DOI:https://doi.org/10.61841/sy68h790 PUBLICATION URL:https://nnpub.org/index.php/EL/article/view/2690

THE OBSERVER'S BLIND SPOT: SWEDISH STUDENT TEACHERS' STRUGGLES WITH SCIENTIFIC THEORIES IN DEGREE PROJECTS

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How to cite this article:
Dimenäs, J., & Ridder, I. . (2025). THE OBSERVER'S BLIND SPOT: SWEDISH STUDENT TEACHERS' STRUGGLES WITH SCIENTIFIC THEORIES IN DEGREE PROJECTS. International Journal of Advance Research in Education & Literature (ISSN 2208-2441), 11(2), 78-91. https://doi.org/10.61841/sy68h790

ABSTRACT

This study aims to deepen the understanding of the challenges students face in using theory during thesis writing in teacher education and to explore the potential of a systems theory approach to explain these challenges. Data were collected via focus group discussions, informed by the analysis of approximately 70 purpose statements used to develop an interview guide. Nine students participated in three focus groups. The writing process is viewed as an operationally closed, self-referential system, regulated by the internal logic emerging from students' communication and actions. Findings reveal that effectively using theory requires recognizing the mutual influence between theory and the phenomena being theorized, which necessitates non-linear and complex thinking. Students must adopt the perspective of an observer and consider the factors shaping their own knowledge creation. A significant insight is that theory is not merely a tool for understanding phenomena but also shapes how observers perceive knowledge. This highlights the importance of addressing "the blind spot"- what remains unseen in scientific processes - and the inherent limitations of language in articulating complex, interdependent relationships. These insights underscore the need for a reflective approach to theory in thesis writing.

INTRODUCTION

According to the Swedish Higher Education Ordinance (SFS 1993:100), a teacher's education is concluded with an independent scientific work worth 30 higher education credits. The Swedish competence description expects the student to integrate theory and practice, promote professional and personal development, and contribute to the development of knowledge within a specific subject didactic area. This requires a writing process where the use of theory and reflection play a central role, as they provide the framework for the scientific work. Theory influences study design, including choice of methods, possible sampling and data collection instruments, and prescribes how data can be analyzed. It guides the research question and influences the development of hypotheses.

It can be stated that the educational and linguistic backgrounds of students and university staff are becoming more diverse (Lea & Street, 1998; Lea & Stierer, 2000). Today's students encounter a highly complex discourse as they develop academic literacy, contributing to the diverse nature of academic writing at Swedish universities (Blåsjö, 2004; Hyland, 2009; Wingate, 2018). Although today's Swedish students meet cultural norms of an academic field, which is characterized by cultural and linguistic diversity, research in Sweden on this is limited (Josefsson & Santesson, 2017; Bergman & Davidsson, 2023). The academic writing assignment is very complex, and the demand for a theoretically well-thought-out approach makes the process even more difficult for the students. Despite the centrality of theory to research procedures, our understanding is that many students experience great uncertainty, not to say discomfort, when it comes to scientific theories.

In the present study, we start from the paradoxical nature of theory to understand the students' perceived problems when they formulate the theoretical side of a scientific work. The study focuses on the theory's self-logical potential and addresses its blind spots that prevent confrontation with ontological paradoxes. These paradoxes, as we will see, are implicit in a phenomenological approach. We use the German systems theorist Niklas Luhmann in this context (Luhmann, 1987), which can be considered to some extent as unusual, as dynamic systems theory starts from a different epistemological basis than several other theories in education. The idea of the paradoxical nature of the theory comes from Luhmann's remarks about dynamic systems observing themselves. A dynamic system cannot do anything but see itself and the outside world based on the categories that constitute it (Luhmann, 1987).

Given that much of the educational writing research in Scandinavia focuses on sociocultural and social semiotic approaches (Bremholm, Kabel, Liberg, & Skar, 2021) and pays less attention to students' engagement with theoretical concepts, this study contributes by offering a systems-theoretical perspective on students' use of theory in thesis writing. The aim is to describe the difficulties students encounter in relation to the use of theory when writing their thesis in the teacher education program, and to explore the explanatory potential of a systems-theoretical approach for understanding these problems. This study is part of a research project where we deepen the knowledge of the academic writing process, examining how it evolves and changes over time, using a systems theoretical approach in which writing is understood as an operationally closed, self-referential system. We focus on how contextual and pedagogical factors influence the writing process in teacher education courses, as reflected in students' statements during focus group discussions. The dynamic system is stabilized through the internal logic of the system (Luhmann, 1987), which manifests itself in the students' described communication and actions. Within the framework of a thesis course, the complexity of the writing process and the effects of elements connected in a network of relationships are dealt

with. In the study, we perceive the students' understanding of their own writing process as a self-organizing system, where higher or later abilities rest on earlier abilities. One can perceive the skill of writing a finished and approved degree project as a kind of epiphenomenon that grows out of an already functioning conceptual system without any special further development effort. If this development is strongly linear and rule-governed with clear action options, this leads to an obviousness that does not need to be questioned and therefore creates security.

BACKGROUND

Swedish research on writing as a process is heavily influenced by Hayes and Flower's (1980) seminal study, which views writing as an essential cognitive and intellectual activity (Flower & Hayes, 1981). In recent years, this perspective has broadened to include social, bodily, and material aspects. These aspects have also been explored in Sweden, where researchers like Hort (2020) assess writing from socio-cultural and socio-material viewpoints. The writing process, both as theory and practice, can be understood through multiple perspectives. By integrating theoretical models and practical steps, we gain insights into how a writer develops a text. Central to students' efforts in teacher education is the completion of an independent thesis, representing the primary goal of their instruction. In this product-oriented thesis instruction, student teachers must master subject-specific terminology within educational science and demonstrate their ability to meet the scientific and formal requirements of an independent degree project (Erixon & Josephson, 2017; Lea & Stierer, 2000; Lea & Street, 2006; Arneback, Englund & Solbrekke, 2017).

Students' writing functions independently as a medium for learning, with the act of writing itself being an activity focused on problem-solving (Wrobel, 1995; Molitor-Lübbert, 2002; Kruse & Ruhmann, 2006). Furthermore, research shows that text production and processing require extensive mental effort. Cognitive strategies can alleviate this burden for writers (Molitor-Lübbert, 2002; Hoel, 2010; Winzell, 2018). These strategies involve planning, formulation, and revision techniques designed to facilitate the writing process and help writers strategically master tasks. Metacognitive strategies, in particular, enable writers to monitor and optimize their cognitive writing strategies. For this, self-regulatory abilities are crucial, allowing writers to independently plan, monitor, and refine their approach. While bodily and spatial phenomena are acknowledged in the writing process, they are not considered in the same way as in dynamic systems theory. The key difference is that a dynamic systems theory approach emphasizes researching the activity of writing as it evolves over time, focusing on its dynamic and process-oriented nature (Luhmann, 1987; Larsen-Freeman & Cameron, 2008).

Using Niklas Luhmann's systems theory to examine students' difficulties with theory use in thesis writing provides a deeper understanding of the complex processes involved. According to Luhmann, society consists of different social systems that are operationally closed and self-referential (Luhmann, 1987; Reese-Schäfer, 1996). These systems - such as functional systems (e.g., legal systems, educational systems), organizational systems, and interaction systems - work in parallel and interact with one another. A system is distinguished from its environment by maintaining specific boundaries and is defined by communication, which is the central element of social systems. It is significant that social systems create and maintain their boundaries and identity through communication. Communication is not just a tool within the system; it defines the system and distinguishes it from others. Messages, information, and understanding circulate within the system, maintaining its structure (Luhmann, 1987; Reese-Schäfer, 1996).

Dynamic systems are autopoietic, a concept originating in biology and used by Luhmann to describe how systems self-produce and self-organize their structures and processes. Luhmann explains that social systems not only maintain themselves through communication but also create their components and structures through it. This means a dynamic system is self-producing and not dependent on external factors to define its internal operations. Nevertheless, the system is not isolated but interacts with its environment. It processes input and handles external influences by interpreting and processing them through its own structures, logic, and mode of communication (Luhmann, 1987; Reese-Schäfer, 1996).

In dynamic systems, there is no import of structure. Instead, systems produce their elements and structures internally, becoming self-referential. Thus, dynamic systems can only observe themselves and the surrounding world through the cognitive categories that sustain and create them. This self-referentiality highlights a dual perspective: externally, dynamic systems can be observed as objects interacting with their environment, whereas internally, they function as cognitive and communicative processes shaping an individual's construction of reality. Observing dynamic systems involves not only examining external behavior but also understanding how internal logic generates and sustains the categories through which individuals perceive and engage with the world. The system must also deal with the paradox of reflecting on itself and its operations while being limited by its structure and specific way of perceiving the world.

This paradox is central to this article, as students must navigate their theoretical choices and address their limitations within the framework of their self-referential systems. Central to understanding students' thoughts on theory is the systems-theoretical idea that every observation necessarily takes place from a particular standpoint. As Luhmann puts it: "Everything, including ontology itself, depends on the distinction on which an observation is based. Differentiation and designation are understood as the operations of an observer" (Luhmann, 1990, p. 29, our translation).

Dynamic systems are adapted to complex contexts, which is why theories addressing this complexity must also be complex. However, systems have ways of reducing complexity, such as selecting and reacting to certain aspects of their environment while ignoring others. This means systems act according to their own logic and operation. In Luhmann's systems theory, communication is the central element of social systems, and how the system processes information is crucial to its functioning (Luhmann, 1987; Reese-Schäfer, 1996). Another important aspect is observation and the role of the observer. Observations depend on the codes and distinctions within a system and vary between social systems. Systems connect to other systems and their environment through structural coupling (Luhmann 1997, vol 1). This interlinking allows systems to influence one another without external control. Structural coupling enables systems to react to changes in their surroundings or environment, which, when creating uncertainty or contradictions, must be managed.

From a systems-theoretical approach, we understand the writing process as an operationally closed, self-referential system stabilized through its internal logic, which is manifested in the communication and actions described by students in our focus discussions. Within a thesis course, the writing process manages complexity and the effects of interconnected elements, which we describe here. Static, linear thinking influences students' thoughts about theory in relation to formulating the thesis's purpose. It is not direct theoretical interest or knowledge being expressed but rather that the use of theory is perceived as a problem students try to manage by finding a theory to match what they are expected to investigate.

Understanding theory is connected to human perception of the world, that is, our ability to see it. At the same time, the concept of theory revolves around phenomena. A challenge lies in articulating theory as something outside the phenomena of the surrounding world while simultaneously interacting with and shaping our understanding of them. The tension between theory and phenomena is not only philosophical but also practical, as seen in educational settings where students often perceive theory and practice as dichotomized domains (Dimenäs, 2010). This perspective highlights challenges in integrating theoretical frameworks with practical applications and reflects broader epistemological issues.

Luhmann uses the concept of observation (*Beobachtung*), but with a specific meaning within his systems theory (Luhman, 1987). In terms of education and learning, a reference to the phenomenological method seems fitting. Phenomenology assumes impartial access to the experience of the world. Its method allows understanding of essential structures and exploration of the foundations of knowledge. It emphasizes returning to the things themselves and observing the world as it appears. Husserl, for instance, formulated the concept of "eidetic reduction" (from the Greek *εἶδος* meaning 'the visible form' or 'the essence,' and Latin *reductio* meaning 'leading back'), which involves abstracting concrete details of an experience to identify its essential structures or "essences." These essences represent the general and necessary characteristics common to all phenomena of a particular kind. This presupposes distancing oneself from preconceived notions to view what exists in the world as pure phenomena and describing experiences without prejudice or predetermined concepts (Husserl, 1913). From a systems-theoretical perspective, this notion of 'pure phenomena' is problematic, as it assumes an impartiality that disregards the observer's role in constructing meaning (Luhmann, 1997, vol 2). Similar critiques are found in variation theory, which argues that it is impossible to fully objectify the world or detach from one's conceptual framework (Marton & Booth, 1997). While we acknowledge these critiques, we do not address them in detail here, as our focus lies elsewhere.

In *Die Gesellschaft der Gesellschaft* (1997, vol. 2, Luhmann, 1987), Luhmann argued that the concepts of phenomenology are not directly applicable to social phenomena and their observation. For Luhmann, the phenomenological method seemed too dependent on the observer and insufficiently focused on the complex interactions within social systems. In his theory, observation is a fundamental action that allows social systems to create their reality. The system selectively takes in information from the environment based on predefined codes. These codes determine the structure for communication and meaning-making in a social system. For Luhmann, observation itself creates and constitutes a social system. Through observation, information is selected from the environment and translated into the system's own codes, enabling the system to create meaning and significance.

One might argue that Luhmann is not far from a phenomenological approach. In the article *Die neuzeitlichen Wissenschaften und die Phänomenologie* (1996), the sociologist from Bielefeld explains that "Husserl's theoretical decision lies in the concentration on the transcendental subject (die Theorieentscheidung Husserls liegt in der Konzentration auf das transzendentale Subjekt)", meaning that Husserl assumes a transcendental basis for phenomenology. However, Luhmann wonders who observes the subject that observes the world. He refers to cybernetics and situates his argument within second-order observation - an observation of observers, which is subsequently communicated (Luhmann, 1996). This involves a differentiation between two sides: one hidden, the other open. Luhmann, with his typically subtle irony, illustrates this with

the question of who determines whether the distinction between good and evil is itself good or evil (Luhmann, 1996).

Cybernetics, founded by Norbert Wiener, is a science concerned with the control and regulation of machines and how these ideas apply to living organisms and social organizations. It is a key aspect of Luhmann's theory, as it considers the human ability to perceive the world through the senses. For Luhmann, the application of cybernetics to communication and observation is particularly significant. The word cybernetics originates from the Greek term *κυβερνήτης* (*kybernetes*), meaning helmsman, and has been described as the art of steering. Second-order cybernetics, also called the cybernetics of the observer, is a further development that focuses on systems' self-regulation. It emphasizes the role of the observer, specifically how the observer's way of receiving and processing information is crucial and influences a system's functioning and perception of the world. Luhmann refers to this in his 1997 critique of phenomenology, pointing out that the observer is part of the system and that the system's perspective and interpretation shape observation. This has significant implications for phenomenological philosophy and theory formation (Luhmann, 1997, vol. 2; Luhmann, 1987: "Konsequenzen für Erkenntnistheorie").

In Luhmann's theory, concepts such as autopoiesis (self-organization) and the influence of the observer on what is observed play central roles - concepts derived from second-order cybernetics. Luhmann asks who observes the subject that observes the world and emphasizes that phenomenology subtly eliminates the position from which phenomenology observes the world (Luhmann, 1996). One might say it is God who observes the one observing the world, but then the question arises: who observes the God that observes an observer? In such contexts, Luhmann (1990, p. 88) refers to the quote, "(d)eum nequaquam concipi debere habere esse," pointing out that as early as the 15th century, Cardinal Nikolaus Cusanus argued that one should by no means conceive of God as something that can have existence (*De docta ignorantia*, Cusanus, 1964). Luhmann uses this reference not to invoke religious belief, but to illustrate the epistemological challenge of conceptualizing a position entirely beyond observation.

RESEARCH DESIGN

Data on students' communication and reflections regarding the use of theory were collected through synchronous focus group discussions (Bryman, 2016). Focus groups allow exploration of shared challenges and strategies related to the use of theory while enabling interactive discussions. They allow participants to build on each other's responses, which is particularly relevant for our study. During the planning phase, approximately 70 purpose statements from the student group were collected and analyzed. Participants were recruited from this group, and selection was made through purposive sampling (Bryman, 2016), resulting in nine students participating in three focus groups. Purposive sampling ensured the inclusion of participants with considerable experience in the course content and thesis writing. The synchronous discussions were conducted online using a video conferencing tool (Zoom), with its recording function used to document and save the discussions.

The discussions were divided into three phases. The first sessions took place shortly after the thesis course began; subsequent sessions were held in connection with thesis seminars, and the final focus group interview occurred after the grading process. During the first meetings, eight student teachers participated in two separate discussions (4+4). In the second phase, three discussions were held with nine students (3+3+3). The final focus group discussion involved five students. The discussions typically lasted about an hour. A pre-designed interview guide structured the discussions and guided the moderator's input. Using this guide, the semi-

structured discussions aimed to gather information on how students describe challenges with using theory and to explore the potential of a systems-theoretical approach to understanding these issues. During the discussions, students and the moderator explored how they use theory in their thesis work, the difficulties they encounter, and the strategies they employ to overcome these challenges.

In academic research, focus group discussions present both opportunities and challenges (Dimenäs, 2020; Bryman, 2016). For instance, student teachers may influence each other negatively, inhibiting conversations for various reasons. The nine students in this study were from the same course and had previously attended classes together. This familiarity meant they formed a homogeneous group accustomed to distance learning via video conferencing. The group's homogeneity, stemming from shared experiences, was advantageous as it grounded discussions in common contexts. However, it also posed limitations regarding diverse perspectives, mitigated by using structured interview guides. To ensure undisturbed discussions, participants were seated at a computer in a quiet, self-selected environment.

The transcriptions of the focus group discussions were analyzed to identify patterns in how students communicate about theory and the writing process. Thematic analysis (Bryman, 2016) was employed to identify recurring patterns in students' communication about theory and writing. Initial codes were derived inductively, followed by iterative refinement to capture key themes related to challenges and strategies. To enhance validity, themes from focus group discussions were compared with data from purpose statements. Additionally, the structured interview guide ensured consistency across focus groups, while reflexive practices by the moderator minimized potential bias during data collection. One limitation of this study is the small sample size, which may affect the generalizability of findings. Additionally, the pre-existing relationships among participants, while fostering open discussions, may have inhibited more critical perspectives. The use of online discussions via Zoom, though convenient, may have introduced technological barriers for some participants. However, participants were accustomed to distance learning and had completed their entire education using similar platforms.

ETHICAL CONSIDERATIONS

This study involved students in the final stage of their education. According to Swedish legislation on research ethics involving humans (SFS 2003:460), no formal ethical approval was required, as the study did not involve sensitive personal data or interventions. However, the study adhered to national and international ethical standards, including guidelines from the Swedish Research Council, which emphasize anonymization, proper data handling, voluntary participation, and the right to withdraw at any time (Bryman, 2016; Görman, 2023). The most experienced researcher collected the data and had no teaching role in relation to the participants. To prevent any influence from prior interaction, measures were taken to ensure impartiality and safeguard voluntary participation. The material was analyzed only after the course had ended and all participants' grades were finalized.

Confidentiality and anonymity were ensured throughout data collection, analysis, and presentation of results (Görman, 2023; BERA, 2018). All participants received detailed written information about the study, including its purpose and procedures, before providing informed consent. This information was repeated verbally before each interview, and participants had ample opportunity to ask questions before confirming consent. Participants were informed of their right to withdraw at any point without consequences. They were also notified that the interviews would be recorded using Zoom. All recorded interviews were securely stored and

managed in compliance with GDPR standards, with data encrypted during both storage and transfer (European Commission, 2018). Pseudonyms were used in the presentation of findings, and no identifying information was included in the analysis or reporting to protect participants' privacy.

ANALYSIS

To meaningfully address theory when working with students writing their theses in education and learning, the question "Where is the observer?" can be a fruitful starting point (Luhmann, 1990). Examining what is observed, by whom, and under which premises helps us understand both ourselves and the limitations and possibilities of research. We argue that this reflexivity, where the observer's actions influence the system, complicates the approach when engaging with theoretical perspectives. The phenomenological approach stems from the insight that observation is an active process- not only gathering information about a phenomenon but also influencing the observer. In Luhmann's systems theory, this is deepened through reflections on what constitutes the boundary between the system and its environment. Where do we draw the line? This question serves as a method for integrating society and humans- as objects, as objects of observation, and as observing objects of observation - into the analysis.

When analyzing students' communication regarding theory in the focus group discussions, the following categories emerged:

1. The emotional aspect of theory usage
2. Theory as something instrumental
3. Theory as an (overly) extensive field of knowledge
4. Theory within the various courses of teacher education
5. Theory structures thinking: the observer emerges

1. The emotional aspect of theory usage

Students' emotional reactions to the theoretical requirements of their theses are a prominent aspect of the material. The attitude toward writing a thesis is often not very positive, with feelings such as being "nervous about getting started with this" and the goal being "to just survive and get through it" (FS4, S3/5). One student describes how, "when I started my thesis, I didn't feel any anxiety," but adds that "it was only when it came to the theory chapter that I felt a certain anxiety" (F5, S3/1). Expressions of enthusiasm, joy, or curiosity about working with theory are rare, though they become slightly more common toward the end of the writing process. This is noteworthy in itself.

Expressions of fear and insecurity about working with theory are present from the first focus group discussion. One student highlighted being "afraid of theory" (F1, S1/5), lacking understanding of the theoretical approach, and wondering, "what am I supposed to do with it?" (FS2, S1/6). However, there are also occasional positive statements. One student expressed, "I am happy with the theory" and was grateful for "reading some learning theories" (FS2, S3/6). This statement seems to reflect the perspective of an ambitious student who understands that deeper theoretical discussions can result in better grades.

In the early focus group discussions, the emotional aspect of theory usage reflects a view of theory as instrumental - something to be applied to data. In the second focus group, one student mentioned, "I think this was the hardest part of the thesis: to understand and apply a theory." They explained that they had "found one or two" theories and discussed them with their supervisor. They added, "When it comes to learning and noticing something, that's where

phenomenology comes in; and the sociocultural theory has been helpful. Vygotsky and Säljö. So I've struggled with that." However, when the student was supposed to continue with the theory section, their uncertainty became more apparent. They explained, "I didn't quite know what I was supposed to use it for" (FS2, S1/6). When asked for clarification, the student further elaborated: "No, but I had trouble understanding what theory is for, but through conversations with my supervisor and the group, it eventually emerged" (FS2, S1/6).

2. Theory as something instrumental

In the discussions, there is little expression of theoretical interest, knowledge, or curiosity; instead, the communication is marked by uncertainty and a lack of independence (F1, S2, 6; FS2, S1, 6). One student expresses that their understanding of theory "has grown stronger in the thesis," but admits that "the first reaction was, okay, do I need a theory as well? What am I supposed to do with it?" (FS2, S1/6). Students investigate didactic literature for models they hope to apply (F1, S2, 6) or search for "keywords" that "fit like a glove" for what they plan to investigate (FS2, S1, 6). Theory is something one possesses, like an instrument, which needs to be found and applied to the empirical project. One student expressed that they are looking for something they can "cram in as theory," a common approach to meet the theoretical requirement in these projects (FS3, S3, 4). In the final focus group, another student describes almost forgetting "theory in the discussion and conclusion," explaining that "it was there, but it wasn't clear enough. It was there in my last paragraph with Vygotsky" (F6 S4, 3). Overall, students' understanding of theory increases during the writing process, but uncertainty surrounding theoretical work dominates communication.

3. Theory as an (overly) extensive field of knowledge

Choosing and using a scientific theory, managing theoretical reasoning, or clarifying a theoretical analysis model is seen, based on the communication in the material, as time-consuming and overly extensive. "There is so much to take in. And then, after these years, it's supposed to be applied in practical action" (S3, FS1/2), one student states. In the first focus group discussion, a student mentions, "I spent whole weeks on Vygotsky. There are so many controversies and scaffolding - what is scaffolding...?" (FS1, S1/5f). In the same discussion, another student shares the same sentiment. They realize that "this is also something that needs to sink in, and then you think, Vygotsky - that's probably good! And it fits." They continue by saying, "you read and read, and then you think, okay, there is this angle that includes this." They emphasize that the process takes time, saying, "it has slowly become clear to me how I might be able to think" (FS1, S3/7). Another student describes the struggle of finding the right approach when tasked with writing a theory and methodology section:

It's reflexive interviews, it's Kvale & Brinkman - which takes time to get through, with fine metaphors like prospectors and travelers. I thought, how much of a traveler am I? You have to figure everything out yourself. And then there's phenomenography. Or is it phenomenology? It would have been great to have a forum where we could bounce our ideas around when we're stuck on theory or method. We sit alone, and it takes time to work through these issues (FS1, S1/7).

The students repeatedly emphasize the time-consuming aspect of the writing process. After working on the results section and analysis, one student describes how examining the results is based on the work done with theory and method. They feel that it "requires quite a lot; a clear thread throughout the whole work," that the process "takes time, at least that's what I've discovered" (FS4, S4/2), and that it was "a long process" (FS4, S2/7). At the end of the thesis course, another student explains that they intended to "create a model, how can one connect

organizational theory to this? The work team and the school's organization. To create an analysis model. And then my empirical work would be to test that model." However, the same student concludes that "developing a model is an advanced task, and I had made considerable progress, but it requires more than what we together thought was possible in a week and a half" (F6, S3/4).

4. Theory within the various courses of teacher education

Statements regarding theory as an (overly) vast field of knowledge are related to the students' experiences of how theoretical competence is addressed in the various teacher education courses. The material illustrates that some students feel theory is not addressed at all in certain subjects: "Because in Swedish, when I took my courses, I never encountered any of the Swedish didactic theories, like Gibbons and Vygotsky" (FS6, S6/5). Other comments show that some subjects do engage with theory: "We have read a lot about it in previous courses (...). It has been full of different learning theories. Vygotsky has been a name that came up all the time in various contexts" (FS6, S2/6). It becomes clear that the prior knowledge gained (or not gained) from subject studies affects students' confidence in using theory and their ability to manage it within the time constraints. In the third focus group, one student summarized their experience:

What I have missed during my education is the red thread. I have received feedback on my take-home exams and the papers I have written, but I've missed the red thread as preparation for the thesis. And I've noticed this now when I wrote my first draft, I realized very early that I had written theory and previous research in the same chapter. And I didn't write it correctly at all. I wrote it as a continuous text, where I combined the researchers' theories with my own text that I had formulated, and the reading. But I didn't specifically outline each researcher's theory. And it says so in your book, even about theory and such. But you can get very tunnel-visioned when you sit down to work, you become very stressed out (FS3, S1/1).

5. Theory structures thinking: the observer emerges

In the first focus group discussion, thoughts about various didactic approaches were explored. One student commented that they were aware of "different examples of different currents within didactics" they had encountered. They raised questions like, "What is knowledge, how can we know something," adding that these are central to the research process and "the basic cornerstones where you have to start." The student also mentioned having heard about "phenomenology," explaining that "it's a research current, how you can know something," and further, "what the disadvantages might be in choosing such an approach, and of course, the advantages, of choosing such an approach to the world" (FS1, S2/6). Some statements clearly illustrate how theory structures scientific thinking and how students come to realize, "now, when you're in the program, you can understand: aha, there are theories about that too, practical knowledge, practical science." The material shows that students sometimes discover during the writing process that a theoretical approach is a way of describing the world through theoretical terms. One student expressed this realization as follows: "And it's very exciting to put names to things, like, what does it mean to have intercultural competence, oh, there's a term for that?" (S3, FS1/2).

As the thesis course progresses, students increasingly articulate how they have developed an understanding of handling theory in relation to the research project. They reflect and realize that "even if you do a similar study, you can look at it from a different perspective or with a different theory, so it doesn't turn out the same" (FS4, S4/4). Another student expressed that "when I read the theory, I understand how the author who conducted the study thinks" (FS3, S1/5). Toward the end of the writing process, students' views on theoretical work in their theses

become more nuanced. They express an awareness that theoretical reasoning is useful for their scientific work. For example, one admitted that, even though they were not "so deeply into phenomenology" when they started the course, they now find it "helpful in my thinking" (FS6, S1/6). Another student commented:

The theories have helped me. Because this is not a heavily researched subject, so I didn't have much previous research to rely on and connect to the theory. (…) And the theory I had chosen was very clearly linked to what I had observed in the alternative teaching and then in the interviews. (FS6, S3/6).

This quote connects the instrumental idea of theory to the notion that theoretical work clarifies something observed. In the final focus group discussion, students' communication centers on the completed results section and analysis. They comment on understanding the significance of theory, with one describing it as "exciting to see" (FS3, S3/2). By the end of the writing process, students communicate that reflection on theory leads to an understanding of their position as observers. Their reflections show how this perspective contributes to knowledge: "I think the theories helped to bring out what I wanted to show. To really show what it was that was the 'gold panning' to bring out." (FS6, S3/6).

In summary, the unclear position of the observer can be interpreted as a key cause of difficulties with theory. The observer's role became a subject of analysis in the 1950s when Heinz von Foerster formulated second-order cybernetics as a theoretical framework (Luhmann, 1990). First-order cybernetics assumes that one observes, and perhaps controls, phenomena without reflecting on the observation process itself. Second-order cybernetics includes the observer and the observation process, recognizing that observing a system affects the system itself. In our approach, the observer's viewpoint - who observes phenomena and processes - becomes a crucial factor in understanding students' difficulties with theory reflection in thesis writing. Conducting research and writing theses in education involves managing complex social interactions and relationships. Without considering the observer's perspective, one risks encountering ontological challenges. These challenges often remain unspoken, contributing to fundamental uncertainty about using theory, as reflected in the students' sense of uncertainty. The phenomenological method begins with an impartial effort to manage the experience of the world. If the meaning and identity of phenomena are not intrinsic but arise through distinction from other elements, this places high demands on awareness of how we observe the world.

DISCUSSION

The focus group discussions reveal that students, through Vygotsky, claimed to "notice something," but it was something they had been "wrestling with"; they did not know what they "were supposed to do with it" (FG2, S1/6). The systems-theoretical approach, however, emphasizes differences, feedback loops, and how systems interact with their environment, leading to the creation of the system's own image of the world (Luhmann, 1987; 1997; Reese-Schäfer, 1996). A system's reaction is tied to its interpretation of its own constructions of reality. Dynamic systems theory focuses on autopoietic systems that are self-referential, meaning they create themselves through interactions with their environment. Information or influence arising within the system feeds back into it. These systems do not seek a fixed, absolute truth but instead constantly adjust their perception of the world. This adjustment involves an ongoing process of distinguishing and differentiating to understand and process information, phenomena, and the broader world.

This suggests that meaning is not absolute and that human perception is strongly limited by cognitive capacities (Luhmann, 1987; Reese-Schäfer, 1996). The psychic system perceives differences in the world, which form the basis for individual understanding. Considering how distinctions and differentiations influence an observing system's information processing, comprehension of the world, and insight creation, the system's active role in shaping its own reality becomes evident (Luhmann, 1996). In the material, the conversations evolve from a negative view of using theory to a recognition of how theory structures thinking. Students begin to understand that abstract phenomena can be named and distinguished, and that this process embodies a theoretical approach. The focus group material shows how an instrumental view of theory develops into the realization that theory clarifies observed phenomena. Understanding the importance of theory was described as "exciting to see" (FG3, S3/2). Second-order cybernetics, as discussed, is based on observing an observation. This form of observation is tied to a blind spot. Unlike first-order observers, second-order observers can recognize the relativity of their own operations. Observers can see that they cannot see what they cannot see (Luhmann, 1990). This concept can be likened to death becoming tangible only when one sees another person die.

Similarly, every observation is bound by a blind spot that cannot be described using standard differentiation processes and thus remains unobservable. This blind spot reflects a system's inability to relate to aspects it cannot perceive. This may result from limited sensory abilities, unconscious filters, or biases. For instance, a system may ignore or overlook certain elements if they conflict with its assumptions or prejudices. It is inherently human for perceptions and preconceived notions to filter incoming information, creating blind spots. For a dynamic system, meaning and structure emerge through self-reference or reflexivity, leading to complex phenomena such as self-organization (Luhmann, 1987). Self-organization allows a system to adapt to chaotic or unstructured environments without external guidance. The "blind spot" in observation highlights how every act of observation necessarily excludes certain elements. This idea, often linked to George Spencer Brown's reflections on observation and self-reference, underscores the limitations of understanding (Luhmann, 1990).

The blind spot raises critical questions about how much our perception and understanding rely on pre-existing distinctions and assumptions. It encourages reflection on the limits of comprehension and emphasizes the importance of recognizing these limitations, especially in the context of a theoretical perspective within the scientific process. By the end of the writing process, students often demonstrate an understanding of their position as observers. This awareness, linked to theoretical reflection in their work, is expressed by comments like: "The theories helped to bring out what I wanted to show. To really show what it was that was like panning for gold to reveal" (FG6, S3/6).

CONCLUSION

This "panning for gold" - the use of theory within the framework of writing a thesis - requires the ability to recognize that theory and the subject of theorization condition each other. This, however, presupposes a capacity for non-linear and complex thinking. Theoretical reflection demands observing oneself as an observer and understanding the prerequisites for one's actions and ways of creating knowledge. A significant challenge lies in the fact that many theory books and philosophical approaches often ignore the existence of the blind spot. A theoretical approach involves acknowledging that in scientific work, one cannot see what one cannot see. This limitation can only be approached through language. Humans are fundamentally bound by language, and this entrapment implies that all theoretical work is inherently shaped and constrained by the observer's linguistic and conceptual frameworks.

This constraint underscores the importance of critical awareness of these limitations in both education and research. From the discussions, a central insight emerges: theory is not merely a tool for understanding phenomena, but also a force that shapes the observer and their approach to knowledge creation. Recognizing the blind spot and the limitations of language becomes an integral part of any theoretical approach. Ultimately, acknowledging the blind spot and the constraints of language is not just an intellectual exercise. It is a vital step toward fostering more reflective and meaningful engagement with both theory and practice.

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