Scholarly Communication as a Situated Learning Process for PhD Students

– an Exploratory Study About Publishing as a Community of Practice

Sofie Wennström
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Abstract

This master’s thesis aims to explore the practice of becoming a researcher and the learning process embedded in this activity by looking at the communicative practices of PhD students, within the context of academic publishing. It is likely that the way in which these soon-to-be researchers reason about the task of communication is related to their way of approaching their field of research as well as the lived world, which makes it relevant to explore further. The study was performed based two sets of data, first open-ended semi-structured interviews with eleven PhD students at Stockholm University, where they talk about their current situation, their motivations and goals and about how they plan to publish their dissertation. Secondly, an analysis of data about publications focusing on work by PhD students at Stockholm University between 2013–2016, and information about how the intended audience, i.e. the readers, have interacted with the published material. These two sets of data were analysed with the use of theories about personal epistemology, sociocultural learning and the rationality of actions. The study shows that the majority of the PhD students at Stockholm University publishes their research findings as scholarly articles in English. The conclusion is also that the publishing process can be understood as a pedagogical tool, as it provides a vehicle for the PhD students to immerse themselves in their community of practice. These findings suggest that it could be useful to further emphasise the publishing activity as a learning process that may lead to a deeper understanding of the role of the researcher in society.

Keywords

Community of practice, higher education, personal epistemology, PhD students, scholarly communication, sociocultural learning, situated learning.
Vetenskaplig kommunikation som situerat lärande för doktorander

- en utforskande studie om publicering som en lärande gemenskap

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Sammanfattning


Nyckelord

Doktorander, högre utbildning, kommunikativ praktik, kommunikativ rationalitet, personlig epistemologi, sociokulturellt lärande, situerat lärande, vetenskaplig kommunikation.
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Introduction

This master’s thesis aims to explore the learning processes involved in the practice of publishing academic works as a PhD student. I will look at this phenomenon with a specific emphasis on which actions lead to learning, through the PhD students’ communication and interaction with the context. In my explorative endeavour, asked groups of PhD students about their view of themselves as individuals in a context regarding scholarly communication¹, through publishing of research results in different forms, to understand more about the drivers or motivation for this activity. I wanted to know whether or not this is something that happens to the individual or if it occurs in a social context (or, perhaps both?).

At this highest level of education, the doctorate, a focus on the personal achievement is inevitable as it is an individual exam. Nevertheless, students can take part in research projects or research working groups during their time as PhD students and are thus immersed in a context together with other (senior) researchers even if they are still assessed on a personal level. PhD students get advice, suggestions, or tips and tricks from a whole lot of people such as their supervisors, colleagues, editors of journals, reviewers, their fellow PhD students, students they teach, support staff and managers in their respective departments. Last but not least, they get influences by contacts they make in social networks in real life or online. All these influences should somehow count as factors influencing the learning process. Therefore, I believe that people working at universities (including myself) should make further efforts to understand the mechanisms that form their knowledge about their context and how they find it meaningful. In a sense, PhD students can be seen as explorers of the academic world, trying to navigate obstacles and create opportunities for themselves within the scholarly communications landscape, as it is a crucial part of their education. However, PhD students quite often seem to lack the necessary tools to manage this navigation challenge successfully (Charpentier Ljungqvist, 2014). The idea is that the study of PhD students’ communicative practices can give us a hint about which kind of compass and map we can provide PhD students with to navigate more quickly through this vast sea of academia. There is a good deal of research done on management and strategies concerning PhD education and the leadership of academic institutions. However, the aim of this thesis is not to look at governing structures or existing measures of success or strategy documents, but rather to explore information about the actions taken by PhD students as a consequence of working within a particular context. I will also try to find indications of the drivers or motivation for the PhD students’ actions with regards to academic publishing, by using theories about different aspects of adult learning. In other words, I would like to understand why people in academia act the way they do by looking at how they publish and their reasoning about publishing.

My growing interest for scholarly communication in general and academic publishing in specific is something that has been going on for a while, since I have been working in the academic publishing industry for over ten years, and as I continue to work with Open Access² publishing at Stockholm University Library. I have over the years been in contact with many PhD students who are baffled by

¹ For a further definition of the expression ‘Scholarly Communication’ see: https://en.wikipedia.org/wiki/Scholarly_communication
² https://en.wikipedia.org/wiki/Open_access
the complexity of the systems or processes they are about to enter. Scholarly communication requires training, strategic thinking as well as a lot of time and effort on the actual writing. These exercises of communication are often designed for a particular context which the students also need to learn about at the same time as they are monitored on the success rate of this action. The ability to successfully communicate the results of research is likely to have an influence on their entire future career. Therefore, I wanted to understand more about why some learners pick up on certain things during their education and not others, and about the people and motivation involved in the process. My experience from working with academic publishing has brought attention to all the rules and regulations, guidelines, checklists, metadata schemas, permanent identifiers, page budgets and whatnot involved in the process. However, by talking to those on ‘the other side’ of things (i.e. the PhD students and other authors), this seems like an area of knowledge which can seem hard to penetrate or to find meaningful. I believe that if we spent more time on creating awareness about the what choices they have and the consequences of their actions, we could contribute to the reduction of stress and disorientation experienced. This frustration has also been noticed in several surveys (Charpentier Ljungqvist, 2014; Gröjer, Elenäs, Gillström, Palestro, & Dryler, 2016) of PhD students in different stages of education. The thesis you are about to read will probably not answer all of the matters addressed in previous studies, but hopefully, bring some light on parts of the process that might influence how these particular parts of the process is valued.

So how do I plan to find out more about how PhD students act with scholarly communication? By linking individual experiences and data about publications together with how published items are being interacted with outside of a local structure could give one indication of how the students’ actions are received. If one of the objectives of academia is to communicate the results of research to the world, it may be possible to say something about how efficient the PhD programs are in guiding the individual towards an exam. Or, perhaps how the current context contributes to the society by creating people who understand their role as researchers from a perspective of serving the public with new knowledge. However, according to several analysis’s based on surveys, there is an intrinsic problem in the academic life of PhD students (Charpentier Ljungqvist, 2014; Gröjer et al., 2016) in terms of pressure to publish and how to find work/study balance, among other things that could lead to for example an uncompleted education or health issues. I will, therefore, start my explorations by presenting an overview of the current state of PhD education in Sweden and at Stockholm University under the heading ‘Formulation of the Problem’, to set the scene of my exploratory study. I will then explain the theories I have used in the section called ‘Theoretical Considerations About Adult Learning’, giving an overview of how you can understand the results of the interviews in relation to the collected quantitative data based on different theoretical perspectives on learning. The aim of the thesis and the research question is presented at the end of the first section. The second part of the thesis will describe the data collection methods, the analysis and the results of the study, and this part will be divided into two sections; first the qualitative analysis of interview data from group discussions with PhD students at Stockholm University. The second part of the result and analysis section is including quantitative data about publications made by PhD students at Stockholm University between 2013–2016, combined with information about interactions made by other researchers related to these publications. The analysis of interactions will be presented with altmetrics data as well as citations, which will hopefully reveal a map of the sociocultural nature of scholarly communication. Lastly, I will discuss the combined findings of the data analysis and will then propose some thoughts on the future use of these results.
Formulation of the Problem

There are many important aspects to be discussed when it comes to evaluating the effectiveness of PhD studies. Some issues have been pointed in a meta-analysis of 995 publications about education for PhD students between 1972–2012 (Jones, 2013). The analysis in this article shows that there are some areas where PhD education could improve, such as helping the students prepare for teaching, employment & career, and improving the design of the educational programs (including admission, recruitment and funding). The overview also reveals patterns that describe problems related to the educational focus how you do writing and conduct research (including issues about productivity, the pressure to publish, and collaboration), as well as the student-supervisor relationship and the doctoral student experience as a whole. 43% of the articles included in the review focused on challenges related to writing and research comprises. One of the conclusions in the study suggests that further investigation is needed to reveal more about how the level of awareness of the entire process can increase, especially studies providing empirical evidence, which further emphasise that the topic of my research is an issue of importance to explore further. According to several other studies, there is also an increasing demand for PhD students to publish and to do so in highly ranked academic journals (Jones, 2013; Lee & Kamler, 2008; Linton, Tierney, & Walsh, 2011; Pickering, Grignon, Steven, Guitart, & Byrne, 2015). The publication process is in these studies seen as one of the essential pillars of PhD education from a global and general perspective. Other studies also suggest that more pedagogical attention needs to be added to the educational mix for PhD students to support their learning about publishing (Kamler, 2008; Lee & Kamler, 2008). Knowing more about the connection between education and publishing is thus something that I will be exploring further through the views of PhD students at Stockholm University, and by analysis of publication focused interaction patterns.

However, to give a bit of a background story to the path into the analysis of learning through communicative action in an academic publishing paradigm, I would like to start by describing the current state of PhD education in Sweden, and more specifically at Stockholm University where I have done my research. The theoretical overview presented in the next section will then serve as a framework for the reasoning about the nature of learning which in turn influenced the method and analysis of data carried out in this master’s thesis. I have been working under the assumption that actions performed, and reflections about these efforts by individuals would say something about their goals and motivations concerning the context they are acting in. However, first, we need to set the stage about how PhD Education is organised in Sweden and at Stockholm University.

PhD Education in Sweden

The right to issue a PhD exam is regulated by the Higher Education Ordinance (Ministry of Education and Research, 1993), where it is stated that in order to be awarded the Degree of Doctor, the student shall:

- ‘demonstrate broad knowledge and systematic understanding of the research field as well as advanced and up-to-date specialised knowledge in a limited area of this field, and
- demonstrate familiarity with research methodology in general and the methods of the specific field of research in particular’ (1993, p. Annex 2).

However, the ordinance document also lists some further competencies and skills that the student should have achieved to be awarded the PhD. One of these skills is that the person shall: ‘demonstrate the ability in both national and international contexts to present and discuss..."
research and research findings authoritatively in speech and writing and in dialogue with the academic community and society in general’ (1993, p. Annex 2). This passage emphasises the importance of communication skills as an important part of the PhD education. Therefore, I would like to explore further the aspects concerning the choices made by the students while they are (hopefully) striving to demonstrate this skill. I will use this idea of the role of PhD students as contributors to the advancement of research in particular and to the society in general as a base assumption for this entire thesis. To further describe the prerequisites for all enrolled students they are, in addition to the above-mentioned communication skills, required by the Higher Education Ordinance to set up an individual study plan for each student to form a structure for their studies, which should be completed together with their supervisor(s). This plan includes first and foremost information about the overall research program and topic, and it is meant to be updated annually to show the current status of the individual’s progress of studies. The plan keeps track of what the PhD student is required to do to stay enrolled in the program (until the final exam). There are consequences for those individuals that deviates from the plan. The document should also include a description of any financial support for the entire period of their studies, as well as a publication plan.

The latest official measure (Inquiry of Research Careers, 2016) concluded that there are about 19,000 currently active PhD students in Sweden, or if we count full-time employees/students about 13,800 (the rest only study or work part-time). The majority of the full-time students (65%) are also employees of the institutions where they study. The number of PhD exams has increased steadily during the last two decades (as has university degrees in general), and there are currently about 2,500–2,700 PhD degrees awarded each year in Sweden. To be awarded the degree of ‘Doctor of Philosophy’ (PhD) according to the Swedish standard, one must have completed four years of full-time studies. An independently authored thesis in a particular area of focus is the final achievement to show the result of the education. An overview of the number of doctorate students and theses produced at Stockholm University will follow in the results and analysis section of the publication data below. In 2014, the statistics showed that the average time to complete a PhD education is 4.5 years (counted in active time), which is a decrease compared to previous evaluations. The reduction of time until graduation was considered an improvement. The median age of enrolled individuals is 34 years. One-third of the PhD students in Sweden originates from other countries. The national guidelines for PhD education were revised in 1998 (Joelsson, 2017), based on findings from investigations and surveys, with the aim to make the process more efficient and professionalised. After the reform of the PhD Education in Sweden in 1998, the number of alternative models for financing was significantly reduced, but the numbers of students at this level have continued to increase with more funding provided by the universities. Several surveys have evaluated the efficiency of the quality improvement efforts made since the reform. The aim of the surveys was also to learn more about the students’ views of their current situation. Examples from analysis’s of surveys such as the national study ‘Doktorandspégeln [“The doctorate mirror”]’ (Gröjer et al., 2016) and the local survey at Stockholm University (Charpentier Ljungqvist, 2014), revealed that some of the challenges remain for PhD students aiming to complete their education. The imbalance between coursework, teaching and at the same time conducting their research is sometimes an overwhelming challenge, as the combination of the stipulated tasks is often considered to be too much and many students drop out or think about dropping out. Funding can also be a problem, alongside with unclear career paths which creates a stressful uncertainty of both the present and the future. The work environment provided for PhD students can also influence the general well-being for the individual, as does the relationship with the supervisor(s). The surveys point out a few areas of improvement for the management of PhD education of interest to this study, such as a healthy working environment, a well-organised workplace regarding research
facilities, etc. In my research, however, I would like to focus on a specific part of the process, i.e. the communication of results of research, or scholarly communication, which is a key task in most PhD study programs as the publication of dissertation as a monograph or a compilation thesis (which includes several articles) is normally the end goal. The requirements for a compilation thesis vary across subject areas or even departments with the same university, but generally, it includes 3–5 articles that are either published in peer-reviewed academic journals or is at least submitted for peer-review or in press (i.e. that it is accepted and awaiting final publication). It could also, in some cases, include peer-reviewed papers in published proceedings from conferences. In some disciplines, it is more common to publish the dissertation as a monograph or a book. The variation of what is required for the degree differs between academic traditions and practices.

**PhD Education at Stockholm University**

The PhD education at Stockholm University is structured in different ways depending on subject area and academic traditions but also in terms of availability of courses, seminars, or possibilities of creating own projects and exchange studies abroad or elsewhere in Sweden. Each year, about 200 PhD students are awarded their exam at Stockholm University. To be exact, 232 PhD students passed their exam in 2015 (Årsredovisning för Stockholms universitet [Annual Review of Stockholm University], 2015), which is the latest reliable count at the time of writing this thesis. Usually, about half of the enrolled PhD students come from the Faculty of Sciences, the other half of the group comes from the faculties of Social Sciences, Humanities and Law. In 2015, the ratio of exams was 107 PhD exams in Social Sciences, Humanities & Law; and 125 in Science. These individuals spent on average 4.3 years to complete their education, with slight variations between the disciplines. Some departments offer the possibility for students to take a Licentiate Exam (and write a Licentiate thesis), which marks about half-way to the Doctorate. There were 85 such exams awarded in 2015, and these students spent on average 3.3 years to reach this level, and most of them continue to complete their PhD degree.

The current state of the PhD education at Stockholm University was thoroughly investigated in a report from 2014, called ‘Utbildning på forskarnivå vid Stockholms Universitet [Researcher Education at Stockholm University]’ (Charpentier Ljungqvist, 2014). The results of this survey includes responses from 761 active PhD students which indicates that the majority of the respondents are satisfied with their educational program, but also that a significant amount of students are not entirely happy with their situation. The discontentment seems not to be tied to gender or age, but rather to particular research groups or departments (even if the report does not reveal which groups or departments to protect the informants). To encourage exchange outside of the local environment, the PhD students can attend international conferences. The international approach is also evident in that more than half of them write articles in English to be published in journals or books distributed to an international audience. There are also exchange programs, courses and other events available for those who would like to participate in the public debate or to study abroad which further encourages communication outside of the department to support internationalisation.

Despite all these efforts to inspire PhD students to broaden the chances of employment after graduation, there seems to be a lack of career guidance for the students according to the study by Charpentier Ljungqvist. Furthermore, the survey also highlights that the students worry about unemployment after graduation. A significant amount of the respondents indicate that they are also dissatisfied with the introduction they got when first enrolled in the program. Other areas where the respondents are displeased are the research environment at specific departments. There seem to be some environments the academic stimulation is not considered to be at an appropriate level and that
the number of relevant courses available to them is not acceptable. The students indicate that the expectations of their performance or results are not made clear enough, which can contribute to an increased stress level. Nevertheless, the majority of the respondents report that they are satisfied with their supervision and trust their supervisor. Although, many respondents also indicate that they are very dissatisfied or have encountered problems in this area. The overall result of the study, seem to suggest that the PhD students are in general satisfied with their program and that they believe it to be of high academic quality. Two-thirds of the PhD students at Stockholm University indicate that they consider a continued career in academia after graduation and that many of these could consider staying at their home institution or department. As previous surveys have been pointing out significant flaws in the PhD education in Sweden, there seem to have been improvements made in most organisations in the past ten years, as students in the surveys from 2014 and 2016 are more satisfied in the most recent studies that what their former colleagues used to be.

This overview of the condition of the PhD education in Sweden and at Stockholm University serves as a backdrop of the study presented in this thesis. I will further compare my results with the previous reports in a short while. But first, I would like to bring the reader into the context of pedagogy by an outline of theories connected to adult learning and higher education.
Theoretical Considerations About Adult Learning

To understand the role of scholarly communication as a learning instrument for PhD students some theoretical support is needed not only to understand how learning is constituted for the individual, but it would also be useful to know more about how the act of publishing works as a part of a sociocultural context, or community of practice. Using different theoretical perspectives becomes relevant to address the complexity of the problem of figuring out why individuals act the way they do when encountering a specific problem as a part of their education. First, to explain the term ‘community of practice’; it is mean to describe a group of individuals who have something in common, like a craft or a profession (Lave & Wenger, 1991). This community is something that develops over time and involve persons and their life-world as well as their activities. This concept will be used throughout the thesis to describe how PhD students are taking part in the cultural practice related to communicative activities and how that can be considered an important principle of learning in higher education. Secondly, the perspective of individual learning is represented by theories about personal epistemology that can explain how the students see themselves and what they think about their own knowledge and knowing, which will influence how they understand the world around them. I see this as a way to figure out how the PhD students reason about the meaning of the choices they make and how it inspires their approach to learning. The first part of this theoretical overview will concentrate on theories about personal epistemology and methods on how to collect data about it. The second section will discuss theories about learning from a sociocultural perspective, and how persons get motivated and act as a part of a context or a group they believe that they belong to. The focus lies on the interaction between intrinsic and extrinsic influences of choice are central to understanding more about how we can better teach PhD students to navigate the complex landscape of academia.

Personal Epistemology

The term ‘personal epistemology’ refers to the ‘...individual’s cognitions about the nature of knowledge and the nature of knowing’ (Hofer & Pintrich, 2002, p. 390). It is related to the individual’s epistemic beliefs, or what the individual believe is true and what they believe that they know. Theories about and methods for investigating personal epistemology has emerged to better understand the epistemological beliefs that motivates a learner. The intention of using this kind of approach is to understand more about how human learning and understanding works from a perspective somewhere in-between the theoretical models of pedagogy and psychology. The beliefs and experiences of the students will have an impact on how they approach new information or something they are about to learn, and how they make meaning of the processing of information to form new knowledge. The personal epistemology will thus influence how individuals integrate new knowledge to what they are already familiar with. From a philosophical perspective, epistemology concerns the origin, nature, limits, methods and justification of human knowledge. So, the study of personal epistemology (or epistemic cognition) could help to describe how individual develop concepts of knowledge or

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1 Lave & Wenger (1991, p. 98) describes it like this: ‘A community of practice is a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice.’
knowing, which seems essential to understand more about how PhD students approach their learning experience when putting together a study plan with their supervisors. The theoretical framework about personal epistemology could also explain how individuals use the concepts they form to understand the world, including beliefs about the definition of knowledge, how the knowledge is constructed and evaluated, as well as where knowledge resides and how it is produced. Research on personal epistemology claims that: ‘It is the view of the knowledge itself that enables learning in a deep sense, not motivation or study skills’ (Hofer & Pintrich, 2002, p. 27). Epistemological beliefs are hard to measure, but still essential to understand more about how individuals form their motivation to claim that they know something. Reflections about knowing and knowledge could thus lead to deepening of knowledge, which could be assumed to be the goal of universities worldwide providing education at the highest level.

But how is it possible to actually understand what individuals think about their learning and motivation? How can we show development in individual thinking in relation to their actions? If we want to know more about how the PhD students at Stockholm University sees their learning as a part of the process of getting involved in scholarly communication, we need to structure the collection of data to measure the level of awareness of their personal epistemology. According to Hofer & Pintrich (2002), his is something that could be investigated through interviews using open-ended questions, a method that allows the interviewed students to elaborate on their understanding and the importance of a certain topic. When the methodology to collect data about epistemological beliefs was developed, it opened up the possibility for researchers to show how the students developed their understanding of the world. The first studies using this approach, called the ‘Perry method’ after the researcher who developed it (Perry, 1970), showed that students’ understanding of a concept of knowledge becomes more elaborate with experience as they realise that there can be multiple valid opinions about a subject or issue. The methodology also aims to capture how students develop an understanding of various contexts or perspectives from which they can analyse issues or arguments. Perry identified nine stages, or positions, of how learners approach their learning and subject matter. These the findings were divided into three levels of complexity; 1) to have multiple opinions about an issue or a subject, 2) to understand or analyse issues from multiple contexts or perspectives, and 3) to define one’s values and identity through multiple commitments. Learners thus encounter these levels of multiplicity or complexity, and their meaning-making mechanisms shift and evolve accordingly in predictable ways. However, it is possible to be reasoning at the third level of complexity in one area, but to still remain at level one in another. The level of multiplicity should be possible to measure with the ‘Perry method’ as the learners’ ability to develop varied understanding of commitments is possible to capture and could thus be used to define values and their identity in relation to the question at hand (in my case, scholarly communication). The students’ meaning-making of shifts in educational plans and their further evolvement of thoughts facilitates familiarisation with their subject of study, which is helping them learn more. With the theory of personal epistemology, it would be possible to claim that the more an individual read, the more they understand that their knowledge gathering process is complex and that it is relative to the context in the field of study in which they are pursuing their career. Thinking about learning from such a perspective makes it possible to understand the personal epistemology of the PhD students divided into two categories. First, how they confront and cope with diversity and uncertainty when learning and secondly, how they develop their meaning-making about learning and the self (Hofer & Pintrich, 2002).
Forming knowledge as an adult

Learning as an adult reaches new levels when the theories or facts are being used to form new knowledge or experience together with colleagues or peers. The knowing thus becomes contextual to a greater extent in comparison with younger learners, as it is applied in particular situations in combination with the individual’s experience of similar cases in the past. A study by Baxter Magolda (2002) showed that the success of the further professional development where depending on the individual’s sense of self. It turned out that to rely on their internal beliefs, or epistemological beliefs, the students needed a coherent sense of self to deal with others’ approval and opinions constructively. This learning process would allow them to be influenced by their own action and view of the work, but not be overwhelmed by others’ perceptions. Individuals sense of self is a core value for personal development, which is related to personal epistemology, as an aspect of the epistemological beliefs of individuals that is domain general. This esteem leads to the conclusion that well defined epistemological beliefs (and the individual’s reflections about these beliefs) will provide an advantage when learning a new domain, especially if the domain is far away from the individual’s zone of familiarity. This sense of self is also connected to beliefs about the self or motivational beliefs. To further differentiate between such beliefs, we could look at a study comparing goal orientation beliefs, task value beliefs, control beliefs and self-efficacy beliefs (De Corte, Op’t Eynde, & Verschaffel, 2002). Their investigation showed that in the something classified as goal orientation beliefs refers to the students’ belief that it is satisfying for themselves to understand the content of their current task (like for example publishing a paper) as thoroughly as possible. The second group, task value beliefs, seem to encourage individuals be more oriented towards finding the best way to complete the task. The control beliefs proved to be related to the idea that if one does something absolutely according to the rules, they will be able to understand it better. Lastly, the self-efficacy beliefs, are referring to the individuals’ confidence to understand the most complicated information related to the task at hand. These principles can also be connected to the social context, or the norms, related to the current learning goal. De Corte et al. describes it as the students’ own views and perceptions on what the norms of their current paradigm are and how they can relate to these norms and how they can solve the problem with this environment. This can lead to naïve or incorrect beliefs if the students follow the more simplistic norms or instructions without thinking critically, just to make sure they can quickly solve the problem.

The effect of epistemological beliefs

Schommer-Aikins (2002) describes another theoretical aspect used to explain the mechanism behind personal epistemology. She describes system of core beliefs, or a pattern of reasoning about beliefs, that can help to conceptualise personal epistemology. The beliefs should be independent, to enable a person to have both mature and immature thoughts about their knowledge relative to the level of complexity of the phenomenon. The epistemological beliefs are more like a distribution of frequency rather than dichotomies or continuums as some of the knowledge could remain the same while other parts of it are evolving. There are both direct and indirect effects of epistemological beliefs. The indirect effect is that these beliefs are mediating the learning process, like for example believing in the success rate of learning measured amounting to the information you can remember which would lead to using memorization as a learning technique. The direct effect could be that the belief in a particular knowledge area will result in the filtering of new knowledge, like for example only interpreting information from your own perspective when reading. Also, whether or not epistemological beliefs are domain general or domain independent will vary over time for any individual, as this depends on the individual’s developmental stage (as the individual develops their thoughts can become more
independent from the domain of knowledge). The development and change of epistemological beliefs are thus influenced by experience.

To figure out how individuals develop their epistemological thinking, we need to understand how they think about what they know. One way to figure this out is to divide people’s assertions of knowing into levels of their view of knowledge, which has been done by Kuhn and Weinstock (2002). The authors have developed a theoretical model to be able to divide the levels of epistemological understanding into four groups: realist, absolutist, multiplist and evaluativist. Their studies showed that a realist would think that assertions made by others are the truth or that they are copies of the external reality. Such a person would also claim that this reality is directly knowable, that knowledge is certain and that critical thinking is unnecessary. An absolutist would on the other hand say that assertions are facts, and would agree with the realist that the reality is directly knowable, that knowledge is certain and that it comes from the outside; The difference between these two first levels of epistemological thinking is that an absolutist would use critical thinking as a way of adding comparative methods in order to decide which assertions about reality are more or less false or true. But there are also other views. For example, a multiplist would say that statements are opinions that we choose, and that reality is not directly knowable. They would say that knowledge in its nature is uncertain and generated by the human mind, but also that critical thinking is irrelevant, as knowledge is subjective anyway. An evaluativist would instead say that assertions are judgements and that others need to compare knowledge claims according to evidence. Such a person would agree with the multiplist that reality is not directly knowable and that knowledge is generated by the human mind and thus uncertain. However, they would also claim that critical thinking is a vehicle that enhances understanding and promotes sound assertions. To assess the level of epistemological thought, you can present a person with two contradictory claims, where a particular knowledge domain is represented.

**Mapping Epistemological Beliefs**

The mapping of cognitive structures via interview data can be used as assumptions about meaning-making to organise experiences concerning motivation. When individuals encounter new experiences, they either assimilate this experience in their cognitive structures or accommodate to the structure to include the new information, according to Hofer’s & Pintrich’s reference to Piaget (2002). Instability in the individual’s surroundings could contribute to this process, as it adds a further incentive for the individual to try to balance the new experiences with the old. Something that could be considered typical for a PhD student trying to understand a field of study that they are approaching. The epistemological development and meaning-making, is taking place in the space between the individual and the social context, as the reflections about experiences are encoded and structured. The view of the self is an essential factor to include in trying to understand a person’s epistemology, as the development of the intrapersonal and interpersonal dimensions are intrinsically intertwined. The creation of meaning is divided between depending on epistemic assumptions, but it is also constructed in the dissonance appearing at the meeting with others who have different assumptions. The meaning-making part of the learning process is, however, also bound to the context in which the epistemological assumptions are made.

**Challenges in studying personal epistemology**

In addition to the theoretical models related to personal epistemology suggested above, I’d like to mention that there are a few challenges when studying epistemological beliefs, such as facing your own epistemological beliefs, or to managing your epistemological beliefs when you become aware of
them. Another problem is to realise that the way you think in the present, is just part of what you will understand in the future (Schommer-Aikins, 2002). The challenges when studying the individuals’ learning process while they are at the same time immersed in a particular environment such as a workplace would require the researcher to capture the entire context the individual is acting within to be able to make assumptions and read between the lines in their statements. It is also essential to collect and interpret data without adding any subjective explanations from the view of the interpreter of the information. I will try my best to address these challenges throughout this thesis.

In this study, the use of theories about epistemological beliefs is motivated by my questions about the goals the University set for doctoral students. I want to know if the University is teaching them to become a part of a research paradigm. There are indications from surveys (e.g. Charpentier Ljungqvist, 2014) that the institutional goals are sometimes not adjusted to the realities of an individualistically oriented educational plan, I am curious to see whether it is possible to bring the policy-makers and the students closer together. Or, as Pintrich puts it: ‘As we come to better understand how individuals think and reason about knowledge and knowing, we should not only be able to improve learning and instruction, but also come to better understand ourselves.’ (2002, p. 413)

Sociocultural Learning in Higher Education

As a counterpart to the individualised mind-set of theories about personal epistemology, other theories relate to something just mentioned in the previous section, namely the context or situations where the learning happens. This would mean that if we want to investigate further how individuals act in relation not only to their inner beliefs and sense of self but also in relation to other human beings in different constellations and contexts, we may use sociocultural theories and methods to understand the individual as a part of a group. The reason for choosing to add another theoretical framework for consideration in this study is indicated by the following quote from an anthology about ‘sociocultural studies of the mind’: ‘...an implication of such studies is that socialisation is largely a matter of mastering forms of goal-directed action deemed appropriate in a sociocultural setting for a task and taught in one way or another by its experienced members’ (Wertsch, Del Río, & Alvarez, 1995, p. 16).

Sociocultural research about learning and understanding sprung out of a lively discussion about the individual-society antimony. The researchers are debating whether or not the learning process takes place within the individual or together with other individuals in society. This unsettled argument has had a huge influence on how I approach the conundrum of working with, and learning about, scholarly communication among PhD students. Since there are several ways of defining the relationship between the individual and the society, it is important to elaborate which one of these explanations are in use at each given moment of analysis. Mediation between people is the focus with the sociocultural perspective of how the human mind works (Wertsch et al., 1995) to understand how their interactions can influence decision-making or actions. The question in focus here is how the context play an essential role when we formulate sociocultural research, as it provides a bridge between the concrete action of individuals and groups and the cultural, institutional and historical settings in which they act. Mediation (i.e. signs, words, symbols and myths) is an active process, where the cultural tools or artefacts involved shapes action, but does not determine or cause it. Introducing a new cultural tool into this mix like for example learning how to publish an article will, of course, transform the active process. According to an interpretation of Vygotsky (1981) by Wertsch et al. (1995), this means that the tools will contribute to altering the structure and flows of mental functions when included in the process of behaviour or action. The altering of structures using a tool is in direct contrast to
psychological explanations such as with the help of theories of Piaget (2007), where the action is viewed as a representation of something that is already present in the human cognitive abilities. Mediation can both constrain and empower action. Cultural-historical psychology theories (like Vygotsky’s) on the other hand, are based on the central problem of mediation of the mind and consciousness, or how individuals relate what is going on in their minds to reality (i.e. it is the culture around us that creates and influences mental activity). The psychological theory of activities in this paradigm focuses on object-orientatedness in both external and internal mental activity (i.e. objects or tools that drives mental activity). It is proposed that the interpretation should be based on the mental functioning and sociocultural setting as dialectically interacting moments or aspects of human action. This action is thus not carried out either by the individual or by society, but there are individual and societal moments to any action. Or, as described by Wertsch: ‘…action provides a context within which the individual and society (as well as mental functioning and sociocultural contexts) are understood as interrelated moments.’ (1995, p. 60). This is why the use of theories about sociocultural learning is essential to understanding the actions of the PhD students included in the study presented in this thesis.

Parameters of analysis for social interaction includes attitudes, concepts, linguistic and knowledge structures and action. Research on actions can, however, appear to be rather ‘slippery’, as it is often a matter of interpretation involved in figuring out what the actions mean to the acting person and the persons they interact with. When studying actions, the study of one instance of an utterance, for example, could, however, make it difficult to contextualise the act with things that cannot be measured at that particular moment. Some focus of the study is therefore needed on the organisation the individual acts in, as well as the complex dialectic in which it is involved. In the research that I am about to do it is, therefore, important to add measures of this context. This will be done looking at data about interactions to published items made by creators, readers or users of scholarly communication, as it may give an indication of how the dialog between people in the community is constituted. Or, to put it simply, if several people have chosen to interact with a certain piece of scholarly communication, it could indicate that this information is of importance to them and therefore believe it is relevant to other individuals in their specific or general context. As not only individuals but also organisations are shaped by several interacting influences which should be analysed with distinction. The role of these influences may, of course, vary. In Wertsch’s interpretation of Vygotsky, there is a tension between the individual and the mediational means by which they interact with the world. Which in turn means that the individual cannot be described as only an agent for actions and their context, but should be described more like an ‘individual-operating-with-mediational-means’ (Wertsch, 1995, p. 64). Wertsch also argues that the individual-society antinomy must be addressed in sociocultural research, with a clear position, to prevent that the relationship between mental functioning and the sociocultural setting cannot become opposites. We should instead look at it as dialectically interacting moments. Maybe the study of human action can provide this link between the two? In psychology, the analysis of humans is divided into behaviour, dynamic (i.e. behaviour in relation to the world), activity, interpretation; but, what status do we give human activity? What status should we give to intentions, decisions and reasons for doing? I am going to use the value we assign to research publications as an example of how this assignment of status is done in practice.

**The Rationality of Actions**

For an individual to choose to do something, there is a process of thought comparing the probable outcome of the action with the individual’s previous experiences of similar situations. This process of reflection is taking place even though the individual seems to be forced to do something by
requirement or under the threat of punishment. It would still, for healthy human individuals, require a conscious choice to take action. Bayesian decision theory (Davidson, 2004) claims that people will choose the action with the highest relative value to the individual, factoring the probable consequence of this action. The primary reason for action is the initial attitude, or the wish, will or view of the individual. This attitude can be displayed in two ways: a) through an expression of the initial attitude by language or other means of communication, or b) by an expression of an opinion based on their inner desire related to said action. To understand how a rational decision is made, we need to understand the primary reason for action on the part of the individual. Or, as Davidson himself put it: ‘The primary reason [for action] is made up of a belief and an attitude’ (Davidson, 2004, p. 124; own translation). Habermas makes a similar connection between rationality and knowledge, meaning that it has not so much to do with what the subjects know, but rather how they acquire and use the knowledge in the form of a ‘know-how’ that is transformed into a ‘know-that’ (Habermas, 1984). The transformation process implies that the communicative action taken is embodying the knowledge of the person taking action. Their level of knowledge of a certain phenomenon becomes apparent in the act of speaking or in teleological action. ‘The close relation between knowledge and rationality suggests that the rationality of an expression depends on the reliability of the knowledge embodied in it’ (Habermas, 1984, p. 8). Habermas also uses the term ‘teleological action’ (Habermas, 1984, p. 85) to describe the action with a purpose, or goal-oriented action where the individual choose a certain action because it seems to be the most favourable choice to meet the end goal in the given situation. In the context of this master’s thesis, I would like to show that the actions of communicating results of research are of such a nature that they could be called teleological because the action is goal-oriented. In the context of the exploratory study that I am about to present, it could be argued that the actions taken by PhD students may be based on rational decisions made while using the knowledge they possess in every given moment during their time at the university until graduation. Habermas means that this is the case for all participants in an action, and he suggests using the teachings of Piaget or, more specifically, Piaget’s model of social participation (2007), to understand how interventions are made in the objective world through this action. In the present study, the will focus will be on the communicative actions carried out by PhD students. Their actions become rational due to the intention of the students to understand a concept or to be open to trying to negotiate the objective truth with the help of others.

**Acting in a sociocultural context**

When reasoning about human behaviour in relation to context, we often ask ourselves why people choose certain actions. The process of choosing is related to my study since I would like to understand more about why people act the way they do. Why do they feel that something is meaningful enough to act upon? According to Bronckart’s (1995) interpretation of Ricœur (1991), the meaning of an action is attributed to three groups of factors:

1) action is behaviours producing effects in the world (and should, therefore, be analysed as such),

2) action develops at the same time within a social framework producing a set of conventions (values, symbols, rules) and the meaning should thus be analysed as a product of this social control,

3) agents become integrated into this network of social relations which is then influenced by the intention of the agent, which is something we can try to interpret.

The groups of factors could be compared to what Habermas calls ‘teleological acting’, or ‘acting in accordance with norms’ and ‘dramaturgical acting’. However, the model by Ricœur focus more on the
context leading to the action rather than the decision to act. In relation to my study, it would be relevant to talk about meaningful acting or teleological acting, as the PhD students depend on their interpretation of the norm at their department, or in their research area. Analysing human action thus need to take all these three factors into consideration, to not miss out on details trying to describe the motivations for acting in a certain way. Or, as Bronckart summarises: ‘The evaluation of social acting is based only on the criterion of appropriateness (whether action conforms to the norms recognized as legitimate)’ (Bronckart, 1995, p. 78). The three factors together form the greater context of human action, from the effects of behaviour, through values and norms, to become integrated in the intentions of the agent. To further understand how this relationship between the individual and its context takes place, we need to talk about ‘Communicative Action’ (Habermas, 1984), i.e. that the rationality of the decision to communicate depends on if the level of knowledge of the communicator, which Bronckart sees as the foundation of meaningful action. To give communicative action proper credit as a motivational factor, it needs to be a part of a mutual understanding of the rules of communication between the interacting parties. These parties need to speak the same language, especially concerning norms and values. They also need to agree on the meaning of the communicative act. Bronckart believes that just studying humans’ actions would not be enough and that we should give the discourse to our actions and behaviour a more important role when conducting analyses. This theory is centred around the life world of the agent and uses an introspective method to map it. Any objections to this theory can be addressed by analysing meaningful action, and the discourse of each situation. And, that by proper analysis of the educational action, and the system in which it takes place, it would be possible to overcome the subjective nature of investigations on a small number of individuals (which is needed in a small study like the one I am about to elaborate on below). The educational or communicative action and its discourse could according to this view be mapped, and analysed by dividing the information into three levels:

1) The educational system, which reveals the construction of purposes and the teachers’ reasons for acting, as the system influence them as they depend on it,

2) the teaching systems provides an overview of the educational event and the constraints of the situation of the action taking place

3) The educational methods, which is the framework of level one and two, consists of the students, their teacher and the contents of their actions.

Analysing step one and two together makes it possible to evaluate how the purposes and motives of the leading agent in action influence the learning agent.

**Participatory learning, apprenticeship and communicative rationality**

To add some further explanation about how students chooses to act in a context I would like to refer to theories about learning where the individuals are immersed in a particular system of rationality and practice, such as the university. A system that often includes working closely with a senior colleague, in our case the PhD supervisor. Lave & Wenger (1991) used the term ‘legitimate peripheral participation’ to describe how individuals are learning while immersing themselves in particular communities of practice. The participants are inevitably progressing towards mastery of the task at hand while they immerse themselves in the activity and gradually learn to master the sociocultural practices of the community. The learning process is here seen as something that is inseparable from the social practice. Participation means that the individual is acting within a context at the same time as they are a part of forming the context. To understand how the learning process in legitimate
peripheral participation works, we need to find out more about the social world in which the individual acts. This is building on the notion that the learning process is a form of ‘apprenticeship’, which is developed in a community of practice. The term apprenticeship refers both to the development of an identity in relation to skills in practice, but also to the process of reproducing and transforming of communities in practice while taking part in them. The community of practice here forms a sort of framework for the learning processes of those participating in the activity. Lave & Wenger states that there is a difference between a learning and a teaching curriculum, where the learning curriculum consists of situated opportunities or goals to use while the new practice is developed. A teaching curriculum is the structure of the process and the learning curriculum is the practice viewed from the perspective of the learners.

Rogoff (1995) uses the metaphor of apprenticeship in a slightly different way and adds a few perspectives relevant to my research, where three specific levels of membership in a group can further explain the mechanisms involved the learning process as a part of a community of practice: personal, interpersonal and community processes. The developmental process for the individual as a part of the community is split into three parts, or modes, of analysis: participatory appropriation, guided participation and apprenticeship. According to Rogoff, these three levels can be used to describe the context, which in turn contribute to the individuals’ ideas that will later lead to action. The activities should be observed in these three modes, which are inseparable and mutually constituting planes; meaning that all three modes are active at the same time. The guided participation is the interpersonal plane of the analysis that refers to the systems and processes of involvement during the individual’s participation in the activity with a distinct cultural value. It is can describe mutual involvement of individuals and their social partners as they communicate and co-ordinate their involvement in structured social activity where all parties are members and can give clues about the meaning for the individual. This process of meaning-making should be seen as a perspective to be used when looking at interpersonal activity while related to sociocultural processes, and can thus be used to further understand the learning and development. Guided participation includes both direct and indirect interaction, for activities that can be made possible or be restricted by others, regardless if these others are present in the situation or not. The participatory appropriation is a concept describing how individuals change during the process of participating in an activity with a cultural value to the group they are trying to belong to. This is the personal process; which individuals are going through by participating in the action within a community of practice. The action thus contributes to a process of becoming something. This process is seen as something different from internalisation (implying a separation between the person and the social context), which could be considered as being static on the border between internal and external. Rogoff, argues that the active participation itself is the process by which they become a part of and learn from an activity, meaning that the process is the product of the learning activity rather than the knowledge collected in the end. Lastly, in Rogoff’s terms apprenticeship is a state in the community plane, where the individuals are participating in a culturally organised activity where less experienced participants are maturing into full members of this group. Research about the apprenticeship model would focus on the institutional structure or the cultural tools rather than the process of changing or the level of interaction.

Exploring the students’ actual involvement in the activities becomes the key study object in this thesis, as that is the way we can understand how they participate in the sociocultural activity and how their participation changes from peripheral observing (or other secondary roles) to eventually manage or drive the development of the activity at hand. Investigating how people participate in an activity, can be done by using data to analyse the community or institutional settings, the interpersonal activity as
well as the personal activity. The questions we should be asking ourselves is ‘What activity is this? How does it relate to others? What are the people doing? With what and how, and why?’. The process of transferring knowledge is inherently creative, as people seek meaning and actively relate situations to each other. This creative process is in itself a sociocultural activity, as described in the following statement:

‘…orienting our inquiry by focusing on how people participate in sociocultural activity and how they change their participation demystifies the processes of learning and development. Rather than searching for the nature of internalization as a conduit from external bits of knowledge or skill to an internal repository, we look directly at the efforts of individuals, their companions, and the institutions they constitute and build upon to see development as grounded in the specifics and commonalities of those efforts, opportunities constraints and changes.’ (Rogoff, 1995, p. 159)

Analysis of levels of participation and appropriation can be used to map the movements of the mind of individuals in relation to their social and cultural context and can in a structured way possibly help me interpret data on interactions with published material. The data I have collected for this master’s thesis would include patterns of interactions between individuals in a certain context as I have been interviewing them in groups where the members are included in the same community of practice, rather than as individuals as a part of a group.

**Publishing as a community of practice**

The publishing of a thesis or a journal article could be seen as a sociocultural community of practice, where the PhD student is taking a step out in their academic context to share and discuss their results with the rest of the world. Thomson & Kamler (2013) refers to this process as a discursive practice, where they describe writing for journals and doctorates as something that becomes a vehicle for understanding the social and cultural context of the specific subject area. The publishing process of a dissertation could be described as below (Figure 1), where the text and the student are in layer one, or the centre of the model. The theoretical framework used, the conventions of the specific discipline and other standards together with the comments from the supervisor provides layer two, here called ‘discourse practice’, where the rules of practice is set. Layer three includes the higher order framework about national policies, or scholarship conventions, institutional policies or other regulations, which provides the outline and limits of what the individual can do. This image could further explain the particular and practical process of completing a doctoral dissertation in a perspective that will be useful when we analyse how the PhD students at Stockholm University see themselves as participants. If we want to know more about what drives the PhD students to action, we also need to understand which parts of the process they are immersed in is influenced by which context.
While writing a compilation thesis, and during that process also submerge yourself into the publishing of articles in academic journals creates a slightly different picture. The image below (Figure 2) shows another example from the literature (Thomson & Kamler, 2013) where another set of players are added to the mix of influencers of the action. It is no longer just the supervisor who sees the text and comments on it in layer two, and it is just not national guidelines that frame the process in layer three, but other related context come into play. An academic journal is often managed to address the conventions within their specific discipline in a particular way, as described in their aims and scope declaration to outline what type of material the journal includes. This means that the writer in layer one needs to understand layers two and three in order to be accepted for publication, which is a crucial aspect of completing a compilation thesis. The authors, therefore, means that assisting the learning process for PhD students by including publishing in journals as a pedagogical strategy is an essential part of a successful education (Lee & Kamler, 2008).

If we claim that the learning process is intrinsic in the process of publishing as a sociocultural practice, then we must also consider the difference between figures 1 and 2, where the latter is attached to a
different layer three. This difference is something that PhD students who wish to put together a compilation thesis must learn how to handle to a greater extent in comparison to those who writes a monograph thesis, as their understanding of the context would be a prerequisite for succeeding with their choice rather than just an important factor among others. The PhD students need to interact with players from all the layers of the community of practice in order to reach their goal.

The Act of (Scholarly) Communication

To help us further understand the drivers of the action ‘to communicate’ (in our case through academic publications), I would like to refer to Rönnström (2006) whose work I will use to further explain the process of publishing as ‘learning through triangulation’. This model could be compared to what Rogoff (1995) would call guided participation. However, Rönnström rather uses theories about communicative action described by Donald Davidson (2001) and Habermas (1984) suggesting that the learning takes place in a sort of chain reaction with individuals who reacts to a stimulus and then share this with other individuals in the same social sphere. The participants in such a group respond to stimulus after estimation of the current situation, including their previous experience and the common reference the individuals all have to the lived world. The theories suggest that they have to share the same frame of reference to understand the causality of social events. This process has three parts which are necessary for the communication process, namely; subjectivity, intersubjectivity and objectivity (Davidson, 2001). According to Rönnström (2006), it is the knowledge about the subjects that are communicating with each other and relating to the world around them through their perceptions. The perceived communication is then connected with the object knowledge about the classification of objects and the events around them that are conceptualised through intersubjectivity, or communication with other individuals. Rönnström mostly refers to communication as the spoken language, but this line of reasoning is also relevant to the process of communication through academic publications, as the knowledge claims made about research results or theories used would always have to be related to the lived world of academics through references to other studies or theoretical aspects. This triangulation can be seen as a base for communicative rationality, which is created by a combination of the communicative self, which is developed through casual and social events, and the sociocultural language in the lived world. The subjectivity is however not only determined by the sociocultural world, but also by the individual’s self-knowledge. The ongoing inquiry of the self, or the individual’s journey to become more self-aware, is needed for the development of new strategies for action which will lead to changes in reactions to a stimulus. The self-awareness could then, in turn, be connected to the personal epistemology that I was discussing at the beginning of this section.

Theories of Relevance – Summary

While attempting to understand more about learning for adults in higher education in different contexts, I have presented several ways to analyse and interpret human action and learning processes while involved in the activity of academic publishing among PhD students (Lee & Kamler, 2008). The sociocultural theories tell us the story about why the students learn relative to the to the norms and rules of the community of practice they belong to (Lave & Wenger, 1991). Or, at least how they interpret their world to be (Bronckart, 1995), or if their action has a function in society or seems meaningful to them as parts of this community (Wertsch et al., 1995). The sociocultural perspective reveals how students learn through their actions as they immerse themselves in a group. During their education the students develop first a ‘know-how’ and then they transform that in to a ‘know-to’ (Habermas, 1984) which will lead to a relevant level of confidence to act. The community of practice
also contributes to meaning-making for the particular individual if it comes with consequences not to act, or if it brings real value to them (Davidson, 2004). The societal norms and rules create a rational choice for the individual, as they learn how to address the norms and regulations (Rönnström, 2006).

The individuals’ learning processes could also be interpreted from a more individualistic perspective, where the societal norms are a factor but not the main reason for taking action. The PhD students have to develop deeper knowledge, which can be analysed via for example interviews designed to collect information about their epistemological reflections as well as the maturity of their arguments within a specific context (Hofer & Pintrich, 2002). Arguments that are too simplistic is significant to individuals that have not gained enough knowledge or awareness of their epistemological status, while arguments with more multiplicity would signify a level of deeper knowledge. This maturity can also be measured by the way in which individual’s approach a problem, and by their confidence while choosing the best option. Awareness of a personal epistemological level will contribute to more self-efficacy, which is a treat that is highly valued in academia, especially for those who would like to become more independent from senior colleagues.

Comparing these two approaches to both qualitative and quantitative data about the epistemological awareness and actions of PhD students would, therefore, be relevant when attempting to explore the current context of publishing a PhD thesis.

**Aim of Thesis**

This master’s thesis aims to explore the practice of becoming a researcher and the learning process embedded in this activity by looking at the communicative practices of PhD students, regarding their publishing activities. I want to understand implications of the method of examination of doctorates, which is made through publications, either in the form of monographs or through a compilation of peer-reviewed articles or conference papers. This communicative practice is something that I believe is related to the learning process of becoming a researcher as a part of the society and the research community both within a specific context and outside of it. I believe that a better understanding of such practices could further increase awareness for PhD students about how to plan their studies and communication activities, which could, in turn, enhance their learning experience. I also think universities and other higher education institutions should become more aware of how the situation for PhD Students is constituted about their final project, the PhD thesis.

**Research Questions**

My exploration into the world of PhD students at Stockholm University has been guided by two main questions:

a) How do the PhD Students at Stockholm University communicate their research findings?

b) How can these communicative practices be understood as pedagogical tools in a sociocultural setting in the strive to become a PhD?
Methods

This following section is divided into two parts. The first part of the investigation is based on data from group interviews with PhD students at Stockholm University. The methodological considerations for the first part is related to the design of the interview questions, the interview method and the analytical approach to the interview material. The second part will include a quantitative analysis of current publishing patterns of PhD students, which includes an attempt at measuring the activity in a community of practice. The methodological considerations of the second part are related to the quality of the data collected, and the analysis of the information patterns. The connection between the two datasets is that I want to show two different ways of understanding learning within a community of practice, not only by talking to the individuals and understanding their arguments but also through measurements of how individuals interact with each other within a larger community such as international publishing.

As mentioned earlier, I want to explore how and why PhD students communicate their results through academic publications. The analysis of qualitative information collected through group interviews with PhD students currently working and studying at Stockholm University aims to show how the conceptions of individuals’ understanding of the matter of scholarly communication influence their personal epistemology. In addition to this, I will analyse the sociocultural nature of learning to be able to say something about how PhD students act in a particular context. I believe this can be done through analysis of quantitative data about the publications, and interactions in public media with academic work published online. It is important to understand more about the choices individuals make which is related to the final exam work, i.e. the doctoral dissertation, to know more about how and when learning for PhD students take place, and how they understand their knowledge about scholarly communication. To do this, I’ve used a quasi-mixed methodological approach (Cohen, Manion, & Morrison, 2011, p. 25), where I have collected two different sets of data to answer the research question. The datasets, one qualitative including interview information, and one quantitative including data about publications and interactions with the publications have thus been collected in parallel but are not combined in joint analysis, since it is not possible to compare apples with pears. The reason for not conducting a combined analysis is that the time frames of the samples in the interviews and the publishing data are not the same. The discussion at the end will include results from both datasets, but I will not compare the effect on equal terms. The datasets will instead be used to claim different types of conclusions pointing to the same problem. This will also be reflected in the structure of this chapter, where the datasets have separate methodological descriptions.

The qualitative data was collected via group interviews with PhD students from Stockholm University in different stages of their career. The interviews were organised so that the individuals were divided into five groups of 1–3 people (one interview group had a late drop-out, and I ended up with just one individual). The selection of individuals to include is based on the lists of currently enrolled or employed at Stockholm University, who attended seminars about scholarly communication arranged by the Stockholm University Library. The students were offered to volunteer for the interviews, and those who did was divided into groups based on which department or research group they belonged to. The choice of a group setting over individual interviews was made to get a better idea of what the individuals had in common as they all belonged to the same community of practice. The idea was to be able to learn more about their lived world to eventually be able to conclude about the primary influencers of their decisions to act. It should, however, also be possible to see patterns of
epistemological beliefs in the interviews, and each person was asked to give their personal views or describe their experiences to indicate how they learn about the task at hand. The group interview setting was also a deliberate choice, to ensure that I could get information about the context the students are acting in but avoid the problem with individual bias. At the same time, I wanted to allow several stories to supplement each other and create another level of awareness for the individual (Arksey & Knight, 1999).

However, as it did not seem to suffice to just talking to a few individuals about their experiences to understand more about the sociocultural nature of scholarly communication, I decided to add another layer of information. This lead to the collection of quantitative data about publication patterns of PhD students enrolled or employed at Stockholm University between 2013 and 2016. By exploring their activities related to publishing, we can understand more about how the students are becoming a part of a community of practice outside of their department or research group. The data about the publications have thus also been analysed in comparison with additional data about interactions such as citations and shares and mentions in different other media. To capture information about interactions I have been using so-called ‘altmetrics’ to add a measurable dimension about how the research community receives the articles published by PhD students. The altmetrics data measures how people have linked to or referred to the material published by collecting data about shares and mentions in digital and social media. This type of information can lead us to conclusions about how relevant the material is to the community of practice, as choosing to share something with a group usually indicates importance for them. In the analysis, I have also included data about citation patterns, which is the traditional measure for analysing the relevance of published items to a specific audience. The data about interactions could in such case gives a better overview of transferred value to the community. As Bronckart says ‘The evaluation of social acting is based only on the criterion of appropriateness (whether action conforms to the norms recognized as legitimate)’ (1995, p. 78).

**Ethical Considerations & Limitations**

When working with human subjects, it is essential to acknowledge the ethical guidelines to protect their integrity. I have therefore done my utmost to not include any information in this thesis or the underlying data sets that can break confidentiality such as specific names of persons, names of subject clusters or areas or places where events have occurred. Therefore, I decided not to reveal at which departments the PhD students are registered. I also chose not to mention the specific subject areas they are working in, but only their faculty. These intentions to anonymise the study was noted before the interviews started, as it is vital that the informants feel they are protected, as some of their shared experiences could be considered as sensitive information like for example statements about the relationship with their supervisor (Kvale, 1997).

The number of participants is a relevant parameter if one would like to be able to of generalise the result, the number of groups to interview was, however, limited to the possibility of recruiting informants during lectures. Sending out surveys to prepare for the interviews was not an option, as several reports about survey fatigue at the university would risk a meagre response rate. I, therefore, decided to ensure that the people participating in the interviews were interested in contributing to the aim of the study. The limited time I had for collecting data to this master’s thesis also narrowed the possibilities to include more participants.

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The group dynamics was also a central contribution to the flow and focus of the interviews, but unfortunately, it turned out that one of the interviews had to be done as a one-on-one conversation due to a late drop-out of a participant who could not make it to the meeting. As I had to interfere more with the communication during that specific interview (interview 3, with Informant 5), the outcome of this particular session did thus not turn out as dynamic as I had hoped. That conversation is, therefore, not quoted in the text since it did not contribute significantly to the summary of the results. Structured informed consent from the informants in the interview study was collected in writing via e-mail, inspired by the by the Codex from the Swedish Research Council. All participants were informed in writing via e-mail of the topic of the interview and the aim of the study. All interviews started with me asking if they agreed with me recording the conversation with my mobile phone under the condition that I would not share the recordings of the interviews with anyone, and that they would be destroyed once the work had been completed. All participants agreed to this. No other sensitive information was shared, nor did any further ethical problems arise during the collection of data. All interviewees were given the opportunity, and accepted, to stay in touch after their interview to be able to read the final result of the study, but also if additional information was needed.

One limitation of this study worth mentioning is that I have chosen not to compare the qualitative and quantitative data with regards to gender differences. The reason for this is two-fold. First, the surveys mentioned in the background of this thesis (Charpentier Ljungqvist, 2014; Gröjer et al., 2016) have already noted that there is no significant difference in the responses coming from men or women. Secondly, the size of the samples study done in this thesis would not show enough generalizable distinctions to influence the conclusions made. I, therefore, decided to exclude the parameter of gender entirely in my analysis.

Furthermore, about the collection of quantitative data, it should be noted that I have chosen to use a tool from a commercial company, Altmetric.com. There are other tools on the market, such as Plum Analytics, providing the same kind of service. However, at the time of writing this thesis, the Altmetric.com platform is the chosen service for a trial period to measure data about publications from Stockholm University, which meant that I could download and analyse data with my institutional access.

It should be possible to be even more precise in a more in-depth study when one would know more about how to collect quantitative data in a structured way. Also, it would be possible to draw further conclusions in a longitudinal study where the researcher could follow the PhD students’ development of their communicative practices through data about interactions and publications from the very beginning of their career. Such an outlook was, however, not possible within the time-frame of this thesis.

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1 http://www.codex.vr.se/en/forskningsetik.shtml
2 https://plumanalytics.com/
Methods for Collection of Interview Data

To analyse the personal epistemological process with an individual, the researcher needs to design for interview questions or observation protocols carefully in order to ensure that the material for analysis gets to the individual’s view on their personal epistemology (Hofer & Pintrich, 2002). However, the analysis should also include information on motivational and contextual factors as well as the affective dimensions to not exclude any contextual parameters having an influence on the learning process.

Sample of Individuals & Interview Settings

The five group interviews with eleven individuals were conducted between March–October 2016 with PhD students at Stockholm University that were either in the beginning, in the middle or near the end of their studies during 2016. Three of the individuals where in their first year of doctorate studies, six of them were somewhere in the middle of their program, and two of them was about to finish their degree. Twelve people in total, divided into five groups, agreed to be included in the study. However, only eleven participants joined, as one participant dropped out due to lack of time, which meant that one of the interviews was not held in a group setting according to the original plan. The participants were all asked to contribute to this master’s thesis in connection with seminars about scholarly communication held by me, in my capacity as a representative from the publishing services at Stockholm University Library. The content of the workshops is related to my research queries and included information about how scholarly communication works and how publishing activities are evaluated. The respondents agreed with me at the beginning of the interviews that scholarly communication here means the process by which academics, scholars and researchers publish and share their research findings to make them available for the broader academic community7. The five lectures had similar, but not identical, content related to best practices within publishing or Open Access publishing. The teaching sessions included discussions about the mechanisms and tools used in the process of publishing and how we are currently sharing research findings, which also contributed to the focus of the interviews. Altmetrics was mentioned as one type of measure to be considered for possible value to them but was not discussed in detail. The PhD students were asked openly at the end of the session if they had time for a one-hour interview (approximately) at a later date, to volunteer as informants for my study. The interviews were held in different milieus, usually in a meeting room in the university library to provide an environment of neutrality, away from their workspaces. One of the conversations was however held in a café during lunch hour, due to time restraints. The interviews were done in five units, where one interview with the one individual, and then two interviews that included two individuals, and two interviews which included three individuals. The recordings of the interviews (in total 4 hours and 36 minutes) were transcribed into text (a total of 48,598 words in writing) using the spoken language as a norm, and including all the sounds the students made when they were hesitating, laughing or thinking about what to say next. The transcriptions were then coded to note who was speaking, and the individuals were numbered continuously in order of appearance in the interviews and given numbers from 1–11 to further preserve the anonymity of the informants. Two of the interviews were held in Swedish and three in English. The quotes from the interviews in Swedish was done by myself. I did however not translate the entire interview transcripts, as that would not have added any new information to the process.

7 See also definition from Wikipedia: https://en.wikipedia.org/wiki/Scholarly_communication
Interview Methodology

The participants in each interview group already knew each other as they participated in the seminars arranged between their departments and the library. The participants were given the opportunity to decide as a group which language would be more suitable, for them to feel comfortable during the conversation. Two of the interviews were thus held in Swedish, as all the participants in these sessions felt more at ease speaking their everyday language (even if one of them had neither Swedish nor English as a mother tongue). All the participants agreed to be interviewed under the condition that the recordings of the interviews were to be coded anonymous and would not be shared with anyone else but me, for them to feel comfortable in the situation and to speak their mind freely. Only the analysis of the transcribed interviews and possibly some extracts of the text were said to be shared, and they all agreed to this. The interviews all started with a short introduction of the aim of the thesis as well as all the participants aimed at setting the stage for the conversation to create an opportunity for the respondents to understand the meaning of the interview and what the results would be.

The sessions were carried out with an interview guide approach (Cohen et al., 2011, p. 413), which mean that the discussions were structured in that same questions were asked of all the groups in the same approximate order. The meaning of such a construction is to ensure that it is possible to compare the results between the sessions without having to control the conversation in detail. The aim was to allow a somewhat systematic analysis of the transcribed text but to ensure still that the interview situation would have a casual atmosphere to them, allowing the interviewees to feel comfortable talking about their personal view and current state (Arksey & Knight, 1999). However, I also wanted to keep the responses somewhat open-ended, so the respondents were therefore allowed to describe their situation with their own words, while I gently nudged them into the intended structure of the meeting. The aim was to serve more as a facilitator of the chat rather than an interrogator. The interviews were designed to capture the personal epistemology of the PhD students to some extent, to better understand their motives for choosing a particular course of action. The dialogues were inspired by the Perry method (Perry, 1970). However, this approach was not used to the full extent as it would require to follow a particular protocol and be validated by trained specialists. Nevertheless, the interview guides aimed at collecting information about epistemological beliefs was used as an inspiration for the design of this study, meaning that the questions are made to let the students elaborate on their knowledge and understanding about their motivation for action (Hofer & Pintrich, 2002).

The questions asked during the interviews were:

- How long have you been enrolled as a PhD student?
- What is your current state of mind, or what is your current situation like?
- What made you apply to the PhD program or position?
- How do you plan to work on your PhD thesis? Will you produce a compilation thesis or a monograph publication?
- What do you think you need to know or do to become successful with your choice?

It was essential to stay true to the open-ended approach for the context to be revealed and to allow the students to follow their train of thought, so sometimes the discussions got slightly out of topic or became very detailed. Two of the interviews deviated somewhat from the format, especially the first interview, as that was at first designed as a test to see if the structure and the questions worked.
However, the test interview turned out good, so I kept the basic structure for the rest of the interviews with just minor adjustments.

Organising the respondents in groups in a setting where the individuals were already each other quite well acquainted was a deliberate choice to create a broader range of responses and to allow for the individuals in the group to develop their thoughts together (Cohen et al., 2011). This approach might seem contradictory to the aim of following an interview guide, but as they are still part of a community of practice, it looks like it is not entirely possible to isolate their views from their environment to make a point of views about their personal knowledge spaces. The epistemological beliefs will appear in different shapes or forms depending on situation and participants of the study. However, it is still a tool for the researcher to use when trying to overview the students’ relationship with the world and how they accommodate to their context (or the context in which the study is made) (Pintrich, 2002). Watts & Ebbutt (1987) note that the individual views in interviews can be seen as collective views, so I have therefore chosen to let single quotes represent the result of the group sessions. This is also related to the contradictory nature of being a PhD student where you are a part of a community, but that large parts their work is, in fact, taking place at an individual level. There are critical voices raised towards this type of study design, by for example Säljö (1997). The critique pointed out that studies focused on the individual in a context could be problematic as they try making general claims about what the descriptions of experiences mean rather than just seeing them as examples of that particular situation (i.e. the themes discussed during the interview). The statements made in the conversations are, however, just ways of answering the questions and, therefore, not necessarily the objective view of what happened in the experiencing moment. The perception of the individual is at this moment already tainted by the sociocultural context. Säljö claims that people use certain ways to interpret the experience to what seems to be needed in each communicative situation. This aim to please could indicate that the reference to the experience is not necessarily properly depicted when discussed in, for example, an interview where the individual is trying to adjust their answers to what they think the leader wants. Säljö points out that: ‘Conceptions of the world are not meaningful in and by themselves, they form part of discursive practices and gain their meaning from their insertion into systematic discourses’ (Säljö, 1997, p. 180). This possible distortion of the result is why I have made sure to include information on how the students relate to their community of practice in the interviews. This opportunity for meta-reflection of the respondents could, therefore, turn the material into something useful while assuming the meaning of the individual statements and choices of action within their context. Another risk while collecting, transcribing and interpreting qualitative data is that I, the researcher, apply traits of my reality rather than that of the people I interview. It is, therefore, important to ask yourself WHY people answer the way they do, not only WHAT they respond and include that in the analysis. It is important to decipher which functional mechanisms make people explain the way they do, i.e. to ensure that you understand the circumstances of the individuals and their group mentality and then relate this to the answers given and the research question. One should also pay attention to the complex web of motives, skills and preferences that lead people to talk the way they do. It is therefore vital to connect cognition to the social practice to bring some light into the constitution of human experience and the practices of being a human in their discourse. The aim of adding the second, quantitative, dataset to the mix is an attempt also to map the current context of being a PhD student to provide a perspective on their lived world.

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8 The level of group involvement versus individual achievement varies for students from different academic fields or research traditions, but the informants in this study all seemed to find this to be a challenge.
Methods for Analysis

The interview data has been divided into themes, corresponding to the research questions as well as the nature of the community of practice to be explored. To sort and analyse the collected information, I organised the dialogue data according to themes that were discovered while I was examining the text (cf. Richardson, 1999). To continuously identify themes in the statements made I repeatedly analysed printed versions of the transcripts and colour-coded similar passages with highlighter markup pens. It was then possible to systematise the text into clusters of information that could be compared with different forms or themes related to the structure of epistemological beliefs. To bring some further order to the work, I used a content analysis method (Cohen et al., 2011, pp. 555–556). This methodology helped me understand how to organise the data into more distinct units for analysis that reflected the purpose of the study, and that these components would at the same time be exhaustive enough and mutually exclusive. The transcribed interview text was thus categorised into sections, or codes, related to the research questions for this study and the structure for mapping epistemological beliefs in individuals in combination with categories that were used in a meta-analysis of articles overviewing research about the nature of PhD studies (Jones, 2013).

The categorisation, or coding, that was applied to the transcript continuously while analysing the interview data, as follows:

- **Communication & Publishing** – this code is referring to the informants talking about publishing in general, in books/monographs or journals or the publication of their thesis. I also included statements in this section if the informants were talking about scholarly communication in general, or if they shared their thoughts about the practical matters of academic publishing.

- **Context** – The ‘context’, refers to statements where the students mentioned anything about the circumstances in which they were acting, such as common knowledge, traditions, routines, or other significant mentions about themselves as a part of a workplace or community. The information included in this category was often a response to a follow-up question such as: ‘What influenced you to choose this course of action?’.

- **Supervisors** – this code has been applied to any testimonials where the students were talking about actions or claims from supervisors (their own or others’). The information categorised in this section could also be described as the part of the interview material where the individuals are giving clues about why they choose a particular path or explain actions they take.

- **Choices** – The code ‘Choices’ has been used to identify when the interviewees talk about their distinct choices and what their drive is to pursue a PhD degree, where this is not necessarily referred to as being mandated by a supervisor. It could, however, be closely related to any extrinsic motivation, but also beliefs, which was also the meaning of adding questions that made the respondents explain the reason for their choices.

- **Time management** – this code was used to identify some additional information about how the PhD students manage their time, as time pressure turned out to be a relevant factor and a source of stress. The reason for adding this as a separate code in the initial coding phase was because previous studies (Charpentier Ljungqvist, 2014; Gröjer et al., 2016) listed the stress of time as one main challenge for PhD students in general.
To give an idea how many times these codes occurred in the text, I have counted the number of indications of each code in the printed pages of transcribed interview data and compiled it in the following overview (Table 2).

<table>
<thead>
<tr>
<th>Coding</th>
<th># of times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication &amp; publishing</td>
<td>75</td>
</tr>
<tr>
<td>Context</td>
<td>103</td>
</tr>
<tr>
<td>Supervisors</td>
<td>64</td>
</tr>
<tr>
<td>Choices</td>
<td>47</td>
</tr>
<tr>
<td>Time management</td>
<td>28</td>
</tr>
<tr>
<td>Combination of several codes in same statement</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 2: Overview of coding instances in the transcribed interview data.

The codes were chosen to correlate with the research questions, where communication and publishing are closely related to the responses from the question a) ‘How do the PhD students at Stockholm University communicate their findings?’ The information related to these codes could be connected with the analysis of the Altmetrics data laid out in the quantitative data set. The other codes about context, supervisors, choices and time management are all related to the research question b) ‘How can these communicative practices be understood as pedagogical tools in a sociocultural setting in the strive to become a PhD?’, where the key challenge is to understand what in the environment of the PhD students are influencing them and to what extent.

Necessary for the reliability of qualitative analysis and interpretation of data is that the researcher is aware of their approach to the subject being discussed and their attitude towards the material (Cohen et al., 2011). An explanation of the interpretation process needs to be added to give the reader an understanding of how this part of the process is managed. Another central feature of the analysis I have done is that the respondents are made aware of the aim and purpose of the study before the interviews begin. As the context plays such an essential role in this method, it is critical to be open about the aims to give the respondent an opportunity to create a ‘meta-awareness’ for them to be able to add their reflections of the topic of conversation (Marton & Booth, 2013). The seminars that precluded the interviews in this study could serve such a purpose of creating a space where the respondents could understand the topic of the conversation in a greater context. The method also allows for the researcher to gain more knowledge about the object of study during the process, which is suitable for an exploratory study like the one in question here. The knowledge creation was evident in the interview situations, as the students were not only learning from each other’s statements but also connecting some of the dots from the lectures provided by the library. The qualitative analysis of the interview data did not seem to suffice when it came to an understanding of the community of practice of the PhD students, so I decided to collect further data about the behaviour of participants of the group, which led to the collection of quantitative data described in the next section.

**Method for Analysing Publications Data**

As I wanted to understand something about how PhD students at Stockholm University shared their findings with the rest of the world and by that taking an active role in their community of practice on a larger scale, which in turn means that the individuals believe they are ready to share some of their knowledge to the world. Such activity could be of significance for confirming theories about personal
epistemology as well as acting within a community of practice. Therefore, I decided to measure how many publications were made in the form of peer-reviewed and academic journal articles during a specified period. Such an overview would give me an idea of how many of the students had made these decisions to publish. I also wanted to know more about how their published items were received in the community. The data about the publications was thus collected from two databases registering academic output from Stockholm University as well as interactions made to these publications between 2013–2016. The design of this part of the investigation can be described as a simplified version of a cross-sectional study (Cohen et al., 2011, p. 267). I collected a snapshot of publications by PhD students during a specific period to give an overview of what kind of activity they were involved with and how the papers were then received in the world. The data about publications are in this study meant to help answer the research question a) ‘How do the PhD Students at Stockholm University communicate their research findings?’ But, it turned out that also the question b) ‘How can these communicative practices be understood as pedagogical tools in a sociocultural setting in the strive to become a PhD?’ This question is relevant if we consider the possibility of adding a meta-awareness of a particular type of activity by use of statistics showing what happens after the publication of a result. However, I do not mean to implicate that the figures presented are organised with fine-grained methods and can claim to be generalizable, as it is not the primary aim of this study to conclude behaviours of a specific group PhD students over an extended period. The data can only show a sample of activities of any students in a similar situation.

Data Collection

First, to get a workable amount of data I needed to establish which PhD students to include in the measure. With the help of the central registry department at Stockholm University, I got hold of a list of students that were active and enrolled in a program or that had a study plan between 2013–2016. This list served as a basis for an outtake of registered publications listed the ‘Digitala Vetenskapliga Arkivet (DiVA)’ [The Digital Scientific Archive]9, which holds metadata about publications from over 40 academic institutions in Sweden10, but where the structure allows for local installations where only the publications from one institution are organised. The DiVA database includes mostly self-reported information about publications11, so there is always a risk that not all publications made are captured (as people can forget, or do not want, to register their activities). The database used for this study include only published items from researchers employed at Stockholm University, where about 3,000–3,500012 published items are reported each year. The data about publications by PhD students from Stockholm University was extracted from DiVA in an Excel document that was compared with data about interactions with the published material from Altmetric.com. This database collecting data about interactions is provided by a company specialised in collating data about referrals from the different type of media outlets and social media channels. The DiVA data was connected with the Altmetric.com data via the persistent identifiers from published material, called Digital Object

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10 Instructions for registering in DiVA for Stockholm University researchers can be found here: [http://su.se/english/library/publish/register-in-diva/instructions-for-registration](http://su.se/english/library/publish/register-in-diva/instructions-for-registration)

11 However, publications registered in Web of Science is imported as metadata and does not require manual input. Also, some registration of publishing data is done by department secretaries rather than the researchers themselves.

12 This is a rough estimate, and the numbers varies from year to year.
Identifiers (DOI)\textsuperscript{13}. The information from Altmetric.com was harvested for this study from a tool called ‘Altmetric Explorer for Institutions’\textsuperscript{14}. This practice of collecting information about how publications have been linked in different media is combined with data about interactions such as mentions or sharing of published items in social media tools. This data can be used in various ways, but it is possible to rank articles with a combined average mention score which is weighted according to the impact on each specific channel. This score can be used to evaluate the impact or level of influence of the communicated research, but it is also possible to use data about the number of interactions per channel and item, which is what I have done in this study.

The sources for the linked data in the Altmetric.com database are: Public policy documents, Blogs, Mainstream media, Online Reference Managers, Blogs, Citations, Research highlights, Post-publication peer-review platforms, Wikipedia, the Open Syllabus Project, Social Media (such as Facebook, Twitter, Google+, and LinkedIn), and other online distribution platforms (such as YouTube, Reddit, Q&A sites) (‘Our sources’, 2015)\textsuperscript{15}. All the data from these sources are collected through open data feeds (see Table 2 below). This information is then organised for each published item, which is recognised through persistent identifiers linked to each item such as DOI, PubMedID, arXiv ID, URN or ISBN\textsuperscript{16}. The persistent identifiers per item are matched with information of how many times they have been linked from many sources (see Table 2) and data about where the links are located and in which context the items have been mentioned or linked. It should be possible to find detailed information about each interaction through linked data. The measures of such interactions are not to be considered as a complete or, nor is it aiming to measure every mention or link back to content. It can, however, still capture a wider and more diverse picture about how each publication has been received by an intended audience as compared to more traditional bibliometric measures. The conventional way of measure impact of scholarly material at universities is usually by the number of citations per article including data from databases such as Web of Science\textsuperscript{17} or Scopus\textsuperscript{18}. The citation data is, however, still the current metric used in the official annual evaluation of the impact of the research produced at Stockholm University\textsuperscript{19}. The Altmetric Attention Score\textsuperscript{20} is an automatically calculated with a weighted score for each published item, but also via a visualisation of the data called a ‘donut’, which graphically represents the weighted count of the attention received where different colours represent different media outlets linking to the item, which complements the numeric score. The higher the score, the more attention to each item. The total score of each mention is weighted according to three principles: 1) Volume – the score is higher the more people interact with the item, but if the same person for example tweet about the same article several times, only the first one counts. 2) Sources – the type of source of the mention is weighted according to importance or type of impact, which means that a newspaper article is more valuable than a tweet. And, 3) Authors – it is measured how often the author of each mention talks about an item, and whether or not there’s a bias towards a

\textsuperscript{13} http://www.doi.org/
\textsuperscript{14} https://www.altmetric.com/products/explorer-for-institutions/
\textsuperscript{15} https://www.altmetric.com/about-our-data/our-sources/
\textsuperscript{16} For further information about persistent identifiers see: http://www.dpconline.org/handbook/technical-solutions-and-tools/persistent-identifiers
\textsuperscript{17} webofknowledge.com
\textsuperscript{18} http://scopus.com/
\textsuperscript{19} For more information about the measures used at Stockholm University, see: http://su.se/english/library/research-support/bibliometrics
\textsuperscript{20} https://www.altmetric.com/about-our-data/altmetric-details-page/
particular journal and who the audience is. The scores are thus calculated by algorithms measuring how often a digital identifier from a published item is represented in the different types of media listed in Table 1. The data of interactions are called ‘mentions’, and the calculated attention score is weighted based on the three factors (volume, sources and authors). More traditional measures of attention such as citation data from Scopus and Web of Science is collected and visualised in the Altmetric for Institutions’ tool to be used as reference, but is not included as a part of the Altmetric Score points. I have therefore analysed citation data according to separate outtakes from each respective database, which is further elaborated further down in this text.

<table>
<thead>
<tr>
<th>Source name</th>
<th>Collection method</th>
<th>Update frequency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twitter</td>
<td>Third party data provider API</td>
<td>Real-time feed</td>
<td>Demographics, support for retweets, with monitoring of suspicious activity. Shares via public accounts only. “Likes” are not counted.</td>
</tr>
<tr>
<td>Facebook</td>
<td>Facebook API</td>
<td>Daily</td>
<td>Shares via public Facebook Pages and posts only, with popular pages prioritised. “Likes” are not counted.</td>
</tr>
<tr>
<td>Policy documents</td>
<td>PDFs collected and scanned from policy sources and repositories</td>
<td>Daily</td>
<td>Scanning and text-mining policy document PDFs for references, which are looked up in CrossRef/PubMed and resolved to DOIs.</td>
</tr>
<tr>
<td>News</td>
<td>RSS feeds and API</td>
<td>Real-time feed</td>
<td>Manually curated news sources, with data provided via a third-party provider and RSS feeds direct.</td>
</tr>
<tr>
<td>Blogs</td>
<td>RSS feeds</td>
<td>Daily</td>
<td>Manually curated list, harvesting links to scholarly content.</td>
</tr>
<tr>
<td>Mendeley</td>
<td>Mendeley API</td>
<td>Daily</td>
<td>Reader counts is number of readers with the output in their Library. Not included in score.</td>
</tr>
<tr>
<td>Scopus</td>
<td>Scopus API</td>
<td>Real-time feed</td>
<td>Citation counts from peer-reviewed literature. Not included in score.</td>
</tr>
<tr>
<td>Post-publication peer reviews</td>
<td>PubPeer and Publons APIs</td>
<td>Daily</td>
<td>Peer review comments collected from item records and associated by unique identifier.</td>
</tr>
<tr>
<td>Reddit</td>
<td>Reddit API</td>
<td>Daily</td>
<td>Includes all sub-redds. Original posts only, no comments.</td>
</tr>
<tr>
<td>Wikipedia</td>
<td>Wikipedia API</td>
<td>Real-time feed</td>
<td>Mentions of scholarly outputs collected from References section. English Wikipedia only.</td>
</tr>
<tr>
<td>Q&amp;A (Stack Overflow)</td>
<td>Stack Overflow API</td>
<td>Daily</td>
<td>Scan for links to scholarly outputs.</td>
</tr>
<tr>
<td>F1000 Reviews</td>
<td>F1000 API</td>
<td>Daily</td>
<td>Scan for links to scholarly outputs.</td>
</tr>
<tr>
<td>Google+</td>
<td>Google+ API</td>
<td>Daily</td>
<td>Public posts only.</td>
</tr>
<tr>
<td>YouTube</td>
<td>YouTube API</td>
<td>Daily</td>
<td>Scan for links to scholarly outputs in video comments.</td>
</tr>
<tr>
<td>Open Syllabus</td>
<td>Static Import from Open Syllabus</td>
<td>Quarterly</td>
<td>Link syllabi’s contents to HLOM IDs.</td>
</tr>
</tbody>
</table>


The possible audience of each item is also taken into account when calculating the score, so a sociologist tweeting mostly to an audience of other sociologists would count more to the score than a tweet from any other user. The attention score can be displayed on an item basis (for datasets or articles), which is also the most common use case. It is, furthermore, important to note that some of the figures presented by Altmetric are not possible to verify, due to the structure and availability of the
original data, such as the number of Mendeley\footnote{https://www.mendeley.com/} readers, total Scopus citation counts, or ‘CiteULike’\footnote{http://www.citeulike.org/} bookmarks, as the providers of the original data has chosen to not open up their code for scrutiny for different reasons. Such reasons could be that the database cannot reveal information about their users due to laws about storing personal information, or that they are only allowed to share data if they do so under an exclusive license. The Altmetric database can only collect data from proprietors providing an open interface for scraping data, like for example Twitter\footnote{More information on the Twitter privacy policy https://twitter.com/en/privacy}. Another limitation of collecting data about mentions in social media is that only activity from public pages or profiles can be used, which means that the number ‘likes’ in social media does not count towards the score as it would not be possible to verify user authenticity for closed accounts. The measure of altmetrics are often misinterpreted to only map popularity by counting ‘likes’. This is a myth about collecting alternative metrics that I hope will be put to an end by the active use of data about interactions in approved scholarly channels. To add some further reliability to the measures, I wanted to compare the ‘new’ measures such as altmetrics and ‘old’ ones such as citation scores, to investigate if articles with a high number of mentions were also cited well. A correlation between citations and mentions could possibly mean that the data collected would enrich the evaluation of which articles are the most important sources of information in their specific field. The comparison of the two datasets was done by a Pearson correlation analysis (Cohen et al., 2011, pp. 632–637), aiming to reveal any connection the altmetrics score and the more traditional measures of reuse of academic material. The aim was to further validate the reliability of the altmetrics in relation to the aim of this study to be able to say something about how the work of PhD students is received by their community of practice. The correlation analysis was done with the help of the statistical software SPSS, to find out whether or not the citations and the altmetrics data (in this case as a weighted score) had any significant relationship. The quantitative data was thus collected from difference while attempting to provide an overview of how the journal articles authored by PhD students at Stockholm University could influence the context of their subject area in different way.

**Limitations of the Mentions & Citations**

In the analysis of the data from Altmetric, I have not focused so much on the ranking to find the most ‘successful’ article, but rather to find general patterns in how the interactions are made and what they mean to community-building and collaborative learning in higher education. Using the actual number of mentions could be considered a limitation of the study as it is most common to use the weighted scores as a comparison, and because the relevance of each mention in itself is not verified. I have, therefore, deliberately not relied solely on data from Altmetric but combined the data on mentions with citation data on publications from PhD students at Stockholm University to ensure that I can show a more diverse picture how the articles are used.

Citations or cited references are the traditional metrics used to evaluate the outcomes of scholarly communication its uptake in other research communities. However, it is not the tradition of all academic disciplines. Scholars in Natural Sciences and Social Sciences show a tendency to publish more papers and cite other papers to a greater extent. Researchers within Humanities and Law are not inclined to choose to publish as many academic articles or cite the work of others to the same extent. The tradition of humanities and law researchers are more leaning towards other channels for scholarly communication such as books or book chapters or articles in popular media or specialist magazines. Furthermore, it is hard to measure metrics for books and book chapters as these forms of publications

\footnotetext[1]{https://www.mendeley.com/}
\footnotetext[2]{http://www.citeulike.org/}
\footnotetext[3]{More information on the Twitter privacy policy https://twitter.com/en/privacy}
are still mostly produced in non-electronic formats, and there are no reliable databases collecting citation data in print publications. Nevertheless, I included some comparison of publication patterns between faculties at Stockholm University to bring some light to the fact that they are different, and that measures of perceived impact to the readers are situated.

While this study could be seen as using data to rank or measure publications, the results should not be considered an exact science. Measuring publication practices often show ambiguous results. Despite several efforts to establish other tools for evaluation that would help to even out the perceived differences between academic traditions, such as the Leiden Manifesto\textsuperscript{24} or the DORA initiative\textsuperscript{25}; there is currently no recognised alternative to the practice of traditional measures implemented on a global scale that could help institutions compare their research output. Nonetheless, this study is not an attempt to create an alternative to bibliometrics, but rather to explore how the numbers can help us understand more about how PhD students are interacting with their community of practice. In the next two sections, I will analyse the two different datasets (the qualitative and the quantitative), first as separate entities and then combine them to explore the relationship between students’ epistemological beliefs and their actions or strategies for action.

**Combining Data to Map the Community of Practice**

The collection of two sets of data, the qualitative and the quantitative, aims to show different aspects of the activities going on in the specific communities of practice that the students belong to. The interview data shows the place of the individual in the smaller community, while the data shows the how the items produced are perceived on a more global scale. The practice of scholarly communication can be both local and global, as the publications are considered to be public information and will get distributed to other academics via databases and journals, and the combination of datasets are, therefore, a way to describe the different planes of the publishing activities. The qualitative dataset is aimed at explaining how the individuals’ personal epistemology shows in a sociocultural context, and the quantitative dataset can give indications of whether or not the communicative efforts are reaching the intended audience.

\textsuperscript{24} http://www.leidenmanifesto.org/

\textsuperscript{25} http://www.ascb.org/dora/
Result & Analysis of Interview Data

To perform the phenomenographic content analysis I had to make the data more visible, so I printed transcribed interviews (as described in the methods section) to have all the information laid out in front of me. The collected text where then scrutinised to find statements related to communication & publishing, context, supervisors, choices & drive and time management to fit the coding scheme. This following section of the thesis is organised with the codes arranged into themed sections and the result is described with general comments of the findings from all five interviews, and I have used extracts from the transcriptions to exemplify the students’ statements. The interview statements are interwoven with an analysis of the results related to theories about personal epistemology and sociocultural learning to validate the conclusions.

I gathered the interview data into clusters of information to form three sub-headings, taking into account the relevance of the content in each section to my research questions. During the analysis, it became evident that the prepared codes were intertwined with each other in different ways and that a meaningful analysis would require some kind of clustering of the information to form relevant units of interpretation. The students’ testimonies turned out to not be as clearly defined as predicted and they often combined their epistemological assumptions differently in their statements, which included references to the prepared topics in the same paragraph or even within the same sentence. Therefore, it became necessary to rearrange the codes and cluster them together into units based on what the students understood of the situation from their perspective, resulting in three synthesised themes. The codes ‘communication & publishing’ and ‘context’ turned out to have similar meaning to the students, as publishing from their point of view seem to be communication within a specific context. Consequently, these codes were combined under the heading ‘Communication, Publishing & Context’. The codes ‘supervisors’ and ‘time management’ was found to be related as both these units of analysis were something that the PhD students had little influence over themselves, but nevertheless incurred problems that seemed innumerable. The PhD students in this study were all employees of their respective departments, which meant that they had other departmental objectives added to their schedule, like for example teaching undergraduate students or helping senior researchers with their projects. This meant that they had obligations to their workplace in addition to the task of completing their studies, which seemed to be intertwined with the students’ views on both their relationship with their supervisors as well as the challenge of manage their time. Consequently, the analytical framework was adjusted to include such statements under the heading ‘Supervisors & Time Management’. The code ‘choices’ was throughout the interview material found to be intrinsic with the PhD students’ testimonials about motivation, drive and actions. Their choices to act was most of the time explained by motivational factors or incentives given by their community of practice, which is why I have summarised this code under the heading ‘Motivation & Drive, Choices & Action’ to give the analysis more stringency in relation to theories about the rationality of actions.

Communication, Publishing & Context

When interpreting, and coding the interviews, it seemed like the PhD students’ plans and activities about publishing is something that is related to the context of what is considered to be ‘good research’
in their academic discipline or area from their perspective. The students seem to be thinking about their voice as one among others in the subject area, as well as what their potential target audiences would consider reading. This reflexive state could indicate that the students are tapping into their goal oriented epistemological beliefs (De Corte et al., 2002) in a rather pragmatic approach to the task of getting published. The informants often seem to struggle to figure out what the basic prerequisites for publishing is. They also want to understand how they can gain confidence to dare to interact with others in their community of practice via some kind of communicative action. The urge to learn more about the how action could possibly be explained with theories about communicative rationality (Davidson, 2004). Davidson claim that individuals are looking for the action that will give the highest return on investment in comparison to the effort level. Several instances in the interview data indicate that the students are indeed seeking to find the easiest way to reach the highest possible impact for publication of their dissertation (or articles in the dissertation if they plan to publish a compilation thesis). The base assumption of their action seems to be based on requirements from their institutions to register publications. The students are also caught up in figuring out how to take the fastest route to a high score by in reports about publishing activity (i.e. bibliometric reports).

Some of the central questions during the interviews were: ‘How do you plan to work with your PhD thesis? Will you produce a compilation thesis or a monograph publication?’ and ‘What do you think you need to know or do to become satisfied with your choice?’. The interviewed students seemed to think that these decisions were not so much up to themselves to make, but rather something controlled by the tradition or current practice of their community of practice. Several of the respondents indicated that they follow their supervisors’ recommendations in a literal sense, without further reflection about if the work could be done in a different manner or the strategic implications of their actions. The testimonials in the interviews revealed a high level of trust in previous knowledge, which could indicate that the students are not yet as aware of their situation to be able to use advanced critical thinking skills within this specific context. Such reliance in colleagues or supervisors would imply that the students are still at a level of epistemological understanding where they believe that the current task is true and directly knowable by absolute facts and where they are not yet capable of forming a view of their own or that critical thinking is unnecessary as they already know the truth (Kuhn & Weinstock, 2002). The students’ incapability of making an informed choice is expressed when they talk about publishing in relation to their supervisors’ actions, implying that they will do the exact same thing without hesitation. It is also revealed that the informants would choose the same path ‘because it is easier’, which seems rational to them at the time. This tendency to take the easy way out could suggest that they see themselves as apprentices to senior researchers and would therefore not have enough faith in their own knowledge in the matter (Rogoff, 1995). Another detailed and observational study of the students’ behaviour would, however, be recommended to support this claim further. Nevertheless, some informants mentioned in the conversation that they had made a choice more related to their philosophy and understanding of what kind of communication they would like to do or would do best from their perspective. This type of determination indicates a stage of contextual relativism (Moore, 2002), where the PhD students become active makers of meaning through their confidence to act according to what they think is best. To take more charge of one’s situation could also propose that those individuals had reached the next level of epistemological understanding according to Kuhn & Weinstock (2002), where they could start to see that some publishing practices are based on opinions rather than absolute facts. It is expected to see variances in the dataset as the participating PhD students were not all in the same phase of their studies. Such differences in opinion was often discussed between the informants, which seemed to add a dimension to the interview sessions as a learning opportunity as well.
The choice of means of communicating the results that were to be included in their dissertation was also something we discussed during the lectures presupposing the interviews, which may have had an influence on their responses to my questions. However, the PhD students still claimed that they followed the lead of their supervisors to a great extent, trusting them to give advice that would lead to a successful outcome. They told me that they trusted their supervisors even if they sometimes felt that they were not always provided with the best option. One of the students even pointed out that they were forced to publish an article in a so-called ‘predatory’ journal. It thus seemed as they felt obligated to follow the lead of their supervisor, even if they were not entirely sure that this was the right thing to do. The explanation of such activity might be that they don’t have the confidence yet, or the self-efficacy belief (Kuhn & Weinstock, 2002), that they could solve the problem themselves and find an alternate route. It does not seem like they understand the meaning or implication of the advice they are getting at all times, but they do it anyway because it seems logical to follow the perceived rules, and they do not have sufficient proficiency in their field to argue with a senior colleague.

Once the PhD students with a plan to publish academic articles decided to put themselves out there and sent a manuscript for consideration of publication, they understand that the feedback they get from reviewers evaluating their papers should be giving them hints on further work and is something that aims to improve their position. This would be an opportunity to learn outside of their closest academic environment, and to act as apprentices of a wider range of experienced researchers within their subject area. However, it does not seem like this feedback always turns out to be constructive, and it takes a long time to learn how to master the entire process, which means that the awareness part of the learning process related to the publication of articles would not get enough space to develop into new knowledge as suggested by Marton & Booth (2013). One PhD Student even refers to the reviewer comments they receive as ‘hazing’, meaning that the feedback that person got was far from helpful. They were also reflecting on the usefulness of the feedback they were getting through the peer-review comments, like for example this statement:

PhD Student 4: ‘I don’t like, is this double-blind thing, which I would actually like to get in contact with this person to ask for more feedback the next time I write something close to this, because this person clearly from their review showed that they, they know something which I don’t yet.’

This particular example from the interview data is not unique, and it seems like the PhD students are considering the publishing process as something that is required of them, but not an activity that has educational value for them. They don’t see the communicative effort or the peer-review process as something that adds to their learning process, but rather something that they have to do to reach their end goal, which is graduation. One study (Kamler, 2008) suggested that there seem to be differences in attitudes towards publishing between students from natural sciences and social sciences. The group of PhD students from the Faculty of Sciences that I interviewed seemed much more inclined to publish because they had to, or because it would give points, while the PhD students from the Faculty of Social Sciences had a much clearer idea of what they would like to get out of the process as an individual. One of them was even firmly rooted in their decision to write a monograph thesis, even if they knew it would mean that they would have a different learning curve in comparison with their colleagues. To confirm similar results, as Kamler suggest, from my study would require further evidence in to draw any significant conclusions. Nevertheless, there appears to be a parallel to the first

26 https://en.wikipedia.org/wiki/Predatory_open_access_publishing

27 The students are often recommended to publish their work in academic journals that applies a peer-review process to publish content. Read more about definitions here: https://en.wikipedia.org/wiki/Scholarly_peer_review
interview with PhD students within social science, where they seemed to think that the publishing process was not something that would be fruitful for the advancement of research within their discipline. It seemed like they rather thought that the demand for publishing in prestigious journals is an expression of new liberalism [sic!], where the individual is in focus and should strive for excellence by the means of measurable results. They don’t seem to believe that the publishing process is something that would be rewarding for themselves, but rather be to the benefit of the management of their institution. Like in this interview extract:

PhD Student 2: ‘… for example in the course we are taking right now called “Academic Writing”, where it becomes clear that you have the opportunity to learn how to produce academic text, like ehm. This learning process has been really great for me, like. If there’s something new in this for me I would say that it is the writing in Academic English.’

PhD Student 1: ‘Yes exactly, it becomes sturdy and concrete and you see that you are producing something.’

PhD Student 2: ‘Yes, but I agree that it’s like what you do like within your role as a researcher what you do is not essentially different from your education, you read and you write and you think. You have your research question when you like write an essay, so it’s like continuing of a learning process that you know of, but then there’s new aspects, and that’s where you find some new knowledge that you didn’t have before. Eh, because sometimes you just like… Then you also learn… I’m thinking of the compilation thesis like on this course, which I might have whined about before, but it is also really exciting to see that you kind of, eh, it’s like factories producing knowledge, where we have all these students from all the different faculties learning to write in the exact same way. [laughter]’

PhD Student 2: ‘[tabs in] Yes, really’

PhD Student 1: ‘Yes, and when we take a course like “Academic Writing for Publication”. And the point is not for us to learn how to write about knowledge in a creative way, but the point is like “–this is how you get published and the strategies you should use regardless of what you write about”. And there we are, students from different academic fields just like [making clicking noise] streamlining, well, standardising, research. Not for the sake of the research itself but for the sake of the new liberal movement.’

PhD Student 2: ‘[tabs in] Yes, that’s exactly what this is about.’

PhD Student 1: ‘Yes, it’s like precisely what it is, and it’s like what you show here as well [referring to the content of the lecture we just had] where on the one hand I think it is super cool with like these scores that you can get and that you can add it to your CV, like, in a way to try to measure the unmeasurable… So, I think that is a learning process in itself which is about you kind of get the research… I think what strikes me is the institutional framework of research and how freaking much it controls what we are doing there. And the outcome… like, what I produce is so much under control by the framework that I’m stuck in.’

These statements indicate that the person talking is in a reflective state on about the topic of the previous lecture and the meaning of publishing in academic journals. It looks like they do appreciate the knowledge they are gaining, but that they don’t see the point of the strict systematic thinking of publishing articles. They don’t seem to think that the communication standards used in academia are something that is intrinsic to the development of new knowledge, or that it is productive for the advancement of research. It appears as the students here have not really accommodated this new knowledge about the system as integrated in their epistemic beliefs. The course they’ve just taken and the lecture they attended did not actually change anything in their view of what the important knowledge is, or how it is constructed. Meanwhile, the students from the Faculty of Sciences that I

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28 This quote has been translated by the author from Swedish, and slightly altered in terms of grammar and language/context-specific expressions.
interviewed would rather see publishing as their primary task, as they believe that would add something to their research field, which is expressed in this extract from their interview:

PhD Student 9: I’m planning to do articles.

Interviewer: Yeah?

PhD Student 9: Yeah, if I get any articles published, of course. [laughs] No, because I think it’s double work if you have to write a monograph. Maybe you can… you would more… like more your own opinion in a monograph, but I also think it’s double work because the, I mean what we are doing now is we are working to publish articles, so that’s the main result I would say. Of this, of this PhD, and to, to, to gain more scientific knowledge, trying to bring more scientific knowledge, and that the main result so then I would just like to publish it, like that, and I just spend more time on that also instead of just writing that monograph.

[…]

PhD Student 10: Eh, I thi… I would it as articles, because that’s just the standard form doing it. But, ehh, the only reason why I would want to write it in articles is because I want one of my things to be used in a court case, and that has much more credibility if it is published as an article. I, I assume that the lawyer think so. Eh, but, eh, as compared to a monograph, but for me the, I mean I have no personal gain in trying to have things published as articles [inaudible]. So, if I don’t have the time I’d write four manuscripts and have four unpublished manuscripts as my work. And that’s sort of being the same as writing a monograph.

The two statements from students included in the same group are, however, somewhat contradictory. PhD Student 9 seem to have an anterior motive to gain more knowledge through the process of publishing to contribute to their field by means of the publication itself, while PhD Student 10 would rather just get it done to move forward and to achieve other goals. For PhD Student 10 it was more important to contribute to their field in by influencing court cases, and the exam did not necessarily seem like the ideological end goal. This type of orientation towards a predefined target is what Habermas would call ‘teleological action’ (1984), as it is an action that the student has analysed the current situation, chosen the path they believe will lead to success, and then figured out what would be required to reach that end goal rationally.

The definition of a publication is also a somewhat flowing definition according to the informants. It is not set in stone in the sense that some PhD students talk only about articles published in academic journals when they mean publications in general, while others are also including conference papers as published items. For the group where the conference presentations were of interest as scholarly communication output, they could also count these papers as published items in their compilation thesis. But, if the PhD students wrote conference papers, they would instead be required to include more papers in their compilation than their colleagues from other departments (five articles in comparison with three or four for other departments), which would indicate that these items have a different value. They seem to be aware that this type of scholarly communication output is not always considered to be of high value outside of their particular context or academic sub-discipline. Nonetheless, it is explained as something that gives them more international experience from getting out there, daring to present their work to an international audience of real people and to receive feedback from others to a greater extent. However, positive feedback in these circumstances seems to be less common than negative feedback, which may seem discouraging for some PhD students, but for those who can stand it, they claim this is giving them more qualifications or making them into better researchers as a result.

‘PhD Student 4: Yeah, I didn’t understand it either in the beginning. I, I thought it was all sunshine and flowers. Until I started getting funny reviews, and then like: –Whoah [laughs]’.
Swedish PhD students can often choose whether or not they want to put together a compilation thesis with several articles and a comprehensive summary (capped ‘Kappa’ in Swedish), or if they would rather write a monograph thesis, which is more similar to a short textbook. The requirements for what is included in either category and the level of freedom to choose varies between departments and institutions. The interview data suggests that the meaning of all these requirements or the idea that it is good for PhD students to immerse in their context through publications are not actually adopted by the students. Based on my findings they still don’t seem to think that the communication practices provide an essential part of their education to become researchers.

The Swedish PhD students are often given a considerable amount of freedom to choose their path during their education. Each student creates an individual study plan together with their supervisor, which includes the main focus of their investigation, the courses they should take and what their publishing plan is, as well as a plan for collecting data (if that is relevant). It is evident in the information obtained from the interviews that the students seem to think that their plan moving forward is still somewhat unclear and that they are not always in charge of staking out the direction of this plan themselves or at least they do not believe they are. From this perspective, I wanted to explore more about how and why the students make their choices and what influences them, as the path they take seems to be so inevitably embedded in their context. One of the more pragmatic choices relates to if they are writing a monograph thesis or a compilation thesis. In relation to the idea that the communication effort is a learning process, I asked questions about how the respondents planned their thesis; and got some varied answers. The most common choice in each group of PhD students seems to depend on their academic discipline and the traditions in their department in the first place.

However, the students in my interviews seem to think that the process of getting published in a journal is not always a useful learning process for them. Therefore, some of them have chosen to write a monograph thesis, which means that they will not necessarily get acquainted with the peer-review process until they have graduated and might start publishing articles to advance their career. Most of the students I interviewed had, however, already decided to do a compilation thesis since they thought that was expected of them, and also that most of their colleagues do this. Looking at the statistics from the Stockholm University Library collected in 2015–2016 we can conclude that 70% of all dissertations from Stockholm University are published as a compilation. According to the interviews I did, it seemed like one of the main reasons to decide to do a monograph thesis was mainly that they did not want to publish in English because their field of study was too embedded in Swedish traditions or problems. The second reason for choosing a monograph thesis was that the PhD students did not think it was possible to publish three or four articles in Swedish, as the number of peer-reviewed journals accepting papers in Swedish is very limited. Other arguments for writing a monograph thesis was that the students wanted to write in a different and more prosaic style and wanted time to develop their data and analysis from a wider perspective than what would be allowed in a short article. Their thoughts about the efficiency of communicating their findings in a certain way were also referring to some kind of significant other, or perhaps rather a community of practice that they did not seem to think was entirely clear, but nevertheless, something they had to relate to. Like in this quote, where the student has decided not to write a monograph thesis, and now try to argue for their choice:

PhD Student 7: ‘I think it seems to be encouraged to do a compilation… Um, but of course, it’s… In our department, then the qualitative field, it might, it have been the more usual, more normal to do the monograph, and a lot of our professors did that. Um, but I guess compilation it’s coming in from the natural science field and it’s… taking over. Because it’s, um, it’s more, it’s more competitive and it’s… Of course it’s a nice idea to get published, I want to write articles and get published as well, and as you said, before you get published you think it’s “woaw to get published”, it’s something that… Eh, that is in… that seems impossible, but then I can imagine it’s, it’s not… It’s probably not
very difficult to publish something one of the low rated journals, so… If you really want to get it done I think, you could do it. But my supervisor says that; No, you should focus on your [giggles]… Well, I have one publication since before, I wrote a chapter in an anthology in… together with my supervisor. In building on the master's thesis, so before I, before I had that it was really something impossible, but now it feels like…’ [the student ended statement without completing the sentence].

Some of the PhD students in the study pointed out that there could be a disadvantage to their future academic career to publish a monograph thesis as they would also need to a couple of published articles in their desk drawer almost ready to be submitted just after the exam has been approved. They seem to think that this inevitable for someone who would like to continue in academia and to get a postdoc position. They also see that there’s a disadvantage in having published a monograph when it comes to applying for research funding.

The same type of reasoning was used during the interview with the group of PhD students from the faculty of natural sciences, where they relate the publication of their thesis or articles to what it takes to succeed with your doctorate (my comments within brackets):

PhD Student 9 [answering the question on what it takes to become successful]: ‘You need to be very proficient but then also this course that we are following now on the publication process and everything and like I see that it’s very useful now but I also think that it’s actually too bad that we need to know all this, that it’s just not possible to not all be good researchers and that it’s just easy to get your things out there. It’s really this whole process of finding a good journal and getting reviewers and picking out the right…’

PhD Student 11: ‘And being all strategic and…’

PhD Student 9: ‘Yeah, you gotta be really strategic and cannot do just research. And I think that’s too bad, but of course we need to learn that too if you want to be very successful. But, they… some people are also very ambitions and want to be very successful researchers with high impact points and everything like that. But I am… I am not really thinking like that. No I just want, also like you said, just want to have some quality in the thing that I do but it doesn’t matter for me if it’s done in a high impact journal or not or…’

It seems like this student is trying to think strategically about publishing and how to become successful, but that it is in their view not directly related to what they see as useful or interesting research. It is merely a requirement that needs to be fulfilled, and which require a pragmatic approach to get the job done. They expressed that they were thankful about the content of the course that preceded the interview where we discussed how to succeed with publication and tools for evaluating this effort, but it still seems like they think publishing is an extra burden to be put on top of what they see as their primary activity, which is to produce the actual research. However, the interview data to some extent also shows that the students do not seem to have an understanding of the combination of strategies that could lead them to the road of success on the narrow path of publishing. Such plans would result in individuals aiming for quick solutions or easy answers to problems, as they don’t have the opportunity to see the big picture, nor do they know where to find it. This type of chase would lead to what Pintrich (2002) calls ‘Simple knowledge’, where a deeper understanding is what is needed to lead them more relevant actions and conclusions.

This is, for example, evident in the interview with PhD Student 3 and 4, where they talk about how the connection between the industry and academia in their specific field work, and the two have different drivers. It seems like academia is not keeping up with industry in their particular area, partly because academic publishing is a process that takes a long time. This has led to a tradition where conference papers and blogging is becoming more relevant than research. The following passage illustrates this:
PhD Student 4: ‘Yeah, the field has a weird dynamic, with this industry versus academia. […] I feel that at least recently […] that the industry moves a lot faster than the academic side, and it’s forcing the academic side to, if they want to publish, they have to literally work, at least for journals, ongoing and literally… if somebody submits within a month that thing has to be published or one person has to read it in a week and put it up ready to be in some sort of. What do you call it, “in press”, kind of version? Because the industry is moving way faster than that. […] People are blogging more than writing papers. We’ll find blogs, there are certain well-known authors who have moved to blogging because they find it’s faster to get it out than go through which is going to take three months and back and forth reviews. Get it out early. […] And in my research field, there’s very very much an inner circle of older researchers that sort of decide what’s being researched. And breaking into this requires that you sort of have to have one of these as your patron. […]’

PhD Student 3: ‘So, it’s really interesting that you have to…the old ones are still controlling both fields but they’ve taken a strict turn away from each other.’

Here, it is evident that there is a context of senior researchers that the PhD students have to relate to and take into consideration when they plan their output. They have to place themselves somewhere on the scale between industry and academia and then take a stance to become successful. This could indicate a high level of awareness of their knowledge, or a what Kuhn & Weinstock (2002) would call a more multiplist level of epistemological thinking. However, it also seems as they are not entirely happy with this position and that they would like to change it but are not sure how. They add that it is a good idea to find a senior colleague to co-write with to become an accepted scholar in their field and that they have to be associated with these well-known names in their field to gain some traction for their results. They also know that this requires a certain level of networking which they are not always comfortable with. They have however become friends with scholars in their field on Facebook to follow their feeds as a kind of networking instead of going to all the expensive conferences, which would be the alternative medium for meeting and discussing with senior researchers.

Based on the interview data, it also seems like the PhD students are heavily depending on their community of practice in several ways, not only to learn the trade but also in terms of their choice of theories and methods. One of the students describe the academic culture at their institution like this:

PhD Student 6: ‘I’ve noticed in my department particularly, that I was not anticipating, is the paradigm. There’s definitely a paradigm in my opinion, in our department. That’s you know, very much, if you’re gonna look at it like beyond just like the word “[subject area in focus]”, you like, you know something that I’ve found is when I’ve said [related subject area], it’s kind of been like: “What, we don’t do that here”. You know… so where, for me I’m comfortable saying, well look…. To me it’s not that different, but it is kind that idea of, just that traditionally, there’s been a separation. And so, I took a [related subject area] class, last year, and it was one of my favourite things to do in the department, just saying “well I’m taking this [related subject area] class right now” and watching their face. [everybody laughs]. You know, to see the reaction. Because it was almost like: “Why, what’s wrong!?” But you do see that in terms of, even if they are open to different things somewhere in their training and in their background, kind of holds on to a little bit of, Oh, you know… “we don’t do that here”.

In this quote, and its related content in this particular interview, it becomes clear that the context in this person’s department is something that is not always outspoken, but rather ‘resides in the walls’, meaning that it is hard for the PhD students to disregard from the tradition or culture at their

29 This quote has been edited from the original recording, partly to reduce some redundant speech language but also to preserve the anonymity of the PhD student. The parts where the interviewed person refers to area-specific names and codes has been removed.

30 This quote has been edited from the original transcript to preserve the anonymity of the informant, so subject-specific words has been removed and replaced with the text in brackets to preserve the integrity of the person talking.
department even if they do not always share those values. The academic culture at this particular department can in a sense both be representing the community of practice as a whole, but also the mediational means of how knowledge is transferred between senior researchers and the PhD students in their context. This information from the interview puts a spotlight on the social world of the students, which is important to understand while exploring their learning experience from a sociocultural perspective. The experience also includes other areas than the strictly academic ones. As all of the students in my study are employed by their university, they are also a part of the social world of the department staff, which means that they have not only their role as PhD students to consider in their working group. Learning to become a part of the department community and follow all the rules in that context is also something that was noted as a challenge in statements from the interviews. One of the PhD students even refers to this process as ‘learning by osmosis’, meaning when it comes to trying to understand what is required of them in certain areas of their work environment. The students seem to believe that they are missing out on something that is not outspoken, or that they are not given any prior instructions or hints on how this would happen.

**Supervisors & Time Management**

To understand more about how the context that the PhD students are acting in, I asked them questions about their current mind-set or situation. The exact wording was ‘What is your current state of mind, or what is your current situation like?’. These questions were asked with an open-ended answer in mind, which in part was meant to set the stage for comments about their self-awareness and perhaps also their epistemological beliefs. It turned out that this question rather triggered thoughts about their current situation that were closely related to their supervisors and how the students managed their time in general. This sensitivity about their situation would indicate that their epistemological beliefs are still not separated from that of their managers or supervisors, as they were often the topic of the conversation. They have not yet developed a sense of self, as described by Baxter Magolda (2002), in relation to this new task and would thus rely on others to make the judgement. It might even be that they have not yet consulted their epistemological beliefs. This finding could be connected to the results from the surveys about PhD studies made in Sweden in the last few years (Charpentier Ljungqvist, 2014; Gröjer et al., 2016). It is pointed out in these surveys specifically that the quality of the supervision is directly related to the quality of the education for PhD students, especially concerning finalising their education according to schedule. It seems, for example, to be relatively common to switch supervisors as the match between individuals and subject areas is not always good from the beginning. About one-fifth of the PhD students at Stockholm University said in the survey by Charpentier Ljungqvist (2014) that they had changed at least one of their supervisors during their studies. It is also common to consider asking to change supervisor, even if that consideration does not always lead to action. One of the other big challenges for PhD students in general and in Sweden and Stockholm seems to be how to manage their time. The surveys referred to above show that there are several things that influences the feeling of time strains or increased stress levels. The results show that it is not only the relationship with their supervisor that causes stress, but that there are also parameters such as too much teaching or research projects that are too big or complicated to handle, which leaves less time for the students to do their research and write for publication. It seems, however, from the result of my small study that a lot of the problems with time management is closely related to the relationship with the supervisor.
The evidence collected for this study confirms that it is a challenge for the PhD students to have a balanced relationship with their supervisor. Switching of supervisors due to problems in the relationship has been indicated in national and local surveys mentioned above as time-consuming issue providing big challenges for the students. In the quote below this is described by a PhD student who is in a rather early phase of their career. This is the response to the question about how they would describe their current situation:

PhD Student 6: ‘So, they didn’t, so they did their best in aligning supervisors with me, but it was kind of, I didn’t even know who to ask for, so I didn’t have that necessarily as an option. So, I was at first assigned a supervisor who is nice, I like the supervisor a lot, but there really wasn’t a connection, there was… the interest wasn’t there, I was getting very little guidance, like where as you guys had already met with your supervisors, I had met with my supervisor one… once… and we hadn’t even met as a team at all. But coming in new, I didn’t know anything different. Like I didn’t know what to expect and… So, since then I have switched, the second semester I switched and so I had a new kind of supervising team, which has been, you know very helpful. But it is kind of starting… kind of from scratch again. […] But, you do also need, which I have gotten now, some structure from your supervisors. And sometimes that can be, you know, personality-wise… just communication. […] That was the first question my supervisor gave me though… “What’s your theory?” […] And I was like, I don’t even know where I am living, you know … the different theories that I had an idea about, the people in my department had never heard of.’

Other examples collected from the interview material on having to switch supervisors and working with the individual study plan, seems to confirm the findings from the survey done by Charpentier Ljungqvist (2014). The survey found that PhD students from the faculty of Social Sciences did not always receive proper follow-up of their study plans, while students from other faculties did not experience the same challenge. The students in the below quote, from the Faculty of Social Science, did not only have problems finding the right supervisor(s) but also noted that the creation and follow-up of their study plan were not always up to standard. As the demand for an individual study plan is stipulated in the Higher Education Ordinance (Ministry of Education and Research, 1993), it is considered a problem if the supervisors do not follow the regulations. The quote below comes from the interview with two PhD students from who both were approaching the end of their time at the university and could therefore reflect on their challenges over time. This statement was made during the very first minutes of the interview, upon the question about their current situation.

PhD Student 3: ‘So I was originally given one supervisor who wasn’t in my area, as of ended I was given supporting supervisor who was in my area but who hadn’t published anything in a long time. They were busy with other things and X was really, uniquely unqualified to be a PhD supervisor. So, my first year was basically teachings, and I think I taught a thousand hours [giggling], or something, out of the three hundred and something I should be teaching. Ulm, of which I could count uhmm, six hundred or something […], and I got no research done whatsoever. So, I switched supervisors and since then everything has been gravy’.

PhD Student 4: ‘More or less the same thing happened to me. It just that I happened to switch twice because I made a bad choice the second time. The third time was the best choice ever. But, yeah, I also had a supervisor who, he didn’t give me a plan. I wanted to, because according to regulation you are supposed to have a plan, pushed for a plan but… Every time we asked about it he was just like, yeah just cook something up, and I’ll sign it off and it never got signed off. And went on for two years. […] And, the second guy was a little more, wanting the documentation so he got it done. But, he was not interested in following it. [Giggles] […] And the third person actually writes and follows. Best ever.’

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31 This quote has been slightly edited to ensure the anonymity of the informant and the persons they are describing in the statement.
It seems evident here that the students in the interview mentioned above felt they did not receive enough support from their supervisors and their department in terms of finding a structure that would help them reach their goal of graduation. This problem with appointing the right supervisor was noted in two of the five interview groups. Nevertheless, it is not only the supervisor that seems to be the challenge when it comes to time management for the PhD Students, which is also supported by data from the survey by Charpentier Ljungqvist (2014). The interview data also suggests that there are a lot of other things to keep in mind for the doctorate. The students have several tasks to fulfil at their departments which are all considered to be crucial parts of their education and socialisation into researchers. The following statement from one of the interviews supports these results, and give an example of how not all of the extra tasks are regarded as meaningful to the students:

PhD Student 7: ‘You, you think about research design and doing interviews and contacting people to interview and, ehm, and reading previous research and building up your, theory apparatus, thinking about methods… things like that. But then you also have to tasks, ehm, other tasks, like courses that you take. And courses that you teach. And other things that you do. You’re attending seminars in the research groups, there are a lot of things that you could do that you can do and participate in conferences and things, so it’s getting a lot of things. And perhaps you can reduce this and do fewer things. Maybe I do too many things at the same time and maybe not everyone is doing that, but, but I guess I can imagine that it’s a little bit the same for everyone. It’s built-in to the position as PhD student is to do a lot of things and try to have managed this and live with this without getting very stressed about it. […] I can imagine it’s a little bit like starting up a new company or something. You have to think about lots of things, and you have to manage it yourself and no one else will tell you what to do. Even though we have a boss, eh, supervisors, they don’t tell us what to do. Maybe they do in other departments, but in our department, I… it feels like they want us to be autonomous and free and, eh, even though this can be difficult sometimes I think. They try to foster this.’

As the material in this master’s thesis are mostly from interviews with PhD students from the Faculty of Social Sciences, I have not got a lot of evidence in about the situation for doctorates working within big research projects that would be more common in the Natural Science field. The individuals included in my study is considered to have more room to choose their topic and plan their own time in relation to their area of interest. Nevertheless, it seems like time management is a crucial aspect that they have been spending a lot of time thinking about.

I have also noticed some correlations of data between the choices PhD Students make about time management. They indicate that they have to weigh in time management issues when making decisions, for example on how much teaching they are supposed to complete as a part of their education or if they would like to participate in projects. Time management is also to some extent considered when they choose what type of thesis they would like to write. They are aware that the time frame becomes more uncertain if they decide to do a compilation thesis due to the lag time of getting your paper through peer-review with a journal. The interview data also shows a relatively low level of awareness about the time it takes to plan and write for publication. This lack of awareness could be related to the fact that many of the respondents were still rather early in their career, but it also seemed like a lot of the doctorates with a few years of studies up their sleeve had been waiting to publish anything for several reasons. It seemed like they thought that they would have to have a lot of reliable results to talk about before they planned their publishing activities. This hesitance to become a part of the system would be in direct opposite to what Thomson and Kamler (2013) suggest would be fruitful to become a successful PhD student. They propose that it is through publishing early in the process that you learn how the discourse or context works, rather than waiting for a later to catch up with what others are doing. Publishing would in this view teach the students how better place themselves in an environment where their results would be well received and used. In my interviews it seems like the students are not encouraged to get better acquainted with their context through
publishing within the current framework of standards. The next section of the qualitative data analysis will further describe some of the motivational factors to published that was mentioned during the interviews.

**Motivation & Drive, Choices & Actions**

When coding the interview material, I realised that there was a theme that I did not initially include, as it did not entirely align with my original scope for this thesis, and that was the motivation or drive to become a doctorate student or becoming a researcher in the first place. The interview data about choices made and actions taken, will be completed with notes on why the individuals chose this particular career path to further show the connection between general and specific level of motivation. Understanding the motivation and drive are important factors to be able to draw any conclusions about the reason why students make certain choices to for example engage in publishing (De Corte et al., 2002).

The questions asked related to these themes were about what made them choose to apply for a PhD student position. I also asked them what it takes to become successful in their current situation. This student’s statement is an example of responses with similar content, and where the obstacles does not seem to obscure the end goal:

PhD Student 6: Well, um, for me I always knew that I was going… Ah, I always knew I would probably ending up getting a doctorate. I finished my master’s in [subject area X], and I graduated during the great recession, […] and at one point I was searching for jobs and doing everything and I was invited to potentially go ahead and go into the PhD program at the university I was at, umh, but decided against it. […] I always knew I wanted to do something unique, I was thinking about actually about going to get a PhD in like Subject Y or something […] and, so I luckily kind of fell into an opportunity where they sent, my university sent me to visit Sweden, wasn’t originally visiting Stockholm, but found out that there’s an international [subject area] centre, […] Reached out. Set up an appointment, […] Had a really good meeting, […] they said “oh, you know there’s a PhD program”, and I was like “whatever”. Kind of just forgot about it, but then Person X in the department e-mailed me and said “hey, by the way, you know there’s an application”, and that was at a moment when I was ready to move jobs. […] And I was like, you know, why not? So, I applied, and ended up getting it, which is amazing. I knew I was gonna go into a PhD program, and I knew I wanted it to be unique, I didn’t understand quite how unique [laughs] it would be. […] Let alone, to have such a great experience living abroad.

This statement tells the story of someone who was aiming towards an academic career, but took a rather long detour, which was just not quite the way they had imagined. The quote is rather long, and winding, which indicates that this choice had an emotional meaning for the respondent. This is included in the learning process, according to Hofer & Pintrich (2002), and the way in which the individual approaches this uncertainty would indicate which level of epistemological awareness the person is at. There are similar stories from other interview sessions, where the students seemed to have applied out of chance, just to see if they could. However, there are also other stories where the students are approached by senior faculty and are asked for applying to the PhD position. There seems to be some kind of discourse where this has merit for the students to be outright asked to join the program, and that they are in a way flattered that for example the supervisor of their master’s thesis think they show such talent that they are encouraged to apply for the position and eventually end up getting it. Almost like they are individually selected for this path, and therefore are unable to say no when the opportunity arises. This could be seen as a way of accepting the role of the apprentice when the teacher is hand-picking them out of a bunch of other students’ due to their individual performance. This could possibly be speaking to their self-esteem in a positive way, that their knowledge is worth
something and that this becomes a motivator for them to pursue this challenging career. The positive attention has a potential to help the students reach the next level of epistemological thinking and to further reflect on their role in the community of practice. However, there are also other types of motivation coming through in the interview material, like the statement below, where one of the students is still hungry for more knowledge in their area of interest. It seems like it is the curiosity driving them to work hard to achieve a goal that is not always crystal clear. One of the students put it like this:

PhD Student 9: ‘It’s more for me I see this more… A lot of people would see it as something that is nice for their CV, but for me it’s more like an extra opportunity to learn so, at first when I applied for this program I thought that it was three years, and then I was thinking, oh it’s actually almost the same as doing an extra master. But then it’s a PhD and like, even if I don’t like I would have only lost three years, which would be almost the same as if I would apply for another master, which I might also like. So, then I thought, ok, then it’s just like extra education and like, I can just like, so now I have the chance to really choose the courses we want to follow and that’s a really nice opportunity, so so, that also a drive for me. Just to have more learning experiences, yeah.’

Statements from other students differ when it comes to motivation for their studies. However, although based on data from a small sample, it seems like the majority of the students I met have been doing a great job with their master’s thesis, and by that was personally selected by senior academics to continue their career. Other motivational factors seem to be related to a personality type that is prone to curiousness or hungry for more knowledge, or just being a person who would like to make the world a better place with their research findings. All these goals are of course valid reasons why they would like to pursue a PhD, but what does it say about their motivational beliefs? In relation to what De Corte et al. (2002) says, this could be understood as more goal orientation beliefs or self-efficacy beliefs, where the students see themselves as confident that they will eventually understand their own set goals, and that they will be satisfied when they have learned what they are supposed to do. If we want to compare these results with the survey ‘Utbildning på forskarnivå vid Stockholms Universitet’ [Research-level Education at Stockholm University] (Charpentier Ljungqvist, 2014), we could conclude that the interview data seem to indicate a similar direction and thus further verify the results of the survey. The correlation of these two studies suggests that the choice of applying for a doctorate is most of the time driven by a motivation to learn more and due to a genuine interest in the research field rather than a career. This could be something to remember when trying to set goals for PhD students to achieve, i.e. that the end goal is not necessarily to become famous but to make some difference.
Summary of Results & Analysis of Interview Data

Eleven PhD students from the Faculties of Science, and Social Science at Stockholm University was interviewed with open-ended questions in groups of 1–3 people. The students were asked about their thoughts in relation to their time as PhD students and their choices to publish in relation to their PhD thesis. The findings suggest that the students are insecure about their role as scholarly communicators, and the standardised nature of publishing in academic journals. They also seem to ask for more knowledge on how to situate themselves in this context, and that their position in the context as apprentices is not always leading to structured learning. Their motivational beliefs are well represented in the interview material, and this indicates that they are eager to learn more about publishing as a means to finalise their exam. The students seem to understand that the communicative practice holds some kind of merit for them, but they are not exactly sure how. Sometimes the strive for more learning opportunities seems to not be fully supported by their supervisors, but their colleagues appears to be helping them to come to terms with their struggle to write a good article and have enough time for taking more courses and teach undergraduate students.
Results & Analysis of Publication Data

In the previous section of this master’s thesis, we learned about what the interviewed PhD students thought about their communicative actions related to academic publishing. However, to be able to say something about the actual behaviour of PhD students to use as an indicator to whether or not they live as they learn, it became evident that another information source was needed to explore the actual output of their work. This part of the thesis, therefore, aims to respond to the research question ‘How do the PhD Students at Stockholm University communicate their research findings?’ Quantitative data about publications by active PhD students registered in the university databases between 2013–2016 was collected and analysed to create an understanding of their actions. The statistics about the number and nature of publications are also compared with data about how other people in the communities of practice has been reusing or referring to the work done by PhD students, utilising information about interactions or mentions about the published papers. Since such data collection methods are usually only possible to perform with digital publications with a permanent identifier most of this analysis had to be concentrated on articles published in journals or other digitalised items such as book chapters or conference papers. However, as a significant part of the total number of publications (about 70%) of the dissertations at Stockholm University are presented as compilation theses, this analysis would still cover the majority of the items produced in the time frame.

Publishing Output by PhD Students

There were 1,046 active PhD Students enrolled at Stockholm University between the years 2013–2016. During the same time, it is possible to find 859 peer-reviewed articles, book chapters or conference papers registered in the university publication database DiVA with a Digital Object Identifier (DOI), which was authored (or co-authored) by one or more PhD students from Stockholm University. Of the total number of items found in the database, 155 articles were authored by students from the faculty of Social Sciences, 18 articles came from authors in the Faculty of Humanities. 686 articles were authored by PhD students from the Faculty of Sciences; however, it is noteworthy that 49% (334 articles) of the output from the Faculty of Sciences was authored in a large research group where collaborative writing is common (often including more than 50 authors). These particular publications are called ‘collaborations’ in the dataset to indicate that they significantly differ from the other publications. This practice is worth mentioning if we are to look at the individuals’ contribution to the writing process. Some argue that students taking part in these large collaborative groups, does not contribute significantly to the final version of the article (Goldstein, 2011; ‘Why research papers have so many authors’, 2016) and the effort could thus not be compared with other publication types common for PhD students. Such large author groups are mostly a phenomenon within sciences, especially within physics, astronomy and medicine, where they work with large sets of data which, for example, sometimes has to be collected by statistical experts or data analysts that are then added to the team of authors. The publication activity data across student groups is therefore not comparable on a 1:1 scale regarding individual effort or contribution for writing an article, so please bear this in mind when you interpret the results of this study. The learning process for PhD students within the large research projects could itself become an interesting topic to explore and to analyse the results of such
collaborations are of course something that others’ struggle with as well, but it is not feasible to do within the limits of this master’s thesis.

First, we will take a look at the overall statistics of dissertations published, to better understand the size of the total output. The Stockholm University Library is supporting the PhD students with the planning, layout and printing of their doctorate thesis that marks the end of their studies, and from 2015 and onwards there are statistics compiled about the number of dissertation per faculty and type of thesis published, which had not previously been available. According to ‘Doktorandspegeln’ [The doctorate mirror] (2016), it was found that 53% of the PhD students had published any work at all at the time of the survey, which could indicate that they might publish an actual measurable item rather late during their time at the university. During 2015 and 2016 the PhD students of Stockholm University produced a total of 463 books with dissertations. The following summary (Table 3) gives an overview of the dissertations published per faculty per semester.

<table>
<thead>
<tr>
<th>Faculty of Humanities</th>
<th>Faculty of Social Sciences</th>
<th>Faculty of Law</th>
<th>Faculty of Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2015</td>
<td>124</td>
<td>32</td>
<td>3</td>
</tr>
<tr>
<td>Autumn 2015</td>
<td>94</td>
<td>31</td>
<td>1</td>
</tr>
<tr>
<td>Spring 2016</td>
<td>132</td>
<td>22</td>
<td>4</td>
</tr>
<tr>
<td>Autumn 2016</td>
<td>113</td>
<td>35</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 3: This table shows the number of theses published per faculty, per semester.

The number of dissertations produced per faculty depends on how many departments each faculty hosts, and how many PhD students they accept within each study period. The number of enrolled students each year are, however, not absolute as they fluctuate while some individuals take breaks due to sickness, parental leave or commitments outside of their study plan. It is therefore not relevant to directly compare the productivity of the faculties, as many other factors that would indicate how a group of students are reaching their learning goals.

Another overview (Table 4, below) shows that most, on average 70%, of the PhD students choose to publish their final doctorate thesis as a compilation rather than a monograph.

<table>
<thead>
<tr>
<th>Type of dissertation published 2015–2016</th>
<th>Total # of thesis’s</th>
<th>Compilation (% of total)</th>
<th>Monograph (% of total)</th>
<th>Full text uploaded in DiVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2015*</td>
<td>124</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Autumn 2015</td>
<td>94</td>
<td>72 (77%)</td>
<td>22 (23%)</td>
<td>83 (88%)</td>
</tr>
<tr>
<td>Spring 2016</td>
<td>132</td>
<td>98 (74%)</td>
<td>34 (26%)</td>
<td>120 (91%)</td>
</tr>
<tr>
<td>Autumn 2016</td>
<td>113</td>
<td>69 (61%)</td>
<td>44 (39%)</td>
<td>99 (88%)</td>
</tr>
<tr>
<td>Total in period*</td>
<td>463</td>
<td>238 (70%)</td>
<td>94 (28%)</td>
<td>302 (89%)</td>
</tr>
</tbody>
</table>

Table 4: Total number of dissertations per semester, type and full text openly available for download via the DiVA database. * There were no data collected for type of thesis or full text availability in the spring of 2015.
The compilation thesis includes some of journal articles compiled together in a book, with a comprehensive summary (in Swedish this is called a ‘Kappa’) in the beginning. Most of the papers included in such a thesis would have to be accepted for publication, but the examination committee can approve dissertations where articles are still under review when it is time to defend the dissertation in public. The learning process of publishing articles is therefore highly relevant to discuss from different angles to find out more about how the students can get more out of their time at the university. Furthermore, the data indicate that the practice of publishing varies very much between the academic disciplines and that the result of the analysis is, therefore, not valid for all PhD students. The students who chose to compile all their efforts from their program into one single monograph will naturally also learn what it means to communicate research, but perhaps at a different pace and from another perspective, as the monograph thesis is not peer-reviewed. Both compilation and monograph theses are published as books in print, and the students are also encouraged to upload a digital version to the DiVA database to make it searchable and available to a broader readership.

According to the information in Table 4, the number of theses authored as monographs increased during the autumn semester of 2016. The reason for this difference is not apparent, as the data does not reveal any changes in the ratio of publications coming from faculties or departments that would indicate a change in preferences. But, it could also have to do with a general increased admission rate 4–5 years ago or increased efforts for doctorates to publish their dissertation and get their degree. If we look at statistics from national surveys, most of the Swedish dissertations (85%) are authored in English (Gröjer et al., 2016). The national data seem to correlate well with the data collected at Stockholm University and is further supported by the practice to publish peer-reviewed articles. It would have been ideal to find verified data about the number of dissertations produced before the spring of 2015, to say something about the total period from 2013–2016 (i.e. the total time span of the article publication data). However, if we compare with the total number of articles published by PhD students in the period 2015–2016 we would see that there were 326 articles published that would have been eligible for inclusion in a compilation thesis. There were an additional 161 articles if you count the collaborative items, which gives a total of 517 articles that are presumably included in a dissertation during that two-year window.

The data set with information about publications from Stockholm University PhD students do, however, not include specific data about when their papers are released after the thesis is done. Nevertheless, it is interesting to measure the ratio of published articles to the total number of enrolled students. The rate is 0.8 articles per person if we compare the total number of items registered and the total number of PhD students enrolled within the time frame measured. In addition to this, we can conclude from the publishing data that several PhD students has published more than one article. It is usually the students from the Faculty of Science that have published more than one article. The ratio of published items per person for Social Sciences was 0.5. For the Faculty of Humanities, there were 0.1 articles published per person, and the Faculty of Law published none (see Table 5 below). The reason for this difference between faculties could be explained by academic traditions, where researchers within the faculties of Law and Humanities tend to prefer to produce books or book chapters as their principal outlet rather than peer-reviewed articles in English.
### Number of Articles per PhD Student

<table>
<thead>
<tr>
<th>Faculty</th>
<th># of articles</th>
<th># of PhD Students</th>
<th>Publication ratio per student (in 3-year period)</th>
<th># of articles including collaborative works</th>
<th>Ratio per student incl. collaborative works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Sciences</td>
<td>154</td>
<td>312</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humanities</td>
<td>19</td>
<td>164</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sciences</td>
<td>352</td>
<td>538</td>
<td>0.7</td>
<td>334</td>
<td>1.3</td>
</tr>
<tr>
<td>Law</td>
<td>0</td>
<td>32</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>525</strong></td>
<td><strong>1,046</strong></td>
<td><strong>0.5</strong></td>
<td><strong>859</strong></td>
<td><strong>1.2</strong></td>
</tr>
</tbody>
</table>

Table 5: This table shows the total number of PhD students enrolled at Stockholm University between 2013-2016, compared to the number of published articles with DOI numbers registered in DiVA.

This data, although interesting, does not provide much information about how the dissertations were published or how impactful they were to the researchers’ context, as this is not something that is followed-up on a detailed level. Worth mentioning in these circumstances is that it is nearly impossible to track interactions of monograph thesis books with publication data or altmetrics as they don’t have digital references with DOIs, which is the reason why it is not possible to follow up on usage for all publications. The only means of finding out how much a monographic dissertation has been used by others is if we look at the number of downloads from the DiVA database. However, this would require that the PhD student has agreed to upload their thesis in full text. The rate of providing an electronic version of the dissertation is high according to the data in Table 5. However, it is unfortunately not comparable to the data about articles and therefore not useful in this analysis as there would be too much overlap between articles and compilation theses by the same students.

Some PhD students author articles together with their supervisors, some with other colleagues (students or senior researchers), some within the scope of a research project; others become part of large research collaboration groups where they publish several articles per year. The three collaborative author groups included in the data analysed here all come from the Department of Physics at Stockholm University. The most productive group is the ATLAS collaboration[^32], but there is also a group called the IceCube Collaboration[^33], and the H E S S Collaboration[^34] included in the calculations here. These groups are all international and include members from several academic institutions from many continents. Such groups would naturally have an advantage when it comes to collect a high number of interactions or mentions, as the networks of researchers with interest to share the results is more significant, so we should be careful when comparing data from different faculties and refrain from ranking the results. Furthermore, it should be considered that there are differences in what is supposed to be ‘good’ or relevant to measuring publications varies between disciplines. Some supervisors encourage their PhD students to write articles together with others; some think it is a good idea to publish conference papers or book chapters. Others seem to believe that it is better for the PhD students to wait with publishing until they have completed their entire work, to write about it in the form of a monograph. It is therefore not always a good idea to calculate an average or compare the departments or faculties on a scale. It is also not possible to make direct causal assumptions based on the heterogeneity of practices between faculties or departments. The data I have collected should, therefore, not be used to rank departments, centres, students or faculties. The only thing we can know

[^34]: [https://www.mpi-hd.mpg.de/hfm/HESS/pages/collaboration/institutions/](https://www.mpi-hd.mpg.de/hfm/HESS/pages/collaboration/institutions/)
is that it depends on the context what is deemed to be of high quality or useful. All in all, including collaborative works, the PhD students at Stockholm University published 859 articles in academic journals between 2013–2016, and we will now move on to look at some other forms of data to understand how the content is reused in their respective communities.

**Interactions with Published Articles**

Previously in this section of results and analysis of the quantitative data, I mentioned that this type of material could be used as a measure of influence to position the work by PhD students in their community of practice. By collecting data about interactions with published items in the public space, we can find out more about this process. To measure the interaction level with their community for the cohort of PhD students from Stockholm University between 2013–2016, I have extracted a list with the DOI numbers of their publications registered in DiVA. This list was then and then matched with the information in the database provided by Altmetric.com, via the tool ‘Altmetric Explorer for Institutions’, that the Stockholm University Library subscribed to during 2016–2017. The instalment of the database includes information about interactions with publications from researchers registered as employees at Stockholm University at some point from 2010 and until today. An open access dataset is available online to ensure as much transparency as possible for the following analysis (Wennström & Schubert, 2017)\(^3\).

![Table 6: The number of mentions per channel and per faculty, since day of publication per item.](http://doi.org/10.17045/sthlmuni.4789408)  

35 http://doi.org/10.17045/sthlmuni.4789408
The table above (Table 6) shows the total number of interactions to all articles divided by communication channel and faculty by the time this information was extracted (October 26, 2016). According to the report retrieved, the most common outlets used for interaction in the dataset from Stockholm University are Mendeley readers, Twitter mentions, referrals from news outlets, and Facebook mentions. The relevance of this data is, however, relative to the number of users registered for or being reached by each information service, where some social media tools are more popular than others in different geographical areas or between academic disciplines. The data indicates that the average attention ratio per article is 17.3, meaning that each item got some attention or that a person that interacted with the published information, in the listed channels about 17 times. The most popular channels for sharing information about research in this context seem to be Twitter and Mendeley. These two tools are entirely different types of research communication services, where one is made for quickly sharing ideas openly and to a lot of people\textsuperscript{36}, and the other is made for managing, sharing and discovering research information\textsuperscript{37}. News outlets (which could be both local and international), Facebook and blogs also seem to be of interest to use for sharing published articles. However, encyclopaedic sites like Wikipedia does not appear to be using this type of research from previously unknown researchers in their summaries to a great extent. Another noteworthy outcome from looking at the figures is that there are not a lot of policy documents that have been referring to any of the articles included in this analysis. Not being able to find referrals in policy documents could be due to difficulties of finding and linking to sources for policy documents as they can be hard to track from the diverse platforms by which policy documents are distributed, and that the publication of such materials is not as standardised as academic publishing. It is, however, a vital communication channel which is relevant for researchers to reach, especially within the Social Science subject areas.

About 67\% (688 items of a total of 859) of the articles in the data set had received a mention score by the time the data was extracted. The total number included the collaborative group-authored articles. If we analyse the occurrence of mentions about the 525 articles that were not authored by a collaborative research group, we see that 41\% of those items had received any attention at all. The assumption of a higher rate of interactions for articles with many authors seems evident here, as the network of other researchers interested in interacting with the material is more extensive than it would be for a piece with one or a couple of authors. There could be several other explanations for this, of which one is that it has to do with the topic and conclusion of the articles and the relevance of this content to each of the target audiences of the communication channels. Measuring the attention score of published items could also be related to the authors’ sense of the self, as argued by Baxter Magolda (2002). It could be that the authors have a result to share with the audience, which they know have been scrutinised through peer-review and this encourages them to acknowledge their findings to the rest of the world with confidence in different media channels. Looking at the bigger picture of what the list of mentions tells us, we can see that the level of mentions per published item was somewhat evenly divided between the faculties, where 53\% of the articles in Social Science received a mention. The equivalent percentage for the Humanities was 53\%, and the publications from the Faculty of Sciences had a mention level of 55\% of the total number of items.

This data would conclude that a little more than half of all articles published by PhD students at Stockholm University receive attention in other media than where they first were presented and that this could indicate that their work reaches outside their close community to a greater extent.

\textsuperscript{36} https://about.twitter.com/company
\textsuperscript{37} http://support.mendeley.com/customer/en/portal/articles/227875-what-is-mendeley-
Correlation Between Citations and Mentions

Measuring the contextual nature of the perceived success rate with attention scores is interesting, but it would also have to be put into context together with other, already established, measures in current practice to become meaningful. Such comparisons are especially relevant if the authors aim to target a particular audience with their results, like for example the general public or a community of practice outside of their department, i.e. target groups that are otherwise hard to reach or understand in full. A first step would be to compare the mentions of articles with the number of citations registered to see how the content has been received by different audiences. I will attempt to make such a comparison below, but we should, however, keep in mind that the data in these model is not an absolute measure, as the numbers change over time; the data collected here should be considered a snapshot of the attention score at a specific date. There are also many parameters hard to control that could affect the count, such as users trying to influence the ratings. Altmetric.com do have routines to protect from the worst instances of users gaming data by boosting interactions deliberately\(^38\). This type of restrictions is there to prevent that the practice of publishers encouraging authors to self-promote their articles via social media once they are published are not misused\(^39\). Nevertheless, it would be interesting to compare the different types of interactions (i.e. mentions and citations) with each other to give us a better understanding of what kind of impact the articles authored by PhD students are making in their community of practice.

A Pearson correlation analysis (Cohen et al., 2011, pp. 632–637) between Altmetric scores and citation data of items in the dataset shows that the Altmetric score and citations from the Scopus database are positively and significantly correlated (\(r = .26, p < 0.01, n = 461\)). The weighted Altmetric score and Web of Science (WoS) citations to the articles under analysis are also positively and significantly correlated (\(r = .28, p < 0.01, n = 461\)). This range correlation indicates a slight relationship between altmetrics scores and citations in Scopus or WoS (or vice versa), according to Cohen et al. (2011). Other studies of a similar sort (see for example Costas, Zahedi, & Wouters, 2015) suggest that altmetrics could be used as a complement to traditional bibliometric measures to say something about the societal impact in other ways than citations could provide. In conclusion, there is support for the assumption that high altmetric scores are associated with an item being cited as well. The citation rates for articles vary considerably between different academic disciplines, and a lot of published articles are never cited at all. Even if it seems like improved information systems and that most articles are now available in digital formats and thus easier to follow up (Larivière, Gingras, & Archambault, 2009), it is not necessarily common practice for earlier works of researchers to be highly cited unless they publish together with well-renowned co-authors. But, if items are shared in other media in different ways, the likeliness of being cited seems to be higher if we should trust the data in my correlation analysis. However, I would not go as far as suggesting that a high altmetric score is directly related to a high citation rate, as the correlation is not highly significant. Although, as Costas et al. notes (2015), the value of the calculations has to be depending on how the society chooses to use the alternative metrics in further analysis of their activities.

A more detailed analysis of the relationship between citations and altmetrics (Table 7, below), shows evidence that it is not necessarily the same articles that will receive high scores in all databases. Compared to the relative speed of articles being mentioned in media measured with altmetrics, where new items are more likely to gather attention. Usually, it takes a long time for a paper to collect

\(^{38}\) [https://www.altmetric.com/blog/gaming-altmetrics/](https://www.altmetric.com/blog/gaming-altmetrics/)

\(^{39}\) See for example: [http://authorservices.taylorandfrancis.com/tweet-your-research/](http://authorservices.taylorandfrancis.com/tweet-your-research/)
citations as most of the highly cited articles are published more than two years ago, while the ones showing high altmetrics scores are somewhat new. As the articles included in the analysis have only been released in public for a short while, it could be assumed that they might get cited later, which would mean that the comparison would be different at that time.

### Total and average citation scores per article

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Citations in Scopus</th>
<th>Citations in WoS</th>
<th># of Articles</th>
<th>Average citation per article Scopus</th>
<th>Average citation per article WoS</th>
<th>Average attention score per article</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Sciences</td>
<td>419</td>
<td>207</td>
<td>155</td>
<td>2.7</td>
<td>1.3</td>
<td>4.9</td>
</tr>
<tr>
<td>Humanities</td>
<td>90</td>
<td>81</td>
<td>18</td>
<td>5.0</td>
<td>4.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Sciences</td>
<td>6,991*</td>
<td>6,513*</td>
<td>686**</td>
<td>10.2</td>
<td>9.5</td>
<td>7.22</td>
</tr>
<tr>
<td>Law</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7,500</strong></td>
<td><strong>6,801</strong></td>
<td><strong>859</strong></td>
<td><strong>8.7</strong></td>
<td><strong>7.9</strong></td>
<td><strong>6.75</strong></td>
</tr>
</tbody>
</table>

Table 7: The table total number of citations to all articles in Scopus and Web of Science (WoS), divided by faculty. ** This score includes 334 (49% of total output from this faculty) articles authored by a large group of authors collaborating about data collection and publication. *These two scores include citations to the collaborative articles, which increases the average significantly.

While these numbers are impressive and tell us a story about how the works of PhD students at Stockholm University is received by the readership of the journals where the articles are presented, I would still argue that we have to apply caution before concluding as we cannot claim that the result is absolute. There are other types of information that could be even more useful to understand how a published item reaches an audience, like for example the number of full-text downloads per article, which could further widen the perspective of reach to a specific community of practice. Unfortunately, it is impossible to collect such data on a larger scale from all publishers, as they would not necessarily approve for such information to be shared with the public. Another factor to consider in this context would be those relatively inexperienced and unknown authors such as PhD students might not have gained as much trust in their community of practice as would articles authored by well-known and already recognised researchers in their field.

In conclusion, we can see that the papers published by PhD students at Stockholm University are cited, even if some of the material has not been made available for long enough to show relatively high citation rates. While looking at emerging practices related to digital publications we can also see that items that have been mentioned in social media or other communication channels for scholarly information are more likely also to be cited and to gather a broader readership. To provide some further depth to the analysis of how the interactions related to a publication can say something about the authors’ relation to a community of practice, I will in the next section include a cut-out study associated with a particular article to showcase the different types of interactions. The next section aims to provide a deeper level of understanding for what the measures of such interactions would tell us about the impact of a single article and the research described in it.
Cut-out Study on Article-Level Interactions

Figure 3: The overview of the article included in the dataset with the highest Altmetric score. Please note that this score is extracted May 7th, 2017 and will therefore be different from the data shown in the published dataset, which is extracted October 26th, 2016. All altmetrics are to be seen as snapshots of interactions by a specific date.

This particular case of altmetric data on article level (Figure 3 above and Figure 4 to the left) is extracted from the Explorer for Institutions’ tool as provided for the Stockholm University by Altmetric.com. It shows the number of interactions made to the article with the highest altmetric score of all articles included in this study (Wennström & Schubert, 2017). It should be noted that this screen grab comes from a later date (May 3, 2017) than the summary of the total mention dataset extracted (October 26, 2016).

First, we need to understand what the data view in the database consists of before we can move on to the analysis of the meaning of the interactions. The figure above (Figure 3) shows the total altmetric score for this particular and the ‘donut’ with the colours representing different types of media outlets. This overview in the live database also provides the opportunity to click and drill down on for example Twitter data to provide a list of who has tweeted about this particular item. There are also tabs for detailed information about other media outlets, with links to blogs, Facebook pages or Wikipedia pages etc., which could guide the interpreter of the data to further analysis of how the published article has had an impact in each specific context. It is, again, worth noting here that the score is not meant to measure the popularity of a particular piece of information, but rather to diversify the image of the readership.

The image to the left (Figure 4) shows another view of the same page as the above, where the number of mentions per channel is listed, corresponding to a colour in the ‘donut’. The visualisation is available to the user if they click ‘more’ in the initial view. In addition to this, the article data screen includes a function where the user can get data about
how the article is doing in comparison to other articles within the same academic context. Both these images contain information that could be useful to the individual (especially the authors) trying to understand more of the context in which the work is being discussed, but also to those trying to find relevant articles that are worth reading and share in their network.

It is essential information to factor in the analysis that the longer an article is made available online, the more likely it is that it will get mentioned or cited. This article used as a case example is somewhat unusual in comparison, as its first authors come from the Faculty of Humanities, as most of the other articles in the top 20 sorted by the altmetric score were originating from the Faculty of Sciences. This particular piece of work is a cross-disciplinary project, where researchers from the Department of Archaeology and Classical Studies at Stockholm University (Faculty of Humanities), have teamed up with the Department of Zoology at Stockholm University (Faculty of Science) and Department of Bioinformatics and Genetics at the Swedish Museum of Natural History. Their work describes how to map the genome structures in archaeological findings of a woolly mammoth. The work is published in a context where the infrastructure for understanding the readership of the journal articles is different from what most researchers in the humanities subject areas are used to (see the analysis of mentions in Table 7 above). This particular article is interesting as the PhD student has entered another adjacent community of practice compared to their fellow students in the Faculty of Humanities due to the nature of their area of study. This other community is more oriented towards publishing journal articles, and the article is presented in a context where people share and talk about articles with a different approach than the traditional print distribution of information, which is often the norm within the humanities where researchers tend to publish books or book chapters rather than articles. The high altmetric score is furthermore boosted by the fact that the article got extensive coverage in general media via newspapers and science news sites both locally and internationally. So, we could in this case conclude that more media coverage leads to more interactions with the article. The journalists producing those news items interpreted the article content to be reliable and to be of interest to their audience, and thus chose to distribute the story about the research to a broader readership. An additional factor that may have led to this article being more widely spread is that content is shared with a publishing license that permits free download, which makes available for anyone to download and read. It has been the norm for academic journal articles to only be made available to subscribers, which would typically just be available to researchers from universities where the libraries have provided access. It is not entirely evident in this case that the option for anyone to download the article is a factor contributing to the high score, but it is possible. There is an ongoing debate in the area of scholarly communications where stakeholders would like to open up access to research information (see for example European Commission, Directorate-General for Communications Networks, Content and Technology, 2016) to allow for anyone to be able to read and use scholarly articles. This context is however not addressed in this master’s thesis, even if it is something that I am involved in through my work with publishing at Stockholm University Library. Nevertheless, I have chosen not to include this as a significant parameter in my cut-out analysis, as that would require a different approach to the selection of publications data and the impact of articles outside of their immediate community.

This example of a case where a published article has led to a significant number of various interactions is a way to bring some light into what the data could contribute with to the already existing conversations going on in the networks of the authors of this article and their peers. It could be seen as an example of how the PhD student interacts with their community of practice, to widen their network

40 https://www.altmetric.com/details/3935916/news
or community, and where the data could help this person understand who is interested in their research. Perhaps one of the tweeters will be their next co-author? If we look back at the theories used to describe how we learn through our sociocultural networks, we could see this as a process of participatory appropriation (Rogoff, 1995); where the author is taking part in the publishing activity and adding something to the cultural value of this particular community of practice. The data could then help universities to understand better this process and how they can guide authors (and PhD students) through it to enhance their learning processes. As the data is analysed, it adds something to the publishing process as a situated communicative practice where the student is immersing themselves in the details but also contributes to the advancement of research in their field. The opportunity for the individual and their research group to reflect upon their contribution through data about interactions would provide an opportunity for more in-depth learning and awareness of the process, and this is how I see that the data about interactions could contribute to advancing scholarly communications on several levels.

**Summary of Results & Analysis of Publication Data**

The quantitative data section of this master’s thesis can conclude that most of the PhD students at Stockholm University (70%) choose to publish their dissertation as a compilation of peer-reviewed articles or conference papers. This means that most PhD students are taking part of the communicative practice involved in scholarly publishing before they are awarded their degree. When analysing the data about published articles in peer-reviewed journals, we can conclude that more than half of the papers the PhD students contribute to are being used and interacted with through different types of media, and they are being cited by other researchers. The correlation between articles that receive media attention and that are being cited is significant. This indicates that research done at PhD student level is likely to have an impact in their particular community of practice, and perhaps also elsewhere in society when the article is made available to people outside academia in different forms. These findings can contribute to the understanding of how the work of PhD students can impact or influence the community. Some of the information about how the work is affecting the community of practice can be visualised with data about of how scholarly communication works.
Discussion

This master’s thesis aims to explore the practice of becoming a researcher and the learning process embedded in this activity by looking at the communicative practices of PhD students, regarding their publishing activities. I wanted to understand more about how these students see themselves and what they know about to the community of practice they belong to on a local and global scale to be able to say something about how their communicative practices play a role in their learning experiences.

The combination of theories about personal epistemology with sociocultural aspects of learning has been key to understanding the findings presented in this master’s thesis. The arguments are here related to the choice to share something publicly through scholarly communication, which is intrinsic the act to open up for others to scrutinise the work via peer-review and publishing. The drivers behind this act can be tested by mapping the epistemological thinking of the individuals while they relate to their research and its context, as the development of epistemological beliefs is influenced by experiences. The mature epistemological belief about communicative action includes the notion that the individual has something to say about the matter in question, and this is expected to occur when said individual has the confidence to tell others that they have reached a certain knowledge level in their field. Basically, the students have to believe that they know something to claim to others. This sense of self, or the awareness of one’s knowledge, is a crucial factor when it comes to opening up for communication within a specific context, as shown in the study by Baxter Magolda (2002). More learning then takes place in these settings, which became evident in the interviews, which could serve as a sample of the context the PhD students are acting in. The sense of self and the drivers behind the students’ actions have been revealed in the interviews, and the findings suggest that while they are insecure about their role as scholarly communicators, there is still an eagerness to learn and understand more and they see the publication process as something essential to decipher. Motivational factors seem to be advice from senior colleagues and supervisors, but also to contribute something significant to their field of research, and to figure out the best way possible to achieve that goal.

More, the act to communicate something also has a sociocultural aspect to it, depending on what is relevant to each’s community of practice. The analysis of data about the current practices of the PhD students at Stockholm University, about where and how they choose to communicate their results. The data about interactions with publications also gave us a hint about how these publications are received by the community of practice. The aim to map the landscape of how the students’ act can thus serve as a basis for further studies, as the respondents would probably be as interested as I am in understanding more about what these numbers mean to them and their future decisions about their career.

Publishing as a Learning Process

Findings in the interview material seem to indicate that the students are getting most of their articles written and published after more than half their time at the university, which means that that part of the essential learning process is delayed. The postponed action, depending on different drivers, could explain why some PhD students feel hesitant towards the practice of publishing, as they are not sure or convinced about how their action will influence their epistemological process. It is not necessarily so that the goal for PhD students studying at Stockholm University should be to publish more. However,
the combined learning possibilities of how the epistemological development seem to be related to the result of the sociocultural learning are depending on the students’ understanding of the processes they are involved in, which could suggest that progress is inherent in the action to publish. If so, the results could suggest that it would be useful for the students to become more aware of their possibilities, despite the uncertain outcome of each specific action (as it is not guaranteed that they will be published on each attempt). The publishing activity could thus lead to increased knowledge for individuals about how their actions are contributing to an expected result, but also help them become more aware of what it means to communicate scholarly information in general, which is a required skill for the PhD degree (Ministry of Education and Research, 1993). Nevertheless, in the interviews presented in my study, the students indicate several reasons for why they doubt that the publishing process is meaningful and that it is something they ‘have to’ do to follow the norm. The interviewed PhD students still consider themselves in the early stages of their career and do not feel they have anything to add to their field yet. The students also seem to believe that they know very little about the publishing process itself or what it means to them personally. However, to assist the students to better understand their own actions, the data about how publications could be used to indicate how the process in itself might be useful. The publication data could become means of understanding more about the context in which the individuals are acting, which could contribute to enhancing the learning process related to publishing, which may, in turn, lead to personal development to the next level of epistemological understanding. The low number of publications produced by some groups of PhD students in my study indicate that there were not enough incentives to encourage the students to publish and learn by interacting with their context, as the average ratio of publications per student during a three-year period is only 0.5 (see table 5). Further incentives to publish would be required if the university would like to lower the threshold for students and instead trigger them to publish by supporting teleological acting (Habermas, 1984). The individuals would probably be more inclined to follow the advice if they see the act as useful to them personally. Properly designed incentives could also, it seems, provide tools for universities to analyse the communicative practice and the impact it has on both the individual as well as their community of practice in a structured manner using data about publications such as altmetrics. Increasing the motivation for PhD students to publish is something universities could look further into if they want to encourage young researchers to engage in communicative action. The data provided in this master’s thesis is, however, not indicating how future measures of publishing activity should be designed and communicated to the target groups. Nevertheless, I am hoping to inspire future studies on the correlation between interactions (i.e. shares, downloads, mentions, blog posts, etc.) and citations. Such reports could lead to a different view of what is considered to be impactful research and how the knowledge on what creates impact could be used to increase the learning for involved individuals.

**Supervision and publishing support to facilitate choices**

Further arguments for the usefulness of publishing as a learning process is that the state of epistemological thinking of the PhD students just before the examination could be seen as a transition towards the next level of personal epistemology. This state exerts a strong influence on the texts the students produce for publication and their know-how and capacity to be strategic in this process, which is also described by Barbara Kamler (2008). The current practices of scholarly communication, however, is something that can be argued to suffer from inertia due to the routines used in the process as they risk becoming too instrumental and not adjusted to the meaning-making process of sharing results with the world. Many researchers complain about the difficulty to get published, and the contradictions of the system described as ‘publish or perish’ (see for example Linton et al., 2011). An
example of how publishing is turned into an instrument without meaning to the individual would be for someone about to get published to concentrate on adjusting the manuscript layout, rather than thinking about what is essential for the readers of the journal and what they need to understand better the research presented. The reason for publishing should thus not be for the sake of statistics and scores or to fulfil a quota, but because the persons writing the piece have something to say about a phenomenon in the world that they have examined thoroughly and want to discuss with others. However, the learning process that PhD students go through by immersing themselves in the context of their specific subject area through publishing does still seem to have some kind value for the individual as they keep doing it despite all the difficulties. Suggestions for future PhD supervisors, according to my results as well from previous studies, would be to stake out the territory and take the lead in developing learning tools or processes related to publishing to provide a more productive and meaningful learning environment for the researchers of tomorrow.

The idea to become more involved in the publishing process and the evaluation tools related to this activity could, furthermore, be supported by one of the values of sociocultural learning which is that the learners themselves play an important role in changing the context they are acting in. They are participants but also contributors and should thus be given sufficient support and tools to navigate this area of learning with confidence to make informed decisions for themselves. Learning is, from a sociocultural perspective, a complex web of collaborations, connections, situations, context and seized opportunities. PhD students learn in a varied setting, where colleagues play a vital role. However, this fact does not seem always to be valued appropriately or analysed but rather seen as something intrinsic in the process in today’s PhD programs without proper support. Applied to the project I am working on; one could argue that the process of ‘participatory appropriation’ (Rogoff, 1995) help describe how the students go through cognitive development by participating in the ongoing work at academic institutions. One could assert that the education to become a professional academic where the individual has to become a part of the context they are trying to belong to should be addressed at an early stage to enhance the learning process. The socialisation process required for a meaningful learning process to take place is, however, not an easy endeavour as the academic culture can be tough, and it is likely that there are several communities of practice to adjust to within each research field for the individual. This was also mentioned by several informants during the interviews for this study. The education of a researcher is thus inherently a sociocultural activity, where the student gradually gets educated by participating in different communities of practices. One of the tools they use during this activity is to be publishing their results as conference papers, journal articles or book chapters, a process where they in collaboration with others learn to develop communication skills reach the next level for themselves as academics while at the same time contributing to further development of the discipline they are immersed in. The students should be given more opportunity to create awareness of how they can continue to transform their activity into knowledge over time. In my study, I wanted to examine how they utilise their skill set related to publishing or communication. The results of my research, from a personal, interpersonal and communicative learning aspect (Rogoff, 1995), seem to support this assumption. However, more extensive studies are needed to confirm that more awareness about publishing and the learning processes involved in this specific activity contributes to further development for individuals.
Publishing as a Community of Practice

Understanding the way in which publication in academic journals serves as a situated learning process is interesting because a PhD degree requires the students to engage with their community through scholarly communication. However, it takes confidence for the individual to present their research results in a community of practice, which is also connected to their personal epistemology. The process of learning by publishing could, however, also be explained with theories about ‘legitimate peripheral action’ (Lave & Wenger, 1991). From this perspective the students become a part of the context as they are at the same time co-creating it. Based on the statements of the students in this study, they seem to experience to be working in a sort of binary relationship with their supervisor, where they are depending on approval for everything they do. Alternatively, they discuss their work within a study group or at the department or faculty to become a part of a community of scholars gradually, but they might still not be prepared to overcome sometimes harsh critique given by reviewers of an academic journal, and this could be counterproductive for their learning process. One of the students in this study even refers to the review process as a form of ‘hazing’ on occasions, meaning that the peer comments can be unkind or unhelpful.

However, the publishing process where the student has the confidence to take in constructive comments from other subject area experts is still the best way to get formative comments from people outside of a close and well-known peer group. Most scholars would probably agree that it is a good idea to include as many perspectives as possible when conducting research, so the view from outside the immediate peer group could turn out to be the most relevant. In an article by Lee & Kamler (2008) this is referred to as a ‘horizontalising’ process, where the students get acquainted with more experienced researchers, at the same time as they are engaging in a network of researchers which they want to become a part of themselves. If the students get their article accepted for publication, they are likely to be invited to become reviewers in return (a common practice among academic editors to grow the list of eligible reviewers for a journal). Such methods give the PhD students an opportunity to further engage with the community to the benefit of their academic career and to becoming a part of a greater context. In a sense, the learning process thus becomes more of a collaborative process on the same level, rather than a hierarchical one that they sometimes experience with their supervisor (who often serves as their manager in the work role as well). So, while the publishing process can be painful and unhelpful, it could also offer opportunities for sharing knowledge and scientific arguments from different perspectives.

But how valuable is this learning process while entering the world of scholarly communication, and how can you become more aware of its dynamics? I would argue that the publishing process does not end with the acceptance letter to get published; it continues as peers are using for examples articles or book chapters (or research data collected by others) when making further arguments or investigations, i.e. citing papers in their list of references. This practice to reuse or refer to arguments made by peers is something that is significant for the academic community and something that places the work done in a context. While academic publishing is turning into something almost entirely electronic, we see an emerging practice among researchers to recommend scholarly content to colleagues via sharing in social media tools to let others know what they are currently reading or thinking. Both citations and social media sharing generate data that could be used to describe the users’ behaviour. The data generated about the publishing culture thus provides an opportunity to show another dimension of the sociocultural learning process involved in understanding the data about social media interactions is used to analyse the practice of recommending reading to others. The learning could be seen as intrinsic in the social practice of meeting other researchers through the publications they produce.
(Lave & Wenger, 1991). When the students’ work is published online, we can add the dimension of following the readership while they link to, recommend, cite or blog about the work to further place it in the academic or public context.

However, while using this information about interactions, it will be important to discuss the meaning of the actions that lies behind it and understand the full potential of data about actions and how meaningful this is to the individual. In the end, it will be up to them to take the learned lessons to construct meaning in future situations where they are set up to do the same tasks but in a different context. To do so, the students need to be aware of what their communicative action may lead to, and they also need agency or confidence to act and to continue co-construct the future context together with their peers. Or, as Lave & Wenger put it: ‘The generality of any form of knowledge always lies in the power to renegotiate the meaning of the past and future in constructing the meaning of present circumstances’ (1991, p. 34).

The instability of the process of becoming a PhD is influencing the narratives of the individuals interviewed in my study. Whether or not the uncertainty in their environment is perceived or lived does not necessarily matter, as they all continuously contribute to either maintain or chance this state through interacting with their surroundings. However, if they don’t think they know anything about the context if they don’t recognise their epistemological beliefs in the mix, it is likely that learning is impaired. There needs to be space allocated for the PhD students to reflect on their knowledge to tap into the learning mechanisms that will lead to further understanding of their place in their context. The data from the interviews, from the publishing statistics and other sources such as the survey by Charpentier Ljungqvist (2014) seem to highlight the fact that the state of reflection is not always given a proper space in the PhD education at Stockholm University. However, this seems to be different depending on which department the students belong to, so we should be careful to draw any significant conclusions about making changes to the current educational plans. Nevertheless, we need to help the students create the space for reflection in-between their social context, and their motivation, as the intrapersonal and interpersonal dimensions, is intrinsically intertwined. Such space for contemplation could be achieved by the use of data as means of creating awareness of how scholarly communication works and how the new information contributes to the existing body of knowledge. Building confidence and a stable sense of the self could assist this process and allow for the students to become more self-reliant and create a space where their success is less dependent on the relationship with one supervisor or group of supervisors.

So, if we were to create a better understanding for students about how to reach the intended readership of an article or a book and how to share it in different media, it could open up for a possibility for the publishing process can be used as a pedagogical tool to a greater extent. As such it could add several dimensions to the sociocultural learning process if the individual could gain experience outside of the local peer group. Innovations such as publishing papers ahead of the editorial process, so-called preprint publishing41, where the work of researchers is shared openly at an early stage in the publishing process have a prospect for the writer to involve supervisors, study groups or peers in the learning process while they are still working on their article. However, to use this opportunity to further understand the social aspect of this particular learning environment to its full potential, it would be useful to take a closer look into how data about publication could further enhance the understanding of the social nature of scholarly communication.

41 https://en.wikipedia.org/wiki/Preprint
Enhancing Understanding of the Publishing Community with Metrics

Collaboration between researchers, and in particular between PhD students and senior researchers, is often seen as a good thing, but how does collaboration influence the learning at an individual and group level? What is it really, beyond citations and impact factors and lists of published items, that drives anyone to get scrutinised or rejected to share their findings with a selected audience? If we see the process of getting a doctoral degree as a kind of participatory appropriation (Rogoff, 1995), where the PhD students are immersing themselves into the academic community as their life world, then the universities should be supporting legitimate peripheral participation (Lave & Wenger, 1991). The collegiate is already helping the individual in many ways through supervision time, study plans and well-designed courses. Another example of this participation is a when supervisors co-write papers with their PhD students or guide them through the process using their knowledge and experience in the matter. However, as Lave & Wenger (1991) point out, if we want to measure this participatory action (or at least the outcome of it) it would be required that we understand more about the social world that the students are acting in. So, one way of knowing more about this world could be to use data about interactions with the students’ publications to analyse the collaboration with their community of practice. In this study, I have attempted to do this by using altmetrics data. If we agree with the claim that the awareness of one’s learning process and epistemological beliefs enhance learning, then the data about interactions could provide a potential platform for creating an awareness of one’s position in the context.

Figure 5: A description of how alternative metrics could serve as a tool for understanding the intercept between discourse practice and sociocultural practice, adapted from Thomson & Kamler (2003).
To better illustrate how the data, or metrics, about publications could contribute to creating awareness of learning involved in publishing processes, I would like to suggest a slight adjustment of the model of discourse practice and sociocultural practice of publishing a PhD thesis as described by Thomson & Kamler (2013, p. 32). If we use the metaphor of a Russian matryoshka doll, in this case shown as squares within squares in the figure above (Figure 5), to describe how the layers of the social world of the PhD student is constituted. The magnifying glass is a metaphor for the possibility to zoom in on the intercept between the specific community of practice and the more general sociocultural norms and values with the help of metrics that describes how the individual is interacting with both the closer community as well as the general context. This image is thus an attempt to explain further what the altmetrics or other metrics about publications could contribute to the learning process.

More significant and in-depth studies are, of course, needed to investigate this suggested connection further to understand better what the data mean. It is not necessarily a question of having the most mentions or citations that would indicate whether or not a researcher has succeeded in communicating the results of their work. We would need to figure out what the real social value of for example the sharing of an article on Twitter, or if the results are mentioned in the news. We would also need to agree within each community what the aim of communicating research is, to give any measures of the action proper meaning. Such knowledge could suggest that there are ways of moving away from the understanding of success commonly referred to as ‘publish or perish’ and instead focus on something more like ‘publish to participate’, where the process of getting published and interacting with the greater research community could have value as a learning goal in itself. The idea of publishing as learning platform could be further supported by the theories about participatory appropriation (Rogoff, 1995), where the altmetric data could serve as indicators of successful participation in the community and reveal patterns of meaningful action. Although, we would need further analytic elements to understand the entire context and process to make this work, as I have mentioned above. It is not enough to study interview material including views of just a few PhD students from only two different faculties like I did. Mapping the epistemological beliefs and motivational beliefs of a larger group of PhD students would be needed to draw such conclusions. This thesis represents the first attempt to try to open up for new interpretations of how apprenticeship is developed in academia, and how the guided apprenticeship is taking place. However, I’m hoping that my findings could give indications for further and more extensive studies to understand more about this complicated matter.

Altmetrics Data as a Driver for Development of Personal Epistemology

While looking at the altmetrics data as a means to further understand the learning from a sociocultural perspective, it could also be useful to look at the opportunities for individuals to develop awareness of their personal epistemology. As noted during the interviews, the PhD students say that they experience knowledge gaps between what they know that they know, and what they think they should know, or what they do not know that they know. They seem unsure of who is in charge of their process of becoming more knowledgeable and what to do next; are they passively receiving information from more senior colleagues, or should they be constructing new knowledge together with their peers? This uncertainty has an influence on their learning process which is not necessarily a positive thing as the approach to the challenge is usually different depending on the individual’s state of mind. The nature of this problem is inevitably complex, as it is hard to generalise results of the highly individualised training to become a researcher. However, the paradigm of scholarly communication could also be
analysed from an epistemological perspective, looking at parameters indicating levels of for example confidence to express oneself in a group of other more experienced colleagues or how open the individual is to receive comments from peers.

The view of the importance of scholarly communication varies significantly across academic disciplines and institutions of higher education. Some research units and funding agencies seem to be using models of measuring the progress of communicative action that seem to mostly be nurturing the elite, where for example only the most cited papers are counted towards a researcher’s good reputation. But do these practices encourage well performed methodologically sound and meaningful basic research as well? How does that support education of new generations of researchers? Usually, it takes two to three years to get useful statistics about citations, which means that articles published by PhD students would not be measurable by their citation rate until long after graduation. The individuals including in this study indicate that they would not be releasing any articles during the first half of their PhD program, and if other study programs work in the same way, this would further enforce that it is not useful to make any conclusions about their citation rate. Measuring of success for this group of students only by utilising the number of citations might therefore not be a realistic model, even if the university uses that method to measure publications in general.

But, how could we understand more about how publishing activity could influence the learning process of these individuals? The alternative measures of influence in society, such as altmetrics, could be a better tool to understand the impact of research by PhD students, but also give something back to those who engage with the results. The examples of altmetrics data shown in this study could prove to be helpful to respond to some queries about external motivation and feedback related to ongoing research and its usefulness to society and the development of epistemological beliefs. As the view of one’s knowledge, or personal epistemology, is contributing to learning in a deep sense (Hofer & Pintrich, 2002), it could be argued that if the students had access to more information about how their publications were received in a context; this could give them a better understanding of how they can relate their readership. In this way, publishing fosters dialogue to understand the complexity of a context, and how the individual and their work has a space within the respective discipline. Such activity would facilitate the move from an epistemology focused on dualism, where the individual believes that information is entirely right or entirely wrong; to a more complex epistemological stance where the state of things is relative to the context. The next epistemological level would allow solutions to be both right and wrong depending on the theories or methods used to present the results of research. The information that can be retrieved from metrics could thus facilitate the understanding of the individual’s contribution to the discussion in their field as the data on article level can reveal where their readers are situated, how many they are and if they recommend reading to other colleagues. This information has a potential to influence how the students understand the world, and by that also develop concepts of knowledge and knowing that can take them to the next epistemological level.

Lastly, I want to add a dimension about to the above argument, about a more open scholarly communications landscape. One could anticipate that the practice to open up access to publications (and data about them) outside of the academic libraries, it is possible to make the pattern of actions more visible for everyone to understand more about how scientific information is distributed globally as well as in a specific community. One example of how this can be done is how we managed the dataset used for this study, by publishing it on an open platform for research data (Wennström &

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42 https://en.wikipedia.org/wiki/Citation_impact
Schubert, 2017), providing a version open for scrutiny and for reuse by others if someone wants to conduct a similar study in the future. The data can be used for comparison or to add dimensions to my arguments. The practice of opening up access to data and publications could further empower PhD students and researchers to understand their discourse better as they will have access to more information and by that perhaps contribute more to the collective learning through participatory appropriation. If the act of sharing information becomes more meaningful to the individual by giving them more data about how their work is reused could, hopefully, lead to publishing activity that becomes more meaningful and less stressful to the individual. If we make it easy for the students to do the ‘right’ thing, i.e. to publish and to do it openly, it is likely that they will follow the path of least resistance. Or, as Habermas describes the process: ‘The rationality of their expressions is assessed in light of the internal relations between the semantic content of these expressions, their conditions of validity, and the reasons (which could be provided, if necessary) for the truth of statements or for the effectiveness of actions.’ (Habermas, 1984, p. 9).

**Methodological Remarks**

The results of this study are not entirely conclusive, as the sample of individuals chosen for the interviews are not the same people whose publications I have measured so that no causal effect can be measured. The method for connecting the actions with the results of the actions could have been taken to the next step if that had been a possibility. That would have created a better basis for a mixed methods approach that would render a more valid result. However, to track down PhD students that graduated several years ago was not possible within the scope of this project. The methods for analysing data about publications could also be further refined, but that would also require an overview of what the university is considering to be of value to align the results with the requirements.

**Conclusions**

The process of publishing is related to the learning process of becoming a researcher, both regarding becoming a part of the community of practice as well as by creating awareness of the individuals’ personal epistemological beliefs. A better understanding of this practice could further enhance learning for PhD students and increase awareness about what in the process of learning is vital so that the individuals can better plan their studies and communication activities, where the practice of publishing is one part. Becoming more in tune with the concept of knowledge and knowing, in general, seems to be a fundamental concept both on an institutional as well as individual level.

Some conclusions can be made concerning the research questions asked at the beginning of this project:

- The first conclusion is that the majority of the PhD students at Stockholm University publishes their research findings as scholarly articles in English that they collate in a compilation thesis. They publish articles both in collaboration with others as well as single-handedly. However, many students would instead publish monograph dissertations in Swedish, when for example the research project is mostly focused on phenomenon relevant to Sweden.

- The second conclusion is that the communicative practices can be understood as pedagogical tools as they provide a vehicle for PhD students to immerse themselves in the context that they are trying to understand. The communicative action triggers learning in several ways, such as
learning how to write an academic article, learning how to get an article accepted for publication and learning how to get constructive feedback by reviewers of academic journals. The participatory nature of academia serves its purpose only if the PhD students dares to challenge their current epistemological beliefs to gain more knowledge about their learning processes. The publishing process has a potential to increase in importance as a tool for learning how to be a researcher, as it provides a framework of guidelines, communicative platforms and values that could follow the doctorates throughout their entire continued career.

From the data and theories in the exploration of communicative practices among PhD students at Stockholm University it is also possible to draw the following further conclusions, that I did not expect when mapping out this study:

- The interviews showed that PhD students don’t currently see writing for publication as a learning process, or something that will give them the confidence to continue to do research, but rather something that is inevitable for the examination. They think the ‘real’ research is going on somewhere else. However, collaborative learning through guided participation in communicative practices seems to create impact, as more people will be interested in communicating the results of the knowledge they have gained and feel comfortable sharing.

- The data I have collected in interviews show that these PhD students seem to be representing the majority of their cohort, as their statements confirm findings from larger surveys. The students’ show a willingness to learn more about how they can interact with their research area has a potential to support internationalisation of research, but also to find academic or professional collaboration outside of the immediate community. The results also indicate that it would be relevant for students to get more support to make the right choices and to keep up to dates with trends in publishing, as the scholarly communications landscape has changed considerably in the past ten years. It is vital that they can be taught to make their own decisions rather than relying on information from others without the tools to reflect upon the consequences of their action.

- Furthermore, it is hard to apply quantitative measures to evaluate effort and impact on an individual level, which would be required if only numbers, algorithms and scores were used to assess the work of PhD students. The measures of interaction used in this study are not absolute, and they change over time. Any measure would therefore only give a snapshot of the entire picture of impact or reach or spread of knowledge at a given time. The use of metrics as part of the evaluation of the quality of academic work should be taken into consideration when referring to weighted scores. As we gain further understanding of how the content generated by PhD students is used on a larger scale, utilising metrics about publications, we could become more aware of how the creating of knowledge takes place in many places outside and inside the higher education institutions.

Theories about sociocultural aspects of learning would not give a complete answer to why PhD students share their work in the form of publication, nor would any solutions including theories about personal epistemology. The reward of getting published is not just about the feeling of having something to add to the academic conversation in a community of practice. The individuals’ intrinsic motivation in communicating research results that they feel certain about could, however, also serve as an individual drive or motivation, which could be explained by theories about personal epistemology. This motivation has a potential to lead to deep learning that could perhaps inspire the design of the entire educational program for PhD students in the future.
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