change affects their field [57]. They aim to utilize this expertise while instructing engineering students and developing climate change-related projects for them.

## 5. Conclusions

In conclusion, this study has explored the possible impact of department teaching culture on new teachers’ teaching styles, considering a case study at a Swedish university focusing on engineering education. Through interviews with experienced colleagues, various aspects of teaching culture, challenges faced by new teachers forming their teaching style, and strategies to overcome these challenges have been examined. The findings highlight the importance of understanding and adapting to the teaching culture within a department, as it significantly influences the teaching style of new instructors.

The identified challenges, such as shyness, lack of literature for highly practical courses, and maintaining work–life balance, underscore the complexity of the teaching profession. However, the strategies proposed, including fostering open communication, incorporating hands-on learning experiences, leveraging technology, and prioritizing student engagement, offer practical solutions to mitigate these challenges. These methods are rooted in the experiences of engineering teachers and students, reflecting the unique dynamics of the field.

Nevertheless, the pedagogical principles underlying these strategies transcend disciplinary boundaries and can be applied across various academic fields. By embracing a student-centered approach, promoting active learning, and prioritizing continuous improvement, educators from diverse disciplines can enhance their teaching effectiveness and contribute to the holistic development of their students. Therefore, while this study focuses on the context of engineering education, its insights have broader implications for pedagogical practice across disciplines. Additionally, understanding how to effectively employ Artificial Intelligence (AI) technologies in both the teaching and learning processes for teachers and students is a contemporary challenge. Teachers need to continuously assess the extent to which AI technologies, such as ChatGPT, an advanced language model developed by OpenAI, can be utilized to enhance the educational experience. Teachers must ensure that students comprehend the genuine contributions of these technologies within a course. By recognizing the importance of teaching culture and adopting evidence-based strategies, teachers can create enriching learning environments that foster student success and engagement, ultimately advancing the goals of higher education.

The findings of this study have several practical implications for academia and practitioners. For academic institutions, understanding the influence of departmental teaching culture can inform the development of support structures and professional development programs tailored to the needs of new teachers. For practitioners, particularly new teachers, the strategies outlined in this study offer practical guidance for navigating the challenges of their early teaching careers and for fostering a positive and effective teaching environment.

While the findings of this study, conducted within a single engineering department, may offer valuable insights applicable to other engineering disciplines and certain non-engineering departments, it is important to recognize the study's limitations in generalizing beyond the specific context examined. Conducted within a single engineering department at a specific university, the findings may not generalize to other contexts. The small sample size may not capture the full diversity of experiences within the department. Additionally, the reliance on qualitative data, though rich, may be subject to subjective interpretation. Therefore, future research should expand to multiple departments and universities to enhance generalizability. Including a larger and more diverse sample would provide a broader understanding of teaching culture and challenges. Further studies could explore the long-term impact of the strategies on teaching effectiveness and student outcomes, and quantitative studies could complement the qualitative findings for a more balanced analysis.

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