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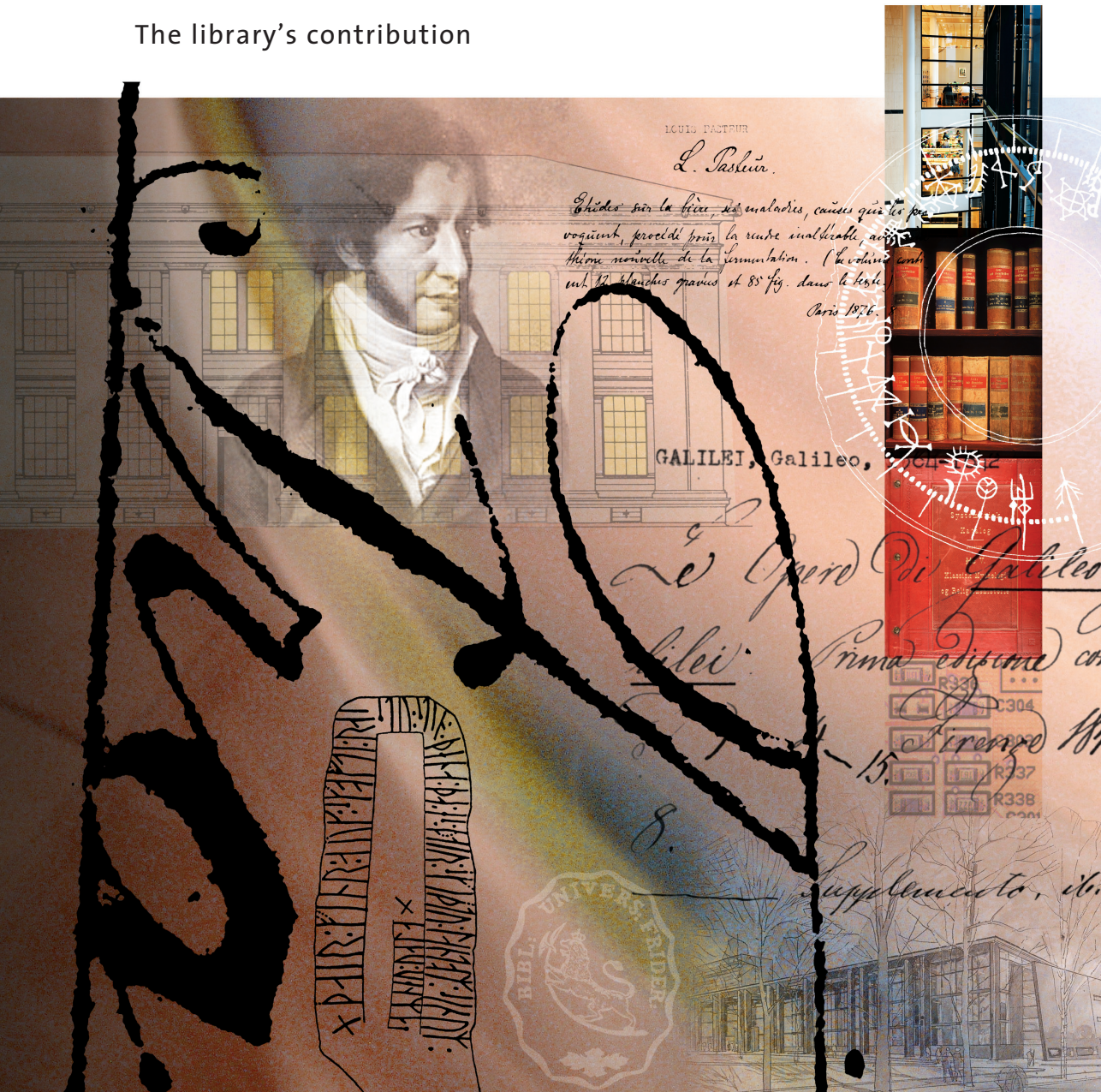
Eystein Gullbekk, Tove Rullestad,
Maria Carme Torras i Calvo

PhD candidates and the research process

The library's contribution



PhD candidates and the research process:

The library's contribution

Edited by:
Eystein Gullbekk, University of Oslo Library
Tove Rullestad, University of Bergen Library
Maria Carme Torras i Calvo, Bergen University College Library

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Bente R. Andreassen

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Astrid Anderson
Anne-Mette Vibe

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About the *Information Management for Knowledge Creation* project

This report presents the results from a literature review and a focus group study of the relationship PhD candidates have to information management and higher education library services. The study has been completed as part of the on-going *Information Management for Knowledge Creation* (2010–2013) project. The last phase of the project will focus on developing online training modules for PhD candidates.

The project is a collaboration between the university libraries in Bergen, Oslo and Aalborg; the NHH library; and the Bergen University College Library. The project receives funding from the National Library of Norway.

The project group that has produced this report consists of:

From the libraries at the Bergen University College, University of Bergen and NHH:
Gunhild Austrheim
Ingrid Cutler
Hege Folkestad
Fredrik Kavli
Susanne Mikki
Tove Rullestad
Maria Carme Torras i Calvo (Project Manager phase 1)

From the University of Oslo Library:
Gisela Attinger
Eystein Gullbekk (Project Manager phase 2)
Kirsten Borse Haraldsen
Hege Ringnes
Therese Skagen
Hilde Westbye

Fra Aalborg University Library:
Mia Bech

Contents

1 Introduction and reading guide

This report is part of the *Information Management for Knowledge Creation* project. The overall goal of the project is to strengthen library support to doctoral programmes in the Higher Education sector by developing evidence-based teaching and training modules that can be offered in seminars and online. The project has the following specific goals:

1. to provide libraries in the higher education sector (HE sector) with updated information about the information behaviour and needs of PhD candidates
2. to develop freely available online training modules that can be used by all interested libraries in the HE sector
3. to give all libraries in the HE sector a flexible training model in English, tailored to PhD candidates in various disciplines
4. to contribute to highlighting the role libraries play in the PhD candidate's education and research process, and to ensure that libraries remain relevant to both

The project consists of four phases: a survey phase, a development phase, an implementation phase, and a dissemination phase. This report is on the results of the survey phase, and thus primarily relates to the first subsidiary goal.

1.1 The information behaviour and information literacy of PhD candidates

In recent years, many university and University College libraries nationally and internationally have focused on developing training that aims to strengthen the information literacy of students.

However, until recently, less has been done to develop knowledge about the information behaviour and information literacy of researchers and PhD candidates, and to translate such knowledge into services for this target group. In this project, we examine the information behaviour of PhD candidates, and focus on their information literacy as it relates to their research training.

Definitions of *information literacy* can be roughly divided into two categories. One relates to the functional definitions that centre on individual's needs,

knowledge and competencies. The most well-known definitions of this kind can be found in framework statements such as *Information Literacy Competency Standards for Higher Education* (ACRL, 2000). Here, information literacy is defined as having the knowledge and skills to be able to acknowledge when information is necessary and to have the ability to find, evaluate and use the information effectively. This definition sees information literacy as consisting of a set of generic skills that are context-independent. Such competencies are also important when setting goals for doctoral programmes. The League of European Research Universities (LERU, 2007) sees PhD candidates' development of generic competencies in research methods, academic writing and communication, application writing, and teaching and supervising students as important markers of the quality of doctoral programmes. In the *Nasjonalt kvalifikasjonsrammeverk for høyere utdanning i Norge* ('National Qualifications Framework for Higher Education in Norway', Ministry of Education and Research, 2009), publishing skills and the ability to highlight one's own research are seen as central learning outcomes for doctoral programmes. The Framework states, among other things, that a PhD candidate (see 'third cycle') who has completed their degree

- is at the forefront of their subject area, and masters the subject area theories and/or artistic questions and methods
- can evaluate the appropriateness and usefulness of various methods and processes in research and in academic and/or artistic projects
- can contribute to the development of new knowledge, new theories, methods, interpretations and forms of documentation within their subject area
- can disseminate research and development through highly ranked national and international channels (Ministry of Education and Research, 2009, p. 1)

An approach to research training outcomes that incorporates an understanding that information literacy is formed differently in different contexts (for example in different academic disciplines at universities and university colleges) can be found in the relational model. This model also includes a wider perspective than those that only emphasise the awareness, knowledge and skills that individuals have. It moves away from the premise that skills are necessarily transferable across contexts. In a discussion of theories of information literacy, Whitworth (2009) argues that information literacy should not only be seen as a set of skills, competencies and characteristics, but rather as a set of methods for interacting with information. According to Whitworth, this set can be understood in the light of Bruce's framework: 1) information literacy is knowledge about information, 2) it is a set

of skills, 3) it is a form of learning, 4) it is a context-dependent social practice, and 5) it is a set of social power relations that also includes social responsibilities. Information literacy is also 6) having experience of the variety and complexity involved in searching for, using and evaluating information once the first five frameworks are combined. These six frameworks constitute a definition that leads us to see information literacy as skills, knowledge and attitudes that are inextricably linked to learning within a social context.

Within this relational framework for understanding information literacy, we want to take a closer look at the target group's information *behaviour*. Information behaviour can be defined as encompassing "[...]information seeking as well as the totality of other unintentional or passive behaviors (such as glimpsing or encountering information), as well as purposive behaviors that do not involve seeking, such as actively avoiding information" (Case, 2007, p. 5). We are interested in how PhD candidates search for information, how they select and evaluate information, and how they publish.

1.2 Questions

The Libqual studies that were conducted in Norwegian libraries in 2009 showed that researchers believe that good access to literature is crucial to their work situation (Association of Research Libraries, 2009). However, the studies tell us little about the methods the researchers use to identify relevant scholarly literature, how they orient themselves within the available academic information and literature, what knowledge they have about the tools that are available for literature searches and which skills they have in using these, or what kind of overview they have of their own access to academically relevant information and literature.

This report contributes knowledge about the target group's information behaviour. The goal is to produce systematic knowledge that can form the basis for the development of appropriate courses and counselling services.

In order to remain within the framework established by Bruce, we ask:

- What *knowledge about information* do the candidates use when they select tools and methods to find information?
- How do they distinguish between relevant and irrelevant information?
- Which *searching skills* do they have to help them effectively orient themselves within scholarly literature?
- How do the candidates' knowledge about and skills in information searching affect the *learning* that their doctoral programmes aim to achieve?

- How does the candidates' information behaviour relate to norms for academic *practice* within the relevant discipline?
- How can we describe *variations* in their information behaviour by seeing these questions in relation to each other?

The project survey phase has consisted of a literature review and qualitative interviews. The survey that is conducted in the first project phase shall form the basis for the development of training modules. The contents of the training modules shall address questions that PhD candidates in different disciplines find relevant to their research processes.

The literature review has helped shape the qualitative interviews. The interviews have consisted of three focus group interviews with PhD candidates from various disciplines at the universities in Bergen, Oslo and Aalborg, and two focus group interviews with PhD supervisors at the universities in Oslo and Aalborg. The topics in the focus group interviews included the PhD candidates' information search behaviour and needs, and their relationship to publishing and disseminating their research results.

1.3 Organisation of the report

The report is organised as follows:

Chapter 2 presents the literature review. The chapter focuses on data from international scholarly literature on various aspects of the candidates' information behaviour and experiences with academic information services. The contributions from the academic literature were selected through a *scoping literature review.* We explain this method in the chapter before we present and discuss the selected literature. Each section concludes with a list of points that summarises central findings.

In *chapter 3,* we present our findings from the focus group interviews. In the chapter, we first explain why we chose to use focus group interviews and then present central findings related to the candidates' information behaviour. We identify seven main topics based on an analysis of conversations from the focus groups with PhD candidates and with supervisors. Each section concludes with a list of points that summarises central findings.

In *chapter 4,* we present recommendations for the libraries' development of training and counselling programmes and materials for PhD candidates. The findings from the focus group interviews and literature review confirm, elaborate on and bring nuance to each other, and the recommendations are formulated based on the relationships we identify between the two studies.

The report concludes with *chapter 5*. The chapter summarises chapters 2, 3 and 4, and addresses the questions we ask in the introductory chapter.

The report can be read in multiple ways. We recommend that the reader first looks at the summaries of chapters 2 and 3. The reader can then move on to chapter 4 and read our recommendations for the libraries' future work on the development of training and counselling. For more in-depth information about the basis for the results, the reader can then read the report in its entirety.

2 Literature review

Gisela Attinger, Gunhild Austrheim, Ingrid Cutler, Hege Folkestad, Kirsten Borse Haraldsen, Fredrik Andersen Kavli, Susanne Mikki, Therese Skagen, Hilde Westbye

In the work on developing services for PhD candidates, it is important to build on existing knowledge and experience. The literature review has been an important part of the first phase of the project, as it allows us to get an overview of existing publications in the field. The purpose of the literature review and the focus group interviews is to provide input about what the training modules should contain and how they can and should be designed. The literature review has been produced by a subsidiary group of nine project members. Four research questions were prepared:

1. What information needs do PhD candidates have, what types of information behaviour do they engage in, and how do information needs and behaviour vary between the candidates?
2. How do PhD candidates and junior researchers publish, and what is their bibliometric performance?
3. What services and trainings do libraries offer to (budding) researchers?
4. To what extent is plagiarism a problem at this level?

The fourth question may be included as a subtopic in the first three questions. There was little information about plagiarism in our materials. The first three questions form the starting point for our report. Each question is discussed in its own section.

2.1 Literature review method

It has been important for the project to find the most relevant literature and to form a broad, interdisciplinary picture of existing knowledge. There are many different ways of conducting literature reviews, as for instance Grant and Booth (2009) show in their review of these methods. We wanted to conduct a literature review that could include a wide range of available literature and at the same time give us the opportunity to compare studies with different contents and research design. A *scoping literature review* (Arksey and O'Malley, 2005) was selected as the literature review method. We found this method to be appropriate as it

emphasises surveying a large thematic area. At the same time, the method enables the collection and comparison of data sets from different sources and with different research designs. This contrasts with other literature reviews that require that the included studies have similar populations and the same research design. The method generally relies on the following approach: identify research questions, identify relevant studies through searches and contact with central persons in the research community, selection of studies and mapping of data.

2.1.1 Inclusion and exclusion criteria

As the goal of our literature study was to include a broad and diverse selection of literature, we relied on relatively wide selection criteria. We mainly used general evaluation criteria. At first, all included studies were to focus on PhD candidates. However, this criterion was later revised in relation to the literature on publications and bibliometrics. The references consisted of literature in Norwegian, Swedish, Danish or English to allow everyone in the project group to read it. Additionally, the literature had to be from 1990 onwards.

2.1.2 Database list and the implementation of searches

Relevant databases were selected with a starting point in the four questions we were asking. Searches were conducted in multiple databases for various disciplines. We wanted to cover multiple disciplines in order to see whether differences had been identified in PhD candidates' use of literature and information.

Article searches were conducted in general databases such as ISI Web of Science, Scopus and Google Scholar. The LISA and LISTA databases were searched for materials from library science, and the ERIC database was searched for materials from education. Cinahl, PsycINFO and PubMed were searched for materials from the health sciences. Within the natural sciences, we searched Biosis, Asfa and Zoological Records For economics; we searched Business Source Premiere and ABI/Inform. The search and alert services were active between June 2010 and the end of October 2010. The Scandinavian library catalogues Bibsys, Libris and bibliotek.dk were searched for books.

The search strategy was developed based on the research questions and reflects the wish to include a wide range of topics in the PhD candidates and libraries field. The user group and each topic area were allocated specific search strings. An overview of the themes of the literature review is shown in table 1.

During the search it was decided to do a broad search within the identified themes, and then connect the search to the search string that was developed for the PhD candidate (phd* OR doctora* OR postdoc* OR "post doc*" OR "post-doc*")

with the use of an AND combination. During the preparation of this search string, it was decided to exclude keywords such as 'post-graduate' and 'graduate student' because these concepts can be used about any student that has completed a degree. In retrospect, we have been made aware that the term 'research fellow' could have been included.

Table 1. Themes of the literature review with associated search string

Theme	Keyword/Search string
PhD candidate	(phd* OR doctora* OR postdoc* OR "post doc*" OR "post-doc*")
Information literacy, user training and bibliographic instruction	("information literacy" OR "user education" OR "user training" OR "bibliographic instruc*)
Information behaviour, search behaviour and user studies	("information need" OR "information behavio*r" OR "user behavio*r" OR "information seeking" OR "information search*" OR "database search*" OR "search* strateg*" OR "user stud*" OR "information retrieval" OR "reference chasing")
Library services	("information service*" OR (reference AND (service* OR interview* OR encount*)) OR "library service*" OR "academic librar*")
Publication/citation	(Scientometr* OR Bibliometr* OR "Citation analysis" OR "H-index" OR "performance indicator*" OR "research impact" OR "research evaluation" OR "research assessment")
Plagiarism	(plagiar* OR "scientific dishonesty" OR "scientific honesty" OR "academic integrity" OR "academic honesty" OR "academic dishonesty" OR self#plagiar*)

2.1.3 Selection of literature

As the searches were conducted, the results were collected in an EndNote library. After checking for duplicates, we were left with an EndNote library of 5,066 references. In the subsequent work, we only included references that referenced PhD candidates in their titles, keywords or abstract. After this review, we were left with 1,525 references that were to be evaluated for inclusion in the study.

To reduce systematic biases, the references were randomly distributed between the project members for evaluation. Each reference was independently evaluated by two project members. Every project member was allocated 305 references for evaluation. Each reference was to be evaluated for inclusion or exclusion.

The references were categorised in the following categories: 'Included', 'Excluded' and 'Possible'. After the evaluation, the references were distributed as follows: 'Included': 210 references; 'Possible': 289 references; and 'Excluded': 1,283 references. From these numbers we can see that in some cases the two members have evaluated a reference differently, and that some references therefore appear in two categories. We chose to include references that one member had evaluated as worthy of inclusion.

2.1.4 Distribution of included references and redistribution between topic areas

The included references were redistributed to thematic groups by the coordinator. The distribution was made based on the title and abstract of each reference. More duplicates were uncovered during this review, and the references to be distributed were reduced to 201. The distribution was as follows:

- 85 references in the 'publication and bibliometrics' category
- 70 references in the 'information behaviour' category
- 46 references in the 'library use, counselling and training' category

In some cases it turned out that the reference discussed a topic other than that suggested by a first impression, and this has led to a redistribution of the references in question between the groups. A redistribution has also taken place in the reporting process, as some articles fit under multiple themes.

2.1.5 Data extraction

In order to assure a coherent evaluation and reporting of data from the included studies, we developed a data extraction form. This ensures that some elements remain the same for all references and in a way that allows the studies to be compared in an analysis. The data can also be presented schematically.

There are many possible approaches to data extraction in literature reviews: The researcher can look to see what s/he finds, or s/he can look for specific topics and see what s/he does not find. We chose to use the latter approach. For each theme we listed subthemes that we considered relevant.

Because project members work at different institutions in different cities, it was important to be able to collect data extraction data electronically. We used the survey functions in the learning support system *It's Learning*. The data that was collected in *It's Learning* could be exported to Excel in spread sheet formats. The data had to be recoded in Excel to some extent.

The data extraction form contained many elements. An example of the form can be found in appendix 7.2. All forms identify the project member who reported on the reference. We also have categories for the user group. In addition to studies of PhD candidates, we included studies about researchers, junior researchers, postdocs and librarians. We were also interested in whether there is a difference between PhD candidates at the early and late stages of the doctoral work. If the study mainly focused on other user groups, it was to be excluded. We wanted to see whether any research had been conducted on differences between the disciplines. Our disciplinary areas are in mathematics and the natural sciences, social sciences including education and library science, humanities, and medicine and the health sciences.

After being divided by themes, the articles were further divided by subtopics. For the 'information behaviour' theme we used the following subtopics: 'information needs', 'information and user behaviour', 'information searches', 'plagiarism', 'evaluation of relevance', 'reference handling'.

The 'publication' and 'bibliometrics' theme had the following subtopics: 'scientometrics' or 'bibliometrics', 'citation analysis', 'performance indicator', 'research impact', 'copyright', 'open access', 'authorship' and 'co-authorship';

The 'courses and training from the library' theme included the following subtopics: 'information literacy', 'user training', 'online courses', 'courses on plagiarism', 'courses on literature searches', 'integrated courses' (in other courses), 'counselling' and 'reference', and 'liaison librarian'.

We used Glynn's review (2006) as a starting point when developing categories for the research method. The categories are: 'user studies', 'surveys', 'case study', 'case control study', 'cohort study', 'course evaluation', 'focus group', 'interview', 'literature review', 'multi-centre' (i.e. conducted in multiple locations), 'randomised control study', 'student evaluation', and 'mathematical statistical analyses'. In addition, there was an open rubric for any other research methods that had been used.

It is impossible to evaluate such a large number of references with equal thoroughness. It was therefore important to have a category in the data extraction form that provided an evaluation of research quality and relevance to our project. Rankings in these two categories were on a scale from 1 to 5. Texts had to score at least 4 in both categories in order to be included in the literature review. In some cases, articles that scored lower for quality had a higher relevance score, and could therefore be interesting to include as a basis for discussions. The purpose of this literature review is to summarise and disseminate a wide field of research in order to make decisions on the development of library services to PhD candidates. In a 'scoping review', research quality is not necessarily an issue (Arksey and O'Malley,

2005). When we chose to include an evaluation category for quality, this was to be able to make decisions about the development of our services based on evidence-based practices. Evidence-based practices aim to make decisions based on high-quality research (Glynn, 2006). In this quality assessment, we considered how the research was conducted and how the results were presented. This mainly meant that the study had a defined population or object of examination, and included a presentation of the data collection, research design and research results. The evaluation of the relevance of the articles ensured that descriptions of successful measures and good ideas presented in the literature were included in the basis for our decisions.

It is important to retain the unique aspects of each study and report on the central findings. The results and main findings from the reports we have reviewed were reported in the form. Our form included a field in which we could report new relevant references that were identified in the literature.

We were also interested in seeing which types of publications there were in our materials. Publications were sorted according to the following categories: academic article, professional article, dissertation, book, book chapter, website, report, review (overview article).

We reported on language and geography at the end of the form. The countries/groups that were included in the form were Australia, Denmark, Norway, Great Britain, Ireland, Sweden, USA, the rest of Europe, and the rest of the world. The language alternatives were Danish, English, Norwegian, Swedish, and other languages.

Next, a selection of the 201 references in the literature review will be presented based on an academic evaluation and an evaluation of their relevance based on 3 categories: information behaviour, library courses, and publications. A numerical presentation of the material is provided in table 2.

2.1.6 Weaknesses in the literature review method

Our wide-ranging and interdisciplinary topic is difficult to summarise. We expected to find great variation in topics, types of publications, research methods and relevance to our project. Nevertheless, we wanted to collect data on all of the selected literature, and to extract data for the themes we had identified.

It turned out to be very difficult to find information on some of the themes we were interested in. This was especially true for literature on copyright. The main reason for this is that 'copyright' is often used in the abstract, and thus we got results regardless of whether the article was about copyright or not. For the same reason, searches for library services also turned out to be difficult. As keywords that only apply to services for PhD candidates are unavailable, there is no way to delimit the search to this user group, which therefore leads to a great number of

results. Another source of error is when the article that appears in our search results is the author's PhD dissertation. As this is discussed in the abstract, the dissertation appears in our search results.

2.2 Systematic data from the literature review

Based on systematic searches, 201 unique references were selected for thorough review and reading. Another 28 references were identified through other methods, such as reference tracking. There are therefore 229 unique references in this review (table 2).

PhD candidates constituted the largest group of users that had been studied, but a great number of studies also included more senior researchers, whether alone or in combination with junior researchers/candidates. As many as 23 studies turned out to be about user groups that were outside of our focus area. With one exception, these were considered irrelevant and were excluded.

In total, 83 references were reported to be about information behaviour, 53 about publication and bibliometrics, and 56 were about courses and training provided by libraries. The distribution of the references subsequent to the thorough review diverged from the rough distribution described in the methods chapter, and the sum of the references is also lower than the number of references reviewed. The latter is mainly due to the fact that some references turned out to be outside our focus areas, and were reported on without being included in a category.

Of the 229 references that were reported on, 55 unique references were assessed to be of sufficient academic quality and relevance to be included in the study.

It is worth noting that the number of relevant references quickly dropped from 229 to 55. This indicates that PhD candidates are a not a widely researched on group in terms of information behaviour, publication patterns and the library's training services. By using the method selected, we have gained an overview of existing research, but the reference selection may nevertheless be incomplete. In particular, the search results for the 'publication and bibliometrics' theme has shown that there is very little material available on the target group. For this theme, it is especially important to obtain more references through alerts, accidental discoveries and reference tracking. In total, the materials identified have nevertheless provided us with an evidence base that we can build on when we start developing the content of the online modules in the next phase of the project.

Table 2. Overview of read and selected articles in the study.

Legend: * Not found through systematic searches [1] Shared between information behaviour and courses/training [2] Shared between information behaviour and publishing		References selected for the review (relevance and quality assessed at 4 or higher)			
		All references read	Information behaviour	Library courses and training	Publishing and bibliometrics
Population	PhD candidates, general	76	16	16	6
	PhD candidates, early stage	9	4	3	0
	PhD candidates, late stage	9	3	1	3
	Mixed population	16	4	1	3
	Junior researchers	8	1	3	0
	Researchers	49	9	11	11
	Librarians	12	3	7	0
	Publications/document	11	5	0	5
	Other, excludes the study	23	0	0	1
Field/discipline	Mathematics/natural sciences	90	23	12	16
	Social sciences	90	20	18	13
	Humanities	59	10	8	7
Research method	User surveys/questionnaires	44	15	7	4
	Case study	31	3	8	2
	Case control study	1	0	0	0
	Cohort study	3	2	1	0
	Evaluation of courses	5	1	3	0
	Focus group	7	2	3	1
	Interview	23	13	7	2
	Literature review	15	7	1	5
	Multicentre study	4	3	1	1
	Randomised controlled study	4	0	0	0
	Evaluation of students	3	1	0	1
	Mathematical/statistical analyses	31	6	1	10
Country	Denmark	6	1	0	2
	Norway	6	1	1	2
	Sweden	3	0	0	2
	Britain/Ireland	25	6	2	3
	Europe, other	24	11	2	8
	USA	72	14	11	13
	Australia	13	4	4	2
	Rest of the world	22	8	3	4
Language	Danish	1	0	0	0
	Norwegian	3	1	1	0
	English	153	34	20	20
Information behaviour	**References about the topic**	83	(4)* 35	(11)[1]	(11)[2]
	Information needs	25	13		
	Information and user behaviour	51	26		
	Information searches	32	16		
	Plagiarism	5	0		
	Evaluation of relevance	8	3		
Library courses and training	**References about the topic**	56	(11)[1]	(3)* 21	
	Information literacy	17		9	
	User training	14		6	
	Online courses	6		3	
	Courses about plagiarism	3		1	
	Courses about literature reviews	8		7	
	Integrated courses	4		2	
	Advising/reference services	4		1	
	Contact librarian	13		5	
Publishing	**References about the topic**	53	(11)[2]		(14)* 21
	Scientometrics/bibliometrics	19			6
	Citation analysis	22			7
	Performance indicator	12			3
	Research impact	11			2
	Copyright	2			0
	Open Access	10			6
	Authorship/co-authorship	3			1
No. of unique references		**229**	**35**	**21**	**21**
No. of unique references selected for the review		**55**			

2.3 PhD candidates' information behaviour and literature preferences

In this section, we discuss PhD candidates' information behaviour and preferences in selecting literature and sources through a thematic presentation of findings from the articles. Note that some articles are about both information behaviour and courses/training (table 2, marked a [1]) or information behaviour and publications (marked a [2]). These are only included in this section when they present new aspects of information behaviour. In the discussion we have chosen to compare the articles in our study with texts that as a starting point were outside our focus area (for example, texts that were about other user groups).

2.3.1 Data

The availability of articles about PhD candidates' and post-doctoral fellows/junior researchers' information behaviour was relatively good (table 2). Articles that were not about PhD candidates/junior researchers as a recognisable group were therefore excluded from the study, as these could not tell us anything specific about the needs of PhD candidates. In total, we found 35 studies that met our criteria. Of these, 31 were identified through systematic searches. That a relatively large share of the publications (9) nevertheless is said to be about researchers is because several studies examine a broad range of topics and they include studies of the behaviour of both researchers and PhD candidates.

The natural and social sciences are relatively similarly represented, and there are twice as many references from each of these areas as there are from the humanities. This is roughly in line with the distribution of the references that were read, though comparatively more of the articles on the social and natural sciences were included in our study.

The most frequently used methods used in this material were user surveys/questionnaires (15) and interviews (13) that were often semi-structured. There were also several literature reviews, often as mathematical analyses of references/citations. Other methods were used to a lesser extent.

Within the 'information behaviour' theme, information and user behaviour (26 studies) and information searching (16 studies) were researched somewhat more frequently than information needs (13 studies). In this round, studies about plagiarism were set aside. This was because only one of the references mentioned plagiarism as a topic. The topic could therefore not be discussed before new and revised searches were conducted. Three texts turned out to be about evaluating the relevance of references. The evaluation of the relevance of references was not a

topic that we included in our search strings, but it emerged quickly in our materials. The topic has therefore been included in the review.

Most of the studies were conducted in the USA or in Europe. However, a few – nine, to be specific – were from the Nordic countries. With one exception, all texts were in English.

2.3.2 The roles and expectations of the PhD candidate

In transitioning from a job or master's degree studies, the PhD candidate assumes a new role in which they face new expectations from the academic community. In focus group interviews, Flemings-May and Yuro (2009) found that candidates must let go of their old roles from lower-level degrees, and enter new roles when they start a PhD programme. One candidate expressed this in these terms: "Undergrad students are like consumers of knowledge; on the other hand, graduate students are like producers of knowledge" (p. 208). The transition is also expressed in the strong and increasing pressure that candidates feel to produce original research and at the same time have a sufficient empirical basis for their research.

2.3.3 The candidates' skills: self-assessment, requirements, measured skills

Candidates have great confidence in their own skills, and see themselves as being more systematic than they were during their previous degrees. They are focused on other types of publications, such as journal articles and conference presentations, rather than books (Earp, 2008; Fleming-May and Yuro, 2009). They acknowledge that it is difficult to admit to a lack of knowledge at such a late stage of their education. It is important to appear competent. Few candidates receive instruction from their supervisors about the use of systems that they are expected to master (Barry, 1997). For example, candidates perceive that supervisors and journal publishers require them to have a good grasp of the literature and to handle references correctly. Master's and PhD candidates consider thorough searches and the correct handling of references to be important in larger research papers, but approximately 20% nevertheless do not do this. This is true even where approximately 80% of the students have been trained in information skills (Fleming-May and Yuro, 2009; Harrington, 2009). In some cases, the senior researchers and supervisors are themselves novice to searching and reference handling, and therefore cannot easily support their candidates. For example, they may not have basic computer skills and may not be necessarily aware of their own information management practices. Nevertheless, they expect the candidates' skills to be in place (Barry, 1997).

A large British study from the Research Information Network (RIN) examined researchers' information skills (parts of the results are cited in Griffiths, 2009 and Streatfield, 2007 and 2008). The study shows that library management, researchers, and planners of doctoral programmes have different views about the information skills that are necessary. The academic community/research managers take a broad approach and include skills in all activities related to their own research and its dissemination. Examples of such activities include information exchange, networking, and data processing. General research qualifications are also required. Researchers emphasise skills in obtaining information from their own discipline, statistical analysis of their own data, and the writing of articles. Researchers in the arts also emphasise skills in searching for visual information.

Library managers emphasise skills in searching for and storing information using reference tools (such as EndNote and RefWorks). Library employees agree that more must be done to support the training of new researchers. According to Streatfield (2007), good research support means that the library training is integrated in methods training. This is a barrier for the library, because library employees must first gain a greater understanding and knowledge of research. This can be achieved by having library employees' work closely with the researcher and the research, while also keeping up to date on advanced electronic research tools.

When the candidates' actual skills are examined in greater detail, it becomes apparent that they overestimate their own skills in searching for and identifying relevant sources. For example, they do not meet the expectations of their supervisors and academic community (Earp, 2008). Comments in focus group interviews uncover both misunderstandings and gaps in their knowledge about the efficient use of library resources (Fleming-May and Yuro, 2009). The literature also shows that good IT skills alone are insufficient for constructing good searches. With more experience and training, candidates ranked IT skills comparatively lower and were able to make their searches more effective by using more complex keywords (Chu and Law, 2007a). Furthermore, studies of examiners' evaluations of the bibliographies in dissertations and in the candidates' literature reviews have found fundamental errors or inaccuracies in a third of the dissertations studied. At the same time, the composition of the bibliography (breadth, depth and how updated the references are) is subject to comments in most dissertations and literature reviews (Holbrook et.al. 2007; Holbrook 2007).

Macauley (2001) and Green and Macauley (2007) warn against meeting the candidates with "deficiency thinking" in which information literacy is something the candidate is lacking, and where the role of the librarian is to fill in existing gaps. The authors remind their readers that the candidates in their study (PhD candidates

in pedagogy) have significant academic experience and are highly motivated for independent learning. Many already have good skills in searching for, organising and evaluating information. They start with wide searches, and move on to deep searches for alternative or opposing standpoints and views. The candidates relate to the information in ways that are affected by their previous experiences, habits and knowledge; thus, conversations and reflection about this may be necessary. According to Macauley (2001), researchers and candidates have content knowledge, while librarians have process knowledge. The goal must therefore be to contribute to empowering and helping the candidates take control over and use the tools available for obtaining information efficiently.

Younger researchers/PhD candidates are expected to be better at using IT tools than older and more senior researchers. Kleinert and Stewart (2007) show that researchers view IT skills as important tools in their field. However, some of the studies seem to indicate that PhD candidates and researchers do not have excellent IT skills (Earp, 2008; Green and Macauley 2007; Macauley, 2001). In addition to IT skills, studies emphasise the importance of training in conducting searches, as most candidates prefer to conduct their own searches rather than ask for assistance (Libutti and Kopala, 1995). The research process requires more and more advanced literature searches as the work develops (Chu and Law, 2008). Adaptation to the discipline is important, because it affects the scope and thoroughness of the searches (Chu and Law 2008; Jamali and Nicholas 2008, 2010a). Libutta and Kopala (2008) reviewed literature on the PhD process in the social sciences. They conclude that supervisors expect PhD candidates to have the skills necessary to conduct a literature review, but for the PhD candidates there is little literature available to teach them how to start and conduct a literature review. Disseminating information about the process and about methods can therefore be appropriate.

2.3.4 How PhD candidates obtain information

Ford, Wilson, Foster Ellis and Spink (2002) looked at individual differences (cognitive style) in the way young researchers think. They studied 111 postdoctoral fellows from various disciplines, such as the humanities, applied social sciences, natural sciences, medicine and engineering. The study concluded that individual cognitive styles affect the ways problems are approached, information is searched for, and projects are designed. The cognitive approaches were characterised as either holistic or serialist, and as either field-dependent or field-independent. Holistic thinkers first focus on developing a broad overview, and like to have several things going at once. When searching for information, they tend to make fewer changes to their question along the way; they appreciate accidental discoveries

and spend time on exploratory activities. Serialists focus on separate topics separately, and the relationship between the topics tend to emerge at a late stage of the learning process. Those who are field-independent excel at structuring and analysing, and prefer approaching questions through testing hypotheses. Those who are field-dependent prefer that the relationships are structured and analysed ahead of time, and largely prefer learning to take place in a social context.

A number of specific methods are used to obtain information. PhD candidates emphasise personal contacts and tips from others in the academic community, such as supervisors, fellow students and conference participants (Barry, 1997; Vezzosi,, 2009). Some may receive a "starting kit" of references from their supervisor. When candidates have read a relevant article, they trace references backwards via bibliographies and forwards through citation services, such as ISI Web of Science, Scopus or Google Scholar (Earp 2008; Fleming-May and Yuro, 2009). Tracing references remains an important method at later career stages, but the extent to which the method is used varies (Jamali and Nicholas, 2008).

Candidates are generally open to accidental discoveries (Green and Macauley, 2007; Penner, 2009; Steinerova, 2008); in other words, to use references found accidentally while searching for something else. When viewed in conjunction with cognitive styles, we see that holistic thinkers particularly value accidental discoveries.

With regard to traditional database searches, Barry (1997) points to insufficient information searching skills and IT skills among PhD candidates and supervisors. The use of computers and online access to journals have increased since this study was conducted. A lack of IT skills may still obstruct the opportunities for optimal information collection. Kleinert and Stewart (2007) show that researchers point to the use of electronic databases as the most important skill in higher education, followed by word processing and electronic communication, as well as teaching-related technology. PhD candidates, as future university teachers, do not have strong views on the IT skills that should be expected of their future students, or on how to approach the planning and organisation of these in collaboration with employees and academic communities at the higher education institution (Dixon and Newlon, 2010).

Chu and Law (2007a) also emphasise the need for IT skills, but in addition they report that advanced IT skills do not automatically lead to good search skills. They have studied how engineering and pedagogy candidates develop search skills. By following the students over the course of a year in which they received individual training in conducting information searches, the researchers saw that the need for sources changed during the process. First, the students looked for sources for

a general orientation within the topic, and then to disciplinary sources (Chu and Law 2007b) that require more advanced skills in efficient searching (Chu and Law, 2007b, 2008).

Jamali and Nicholas (2008, 2010a, 2010b) looked at information behaviour among astronomers and physical scientists at a London university. Among other issues, they looked at methods for finding articles and keeping up to date. Astronomers tend to trust recommendations, while astrophysicists also search databases and order alert services. Jamali and Nicholas (2010b) show that there are significant differences between the sub disciplines within astronomy and physics in terms of the extent to which interdisciplinary searches are required for the researcher to remain up to date. There are also differences in terms of the extent to which researchers choose to read interdisciplinary materials.

The candidate can only direct his/her attention to regular alert services and other advanced methods of keeping up to date in the field once he/she has gained the necessary overview of the discipline. However, not all candidates are able to attain such a level of expertise during their doctoral studies (Chu and Law, 2008). Furthermore, not everyone places equal emphasis on remaining updated even after completing the doctoral degree. Senior researchers are more likely than junior researchers to place importance on keeping informed through alert services (alerts for new results in searches or for contents of relevant journals) and e-printing services. This may be because senior researchers already have an overview of the discipline (Jamali and Nicholas, 2008).

2.3.5 The candidates' selection of relevant databases

Barry (1997) points out that only a few of the interviewees use more than one database, and that they quickly give up on databases in which they do not get relevant results. In Earp's study from Ohio, USA (2008), the candidates ranked bibliographic research databases outside the field of education (Academic Search Premier, PsycINFO) above similar databases within the discipline (Education Abstracts, ERIC, Professional Development Collection), and ranked the latter above library catalogues. This contrasted with master's degree students, who ranked search engines (Google, Yahoo) the highest. However, Italian candidates identify Google as a crucial resource, especially for quick information. Nevertheless, they state that they know databases, electronic journals and library catalogues well (Vezzosi, 2009). Chu and Law (2007b) found that the importance of some databases dropped as the programme of study progressed, as the candidate gained experience, and as the number of training sessions increased. Others assumed greater importance. In their view, the candidates at first turn to resources that contain general

information, then towards resources with more specialised (disciplinary) information, and finally to sources that offer the most up to date information.

Chu and Law (2008) characterise a highly skilled information seeker as someone who has thorough knowledge about resources. A competent information seeker is expected to have knowledge of the various types of resources within their area of research, and can be expected to be independent, achieve reliable search results, and feel confident in their searches. A highly skilled information seeker is also expected to know several databases within the most relevant types of databases, and be familiar with more peripheral databases. At this level, searches yield good results and are effective.

The database use among more senior researchers depends on how interdisciplinary the literature in the researcher's field is. Researchers, whose work is interdisciplinary, use general search tools such as Google, Google Scholar, Web of Science and disciplinary databases more (Jamali and Nicholas, 2010a).

Larsen and von Ins (2010) show that in the past 50 years there has been an increase in academic publishing. Additionally, publications in new channels such as conference publications, institutional archives and homepages are on the rise. The extent to which bibliographic databases manage to reflect the growth in publishing varies from discipline to discipline. Science Citation Index reflects this growth to a lesser extent than comparative databases. The coverage is particularly low in some of the fields that have had the highest increases in publications, such as informatics and engineering. Conference publications are considered important in areas that have a high growth rate. However, it has been shown that the increase in conference publications is not higher than the increase in journal articles. The indexing speed of the databases may thus affect where the PhD candidate ought to search for information within disciplines where the available information is growing rapidly.

2.3.6 Selecting, reading and using references

The attitudes of the PhD candidates affect both their selection of information and how they use it. Many candidates report problems in finding relevant information in the wealth of information available and struggle to put the information together into a whole (Fleming-May and Yuro, 2009). Which references the candidate sees as relevant, chooses to read and includes in their own material depends on a number of issues. The candidate's evaluation depends on their personal assessments of quality, others' views, the author's assessment, evaluations of the visual and linguistic characteristics of the material, and their attitude to the material. It also depends on more fleeting factors, such as mood (Steinerova, 2007, 2008).

Increased knowledge changes the evaluation of which references are relevant. The selection of references for reading and citing can potentially be affected by factors other than the strictly academic, such as political, financial or rhetorical factors. However, it can be assumed that citations are predominantly used to recognise the academic contribution of others, and citation analyses may therefore be used to measure the degree of impact (L. Bornmann, Mutz, and Daniel, 2008).

Jamali and Nicholas (2008, 2010a, 2010b) show that there are differences in reading behaviour between different disciplines and sub disciplines, and between researchers with different academic status. Jamali and Nicholas (2008) point out that there are differences between astronomers and astrophysicists with regard to how the articles they read have come to their attention. This suggests that the evaluation of the selection of literature varies across academic areas, including those that are closely related.

That the materials are identified and read does not guarantee that they are used in an ethical and honest manner. Student groups have been identified who treat information sharing and its free use (without showing consideration of copyright issues) as a matter of course, for example on the grounds that they pay school fees (Huan-Chueh, Chien, Hao-Ren, and Mei-Hung, 2010). Flowerdew and Li (2007) analysed texts and interviewed Chinese students to examine how the students 're-use language'. This is a particular type of plagiarism that is particularly frequent among students with a poor knowledge of the language in which they publish. The candidates use words and phrases that they have picked up from leading academics in their field. They also use texts as guides: in other words, they use already published articles on the same topics to shape their own articles. The students do not see their practices as plagiarism, which to them means stealing the work of others. The students have done all their own research, most commonly laboratory work, but face challenges in expressing themselves in a foreign language.

Studies of the candidates' referencing skills and ability to use referencing tools are not directly covered by our literature review, but are described in several of the studies as insufficient (see e.g. Barry, 1997). Vezzoni (2009) quotes one candidate: "I know that I should organise my references in a better way and you (the librarian) taught us the use of EndNote, but when I am searching databases and reading papers I don't like to interrupt myself and organise my references, which ends in a terrible mess and a waste of time" (p. 74).

Researchers use the information they obtain to build general knowledge, support their choice of method, and to have a point of reference with which to compare their own results. A measurement of successful information collection may therefore be to see which references are included in the candidates' reference lists.

The original need for information can thus be measured indirectly through a study of the bibliography (Chaparro-Martinez and Marzal, 2008). However, this is not a perfect measurement. Even if the reference list consists of successful search results – references that have been selected for reading and that have passed an assessment of relevance -, it does not indicate which materials were not found (lack of database access or lack of searching skills), or which materials were unavailable (closed collections, no subscription, too expensive to order, too laborious to obtain). In the two studies mentioned from agricultural sciences and biology, significantly more than half of the references were journal articles. In both cases monographs (books) were the second-most used form of materials, while the remaining categories combined only represented 10–15%. This is similar to the way theology candidates rank types of references, with books and journals at the very top (Penner, 2009). Kuruppu and Moore (2008) found that the age distribution of citations in dissertations varied according to sub discipline. Not unexpectedly, disciplines such as molecular biology and genetics used newer references than the others.

2.3.7 Differences across disciplines

Several of the studies highlight differences across disciplines, geographic areas and individuals. Chu and Law (2007a, 2007b, 2008) look at pedagogy and engineering students and find differences in their need for and use of references. The availability of information, and knowledge about this availability, also plays a role. For example, there are many databases (and easily accessible information) within engineering disciplines, but few databases are available for pedagogy. At the same time, the need to search multiple databases (for example when engaged in a high level of interdisciplinarity) can require more advanced methods of searching. The selection of databases can thus affect the candidate's development of search skills. The nature of the candidate's question determines whether it can be answered through searches in general databases or whether more specific resources are needed. The need for access to other types of materials, such as patents and reports, will also be affected by disciplinary traditions.

Researchers within broad thematic and interdisciplinary areas use many tools to gather information (Jamali and Nicholas, 2010a). Jamali and Nicholas (2008, 2010a, 2010b) looked at interdisciplinary differences in information searching, and show that there are differences not only across disciplines but also across sub disciplines. Researchers often gather information through tracing references and on the recommendation of colleagues. This way, they keep up to date and find the articles they actually read.

These findings are supported by Kuruppu and Moore (2008), who studied different subfields within agriculture and biology. Researchers in the agricultural sciences have a lower average rate of citation than those in biology. The most cited information is from journal articles. The relationship between citations of books and articles is stable between 1997–2006, despite the increasing online access to articles. The tendency within biology and agricultural sciences is to cite newer information, but researchers in agricultural sciences also look at older information.

Differences in educational systems may affect the way PhD candidates relate to information. Green and Macauley's (2007) comparison of PhD candidates in the American and Australian educational systems show that the candidates' information needs are governed by how much teaching or research activity is expected of them. The Australian system requires more independent research activity. This leads to extensive information needs and more searches.

2.3.8 The PhD candidate and the library

One of the reasons that there has been little research on PhD candidates in the literature on libraries may be that few librarians have themselves completed doctoral degrees and they therefore do not know what the challenges are (Fleming-May and Yuro, 2009). Some of the studies in the literature review examine where libraries can best meet their users. Is it the physical library or the virtual arena that is the preferred meeting place? A study of PhD candidates from Italy showed that students depend on digital services and only to a limited extent use the physical library. Ease of use, access and right timing are important when offering tools and services to the candidates (Vezzosi, 2009). This fits with the findings made by Chaparro-Martinez and Marzal (2008) and Steinerova (2008). Another study looks at use of the physical library at the University of Oklahoma (Antell and Engel, 2006). The study looks at junior and senior researchers' use of the library. They conclude that different uses of the library relate to physical and academic age. 'Everyone' uses the library, but in different situations and to different ends. Younger researchers use the library as a place to work. They prefer electronic resources, use services such as interlibrary loan less, and are greater supporters of the library as an ideal for knowledge development than the older users. According to Harrington (2009), users prefer electronic access to information and want large electronic collections. Most find the resources through the library's website, and search for information in the library catalogue and electronic databases. Only 25% of PhD candidates visit the library regularly. However, electronic access does not guarantee that they find the material in an efficient manner. In Hong Kong, Chu and Law (2007b) found that candidates in engineering and pedagogy valued

services such as interlibrary loan and reference help much more after having received several training sessions from the authors of the study.

In the Norwegian context, the university library in Trondheim examined students and researchers' use of online information and views on the physical and digital library. The study is based on in-depth interviews with bachelor and master's students, PhD candidates and researchers. The results show that the PhD candidates primarily look for new research, that they use Google a lot, and that they prefer the information to be available electronically. Researchers look for information for research or teaching. Though they prefer electronic materials, they also use printed materials. Those who are the most aware of the library are those who use the physical library. They see the library as a place with quality assured information and knowledgeable staff whom they can ask questions (Sentio Research, 2010). At the same time, other studies show that masters and doctoral candidates generally are reluctant to seek help, whether from fellow students, researchers or library staff (Earp, 2008). When they need help with a search, they will primarily turn to supervisors and fellow students. This also applies when the students have been trained in information literacy, and when they believe that searching for information is important in the research process (Harrington, 2009). They rarely ask librarians (Chu and Law, 2007a; Fleming-May and Yuro, 2009; Harrington, 2009; Vezzosi, 2009). Asking a librarian is seen as asking someone else to do a job they ought to have done themselves (Fleming-May and Yuro, 2009, p. 213). With regard to the PhD candidates' trust in the competency of the librarians, this increases as the candidate has contact with a librarian (Chu and Law, 2007b).

Barry (1997) describes candidates' needs as different from the needs of senior academics, in part because PhD candidates do not have an established network to turn to. According to Barry, PhD candidates need to acquire a breadth of information that can also be transferred to the labour market. She believes that the candidates' supervisors have the best starting point from which to convince the candidates of the importance of information literacy. Further, she argues that supervisors can most easily provide training that is contextualised within the discipline and individualised. She sees the library's role as three-fold: It is to train end-users (candidates), provide training for senior researchers and supervisors to enable these to offer training, and develop self-help tools that enable users to manage their own training. Barry believes that there is a connection between information-related skills and the candidates' rate of completion, and thus the candidates' opportunities to succeed.

2.3.9 Recommendation for the library

Studies of PhD candidates shed light on users' needs, and can provide a basis for advice and tips regarding the library's training of PhD candidates. PhD candidates believe that there is a need for training in library services. Studies show that their needs differ from those of other users, and that bespoke services are therefore needed (e.g. Penner, 2009; Fleming-May and Yuro, 2009; Barry, 1997; Harrington, 2009). Fleming-May and Yuro (2009) are concerned about whether the training offered is sufficiently relevant and appropriate for candidates with limited time available. The training must take place when other related activities are taking place, and help must be provided 'there and then'. Academic employees can help determine what the appropriate times may be (Barry, 1997; Harrington, 2009). They are also best placed to motivate the candidates to take the work on literature searches seriously. It is important that the library markets its service offers to PhD candidates even if it is natural to have the academic community provide parts of the training (Barry, 1997) or to integrate the training in academic services and teaching. This is done in part by creating trust in the academic communities (for example, by making library and professional competencies explicit), and by getting to know the candidates (Fleming-May and Yuro, 2009; Penner, 2009). Most studies emphasise that contact with the candidates needs to be of some duration, in part because the candidate develops increasingly advanced search skills as his/her project progresses (e.g. Barry 1997). In general, a goal must be to establish good collaboration with the academic communities.

Penner (2009) emphasises the importance of a physical presence in the users' arenas instead of having the user come to the library, and he suggests that the librarian can be part of the users' informal networks. If the candidate is hesitant to go to the library for help (see Harrington, 2009), an alternative may be to make the library services easily available from the candidate's place of work through e.g. chat services, electronic guides, and online workshops adapted to their needs. In their focus group interviews, Fleming-May and Yuro (2009) highlighted that the candidates are positive to such communication. They also mention access to the library contact person outside office hours as something that is desirable.

Based on a study of candidates in psychology in Ontario, Harrington (2009) believes that there is a need to change how libraries offer services to PhD candidates. The form of training may include individual counselling, classroom training and/or independent study, though Libutti and Kopala (1995) do not point to any one form of teaching being better than the other. Courses and training should consider the cognitive and learning styles of the individual users, as well as the need for independent learning (Barry, 1997). Other studies emphasise the opportunities

for self-directed learning through online work groups or counselling (Fleming-May and Yuro, 2009).

According to Barry (1997), teaching should preferably be about the effective use of technological tools for information gathering and processing.

2.3.10 Summary of chapter 2.3: information behaviour

- In order for the library to have an understanding of the research process, it is important to understand methods and advanced electronic research tools (RIN survey, cited in Griffiths, 2009; Streatfield (1007, 2008)
- There are perceived weaknesses in the information skills and literacy of PhD candidates (Green and Macauley, 2007), though the candidates often are not aware of, do not want to know, or do not dare admit to such weaknesses (Fleming-May and Yuro, 2009; Harrington, 2009)
- The candidates fear that the services they are offered are not relevant to them, in part because they are pressured for time (Fleming-May and Yuro, 2009). Barry (1997), Fleming-May and Yuro (2009), and Harrington (2009) emphasise the importance of training that is tailored to the needs of the target group. With regard to the timing of the training, it must take place in combination with other related activities and offer candidates the opportunity to get help immediately (Barry, 1997; Harrington, 2009). Barry (1997) stresses that several training sessions should be held as the candidate develops increasingly advanced searching skills as his/her project progresses
- Different degrees of information and knowledge about how the information is accessible leads to different types of use of and need for information resources within various disciplines. Interdisciplinary topics lead to the use of more databases (Chu and Law, 2007a, 2007b, 2008). The need for access to other types of materials, for example patents and reports, will also be affected by disciplinary traditions and can lead to disciplinary differences in information needs (Jamali and Nicholas, 2010a)
- There are interdisciplinary differences in information searches across disciplinary fields and communities within a field in one academic area (Jamali and Nicholas, 2008; Jamali and Nicholas, 2010a, 2010b)
- Steinerova (2008) shows that the selection of information is affected by disciplinary criteria as well as extra-academic factors. Random factors, such as mood, have been shown to affect the selection
- Kleinert and Stewart (2007) show that researchers consider IT skills to be very important tools in their work. However, some studies suggest that PhD candidates and researchers do not have very good IT skills (Earp, 2008; Green and

Macauley, 2007; Macauley, 2001). Chu and Law (2007a) show that IT skills cannot be tied directly to search skills

- The citation practices of PhD candidates show a strong tendency towards the use of freely available electronic resources, and a reduced use of printed material, which means that the candidates to some extent lack recognised sources. Furthermore, the citations in the text and reference list show that they have an insufficient level of accuracy (Evans, 2008; Conkling, T. W., Harwell, K. R., McCallips, C., Nyana, S. A., and Osif, B. A., 2010)
- Green and Macauley (2007) have shown that the candidates' information behaviour is affected by the education system they are in

2.4 PhD candidates' production of knowledge: publication patterns and bibliometric evaluation methods

2.4.1 Purpose

The purpose of this section of the literature review is to identify the type of literature the PhD candidates select, where they publish, and the level of awareness they have of bibliometric evaluation methods. This section also looks at the candidates' attitudes to copyright, co-authorship, and open access.

2.4.2 Data

The search results for the 'publication and bibliometrics' topic consists of 85 references. After a quick review, 24 of these were identified as not belonging to this topic, but rather to the 'behaviour' and/or 'training' topics. Furthermore, 39 references were excluded because they did not fit the topic.

Thus, 22 of 85 references were included in the study for a more thorough reading and reporting in the data extraction form. Additionally, 15 references have been included through alerts, references found in articles that we read, and accidental discoveries. After a final review for quality and relevance, the selection consists of 21 references, 7 of which were found through systematic searches and 14 of which were identified through other methods. These are the references that are discussed as our main findings and that are included in table 2 above. We have also included references in this discussion that score lower for quality but that are nevertheless seen as relevant.

The number of references not found through systematic searches is quite high, and indicates that a large share of the relevant resources was not originally identified. This is because the questions that are described in paragraph 2.4.1 apply

to most researchers and are not necessarily specific to PhD candidates (see the relatively low PhD share under population in table 2). The findings that are described here are therefore somewhat random and do not represent the entire scholarly literature in the field.

There turned out to be some overlap with the 'behaviour' topic (11 of 21; see table 2). This is because the publication and citation patterns reflect the researchers' behaviour. It is therefore useful to see the results in these two chapters in conjunction with each other. The findings are divided into two main themes: *bibliometric evaluation methods* and *publishing*. Further, the results are grouped into subtopics and seen in relation to each other. The table indicates whether the reference in question was identified through a systematic search or through another method.

2.4.3 Main findings: bibliometric evaluation methods

2.4.3.1 Citation practices

Some studies analyse references in terms of whether they are electronic or printed documents (Beile, Boote, and Killingsworth, 2004; Evans, 2008). Studies also examined the extent to which the literature used in doctoral dissertations is representative of the literature in the discipline. This was done by analysing the references in different parts of the dissertation, such as in the introductory chapter (Beile, et al., 2004). The conclusion was that PhD candidates, regardless of their discipline, largely rely on electronic resources that are easily available. Original sources or authoritative sources within a subject are not always sufficiently cited (Holbrook, 2007; Holbrook, Bourke, Fairbairn, and Lovat, 2007; Rienecker and Jørgensen, 2010). Clements and Wang (2003) examined Australian dissertations in economics, and found that these mainly cite authors from the same institution, and in particular the candidate's supervisor. There were few citations from other institutions in the same country, and there seemed to be little external national communication. Mistakes were also made, in that the quotes, citations and references were imprecise (Holbrook, 2007).

Bibliometric data, and citations in particular, are often used for evaluations. This kind of statistical method is seen as a more objective method than peer evaluations. However, basing the evaluation of a researcher's performance on citations has been subject to repeated criticism. Citations are not only used to offer intellectual acknowledgement, and are therefore not an objective unit of measurement. In a review article, Bornman and Daniel (2008) examine the motives for an author's selection of references. They find a number of texts that support the thesis that researchers cite for reasons other than a desire to provide intellectual recognition.

Citations are often used as tools to convince the reader, and are motivated by personal interest. The authors claim that studies of citation practices have a number of methodological weaknesses and divergent research designs, and that these therefore appear less weighty. However, many studies confirm that researchers credit the work of colleagues that they use by citing this work. Citations thus represent an intellectual or cognitive influence on an academic text. The conclusion is that citations can be used as the basis for evaluations.

Based on data from Thomson Reuters Web of Science, Evans (2008) shows that the age of citations – the number of years from the date of publication to the date on which the publication is cited – declines in accordance with the number of years the journal has been available electronically. He is concerned that research is becoming too narrow-minded and that researchers are losing a broad overview. The results of Lariviere et al. (2008) show the opposite trend: that the age of citations is on the increase. This is discussed in terms of academic literature becoming obsolete. They explain this as a result of older materials also being easily accessible through online catalogues, and that the average age of all literature is increasing. This study is also based on Thomson Reuters' data, but does not relate the age of citations to how long the journal has been online. Evans (2008) argues that a smaller range of sources are being cited (he discusses this as "the narrowing of science and scholarship"), while Lariviere et al. (2009) find the exact opposite: that the range of sources cited is increasing. It is the focus on online materials only that makes Evans' research especially interesting. However, one should be careful about reaching any general conclusions that science is becoming more narrowly focused as literature is made available online.

2.4.3.2 The evaluation of PhD candidates

Impact or performance is often measured in terms of the number of accumulated citations per publication. One of the ways that average citation frequency is measured is through the "h-index", which has become prominent in recent years. Articles written by PhD candidates are analysed according to how many citations they have achieved. There is a clear link here that shows that the more articles an author has produced, the higher their citation frequencies (Bormann and Daniel, 2007; Hasla and Laham, 2010). The number of citations is also seen in the context of the journal's *impact factor*. There is no unidirectional connection here. A study of biomedical articles (Bornmann and Daniel, 2007) shows that the higher the journal impact factor, the higher the number of citations, while a study of researchers in social psychology does not show such a connection (Haslam and Laham, 2010). The number of citations also correlates to the length of the article. Very

short articles have little content and may be less likely to be cited (Bornmann and Daniel, 2007).

New publication trends have created a dilemma for research evaluations. The extent to which academic publications are indexed in the conventional databases is decreasing (Chen, 2010; Larsen and von Ins, 2010), which reduces the usefulness of evaluation methods that only rely on single databases. In contrast, Google Scholar manages to expand its portfolio through an increasing number of agreements with publishers. The service keeps up with changing publication trends, and along with its automated indexing routine, this enables it to cover the disciplines in a more comprehensive manner. Google Scholar therefore asserts itself as a significant academic service in line with ISI WoS and Scopus (Chen, 2010). This has the caveat that the data quality in Google Scholar may be insufficient and thus weaken the credibility of the service (Chen, 2010; Garcia-Perez, 2010; Mikki, 2009, 2010).

2.4.4 Main findings: publishing

2.4.4.1 Selection of journals

The criteria for the selection of journals to publish in may include the likelihood of acceptance, the credibility and prestige of the journal, potential impact, time from manuscript submission to publication, and philosophical and ethical questions (Knight and Steinbach, 2008). Coonin and Younce (2010) have examined the attitude of authors in open access journals in the field of education. They list the following criteria as significant in the selection of a journal: 1) whether it is peer-reviewed, 2) whether it fits the project well, 3) whether the journal is lined to an academic association, 4) whether the author has published in the journal previously, and 5) whether the author retains copyright. Surprisingly, the journal citation frequency was not significant.

The ways in which research results are presented have changed after the advent of the Internet. A broader range of publication channels like open access journals are used, and traditional journal publications are somewhat on the wane (Bornmann, Schier, Marx, and Daniel, 2011; Chen, 2010; Phillips, 2010). The peer-review that most journals use is also changing towards a more open and quicker process, because the peer reviewers are no longer anonymous and selected by journal editors (Bornmann, et al., 2011; Phillips, 2010).

2.4.4.2 Open access

However, Björk et al. (2010) show that the share of open access publishing is on the increase, and that when divided by all disciplines, approximately 20% of publishing occurs in open access channels. There may be multiple reasons for selecting open access (OA) channels.

Norris, Oppenheim and Rowland (2008) and Brody and Harnand (2004) discuss the so-called Open Access Advantage, in which open access publications (whether online or printed) are cited more frequently and thus potentially achieve a higher academic status. Norris et al. found that in their data there were significantly more citations from OA sources than from paid sources, but that there were differences across the disciplines. However, the authors could not draw any clear relationships between OA channels and various variables that might explain the reasons for this citation advantage. However, Kurtz et al. (2005) have analysed publishing in astronomy, and found that improved access to articles does not increase the likelihood of their being cited. Like Norris et al., Kurtz cannot draw any clear conclusions from the material.

Ji-Hong and Jian (2007) look at other factors that may govern a PhD candidate's decision to publish in OA channels. In this study, the authors used qualitative methods in addition to citation analyses to examine the factors that affect an author's choices with regard to publishing. Ji-Hong and Jian find that personal views on factors such as the reputation, relevance, accessibility, career advantage and the quality of the journal govern this decision. The authors find a weak negative correlation between a journal accessibility and perceptions of quality. The authors interpret this to mean that PhD candidates generally are sceptical to the Internet. In contrast, Coonin and Younce (2010) found that a minority believed that OA journals were not prestigious, while Xia (2010) shows that authors can be sceptical to OA channels. Xia also shows that authors are insufficiently familiar with such resources and are concerned that a low level of prestige can hurt their career. Ji-Hong and Jian's correlation is very weak and no generalisations can be made from this correlation. Coonin and Younce's (2010) materials show that publishing in OA channels may lead to more citations, quicker publication, increased readership and lower subscription costs. This study also shows that authors who choose to publish in an OA journal do so of the recommendation of a colleague who is associated with such a publication channel. With regard to the choice of an OA journal, Coonin and Younce (2010) report that authors find the journals through online searches, suggestions made via professional associations or institutions, through libraries or through an institution that provides research funding. The authors find a low correlation between self-archiving and open access publishing, and suggest

that authors generally have a limited understanding of what open access is: many assume that open access is the same as electronic access.

Xia (2010) found many of the same reasons for OA publishing as Ji-Hong and Jian, and Coonin and Younce (2010): easier access, fewer restrictions, and shorter time to publication. Like Björk et al. (op. cit.), Xia observed a steady increase in both OA publishing and OA awareness generally. However, the willingness of authors to publish in OA journals has not changed in a similar manner. There appears to be a discrepancy between the support for open access in theory and in practice.

2.4.4.3 Copyright and co-authorship

Price, Drake and Islam (2001) focus on ethical considerations related to publishing made among employees in the health sciences at 195 universities. Employees were given different cases about ethical issues related to publishing. Several of the topics related to co-authorship and copyright in relation to publishing. The results show that there are considerable differences between participants in terms of what they consider ethical and unethical. The confusion may be due to a lack of ethics training. If candidates do not receive such training, there is a greater chance that they will overstep ethical boundaries during their careers.

Hagen (2010) also touches upon some of the ethical challenges related to co-authorship. He discusses unclear rules around the number of articles required for a doctoral degree. The issue is discussed in relation to the natural sciences and biomedical fields. Hagen suggests a weighted measurement and believes that the listing of authors must be clear, carefully considered, and be based on just ethical criteria.

In their article on publishing in OA journals, Coonin and Younce (2010) state that the opportunity to retain copyright is one of the criteria authors use when selecting a journal in which to publish. It is not possible to draw any conclusions about the authors' attitudes to copyright based solely on this article. Nevertheless, it does show that retaining copyright is important to the publishing decisions of some authors.

Huan-Chueh et al. (2010) survey the common misunderstandings that arise with regard to copyright when the library recommends the use of digital library resources to students. The study shows that students at the bachelor's, master's and PhD levels do not know enough about copyright. The most common misunderstandings among students were that they believed that digital resources could be shared and downloaded freely, and that using such resources in teaching was free. The authors conclude that libraries have a responsibility for training students in the ethical and legal uses of digital resources.

2.4.5 Publishing and bibliometrics

The results from the systematic literature searches about publishing and citations showed that there is very little material on PhD candidates. This confirms our assumption that there is little available research that sheds light on PhD candidates' situation in relation to this topic. Nevertheless, the findings have given us a basis that we can build on when developing relevant content for training and counselling. We will now summarise the results based on our main findings. We also refer to some articles that fell outside our inclusion criteria, but that nevertheless gives valuable insights into the issues under discussion.

Bibliometric evaluation methods have traditionally been used in international communities that publish in journals. The studies referred to in the section on publishing are mainly based on such communities. It turns out that bibliometric evaluation methods affect the behaviour of PhD candidates. These methods can affect the candidates' choice of research topic, collaborating partners and publishing channels, and may also shape their patterns of citation. For the candidate, it is important to increase his or her visibility by publishing in open access journals, for example. It is important to expand their research network through collaboration and co-authorship, in order to increase the likelihood of being read and cited. However, an increased rate of collaboration can increase the level of friction and lower the willingness to be open about one's work due to a fear of misuse (Louis, Holdsworth, Anderson and Campbell, 2007). Awareness about copyright issues will be useful in this context. Such awareness may also improve citation practices. The candidates reveal a lack of academic skills in this regard.

Candidates' lack of academic skills is also highlighted in studies of the sources used in dissertations. It turns out that candidates to a great extent stick to resources that are easily available and do not cite sufficient numbers of authoritative sources.

In order to improve the candidates' information management skills it is important that they gain better knowledge about databases. Better knowledge about searches and evaluations will also ease the work on gaining an overview of a topic. Coupled with a reference management tool, the databases' options for exporting references will improve the quality of the references in the texts. To further address the candidates' information needs, the analysis function in the databases can be used. For example, it may be useful to analyse a source based on the number of citations, the author, institution, publisher and underlying networks. Unfortunately, the disciplinary databases have only partially enabled citation functionalities. This is particularly true of databases in the social sciences and humanities (Armbruster, 2010).

2.4.6 Summary of chapter 2.4: publishing and bibliometrics

- Bibliometric evaluation methods have traditionally been used in international communities that publish in journals. The studies in this section are mainly based on such communities
- Bibliometric evaluation methods affect the choice of research topics, collaborating partners, publishing channels and citation patterns
- The candidate's visibility or recognition increases through
  - participation in research networks
  - collaboration and co-authorship
  - publishing in open access journals
- Awareness about copyright issues is important for collaborations and citation practices
- The candidate's ability to handle information can be improved through increased knowledge about the databases and the use of their analysis functions
- Increased knowledge about gathering and evaluating information will help improve quality, particularly in the dissertation literature review

2.5 Library services, training and counselling of PhD candidates

2.5.1 Purpose

The main focus in this section of the literature review is on PhD candidates' use of information. The purpose is to investigate how PhD candidates use libraries and which services libraries offer this group, particularly with regard to training and counselling services.

2.5.2 Data

This topic was allocated 46 references after the first evaluation of articles for inclusion. Five references were identified through alerts, literature lists and accidental discoveries. In the critical evaluation of the literature, another 11 references have been added from the other topics; project members have considered these to be relevant to this topic. In total, 58 unique references have been evaluated. Of these, 21 were considered relevant and of sufficient quality to be included for further analysis. The 21 articles included are on multiple topics, and some discuss more than one topic. This topic overlaps with literature on information behaviour. Eleven of the 21 references included are shared (see table 2). The shared references are discussed in terms of the focus of this literature review.

The data extraction form (see appendix 7.2) included the following topics for this subgroup: information literacy, user training, online courses, courses on plagiarism, courses on literature reviews, courses integrated in other courses in doctoral programmes, counselling and reference services, and liaison librarian. Of these subtopics, the majority of the articles are on information literacy, user training, and courses on literature reviews.

2.5.3 The PhD candidates' use of the library

The studies included in this literature review show consistent results on how PhD candidates use libraries and library collections. Studies from Norway, Germany, Italy, Canada, the USA, and Australia all show the same results (Dumont, Dupuis, Foucault, Hiller, and Proulx, 2005; Fleming-May and Yuro, 2009; Green, 2010; Green and Macauley, 2007; Kohl-Frey, 2007; Macauley and Cavanagh, 2001; Rempel and Davidson, 2008; Sentio Research, 2010; Vezzosi, 2009). These studies vary in their research methods and population size, but the results are nevertheless the same. PhD candidates prefer information and literature in electronic formats. They use the physical library very little, and tracking references backwards and forwards is the preferred method of searching for literature.

Several studies comment that PhD candidates are uncomfortable asking for help with literature searches. (Fleming-May and Yuro, 2009; Harrington, 2009; Macauley, 2001; Rempel and Davidson, 2008; Sentio Research, 2010). Candidates primarily rely on other candidates, secondarily on their supervisor, and lastly on the library. There are several reasons for this reluctance to ask for help from the library. PhD candidates feel that they are competent in the use of information and do not feel a need to ask for help. Supervisors also assume that PhD candidates are competent in searching for literature, and they expect candidates to be independent. These issues may make it difficult for the library to reach out to candidates with training and counselling services (Rempel and Davidson, 2008). Another important reason that PhD candidates do not ask for help is that they do not know enough about library services. Fleming-May and Yuro (2009) discuss how libraries can reach PhD candidates. Their study emphasises direct contact with PhD candidates. The library must be proactive and not expect that PhD candidates receive information from their supervisors or locate information about library services on their own. Macauley (2001) shows that many, but not all, PhD candidates are interested in help from the library but that they are unaware of current offerings. The Norwegian study (Sentio Research, 2010) emphasises that the library is a place where one can get help from staff.

Though access to library resources and literature is heavily emphasised and the use of the physical library has declined equivalently, there is some agreement in terms of how libraries are viewed. Antell and Engel (2006) examined researchers' use of the physical library. Their study shows that the library is considered important to academic work. The physical library is a manifestation of its contents, and it is often easier to use than the electronic resources.

2.5.4 PhD candidates and information literacy

This topic had the most results in our literature review. In our context, information literacy is a problematic term. The term is used to describe the skills PhD candidates have with regard to using literature effectively and in accordance with ethical standards, and it is also used about the training offered by the library to its user groups. Library literature includes the term 'information literacy skills' (Rempel and Davidson, 2008), and this operationalization of the concept helps turn information literacy into a teaching topic.

Studies of PhD candidates show that they feel confident and competent in the collection and use of information for their own work. Nevertheless, studies show that they use simple search methods. More advanced search methods are rarely used, and candidates often ignore literature that turns out to be difficult to access (Fleming-May and Yuro, 2009; Kohl-Frey, 2007; Macauley, 2001; Sentio Research, 2010).

In contrast to the PhD candidates themselves, library literature indicates that candidates have low information skills, or that they need more training in searching for information. Both Macauley and Green show that librarians have these attitudes (Green, 2010; Macauley, 2001). Their research on the attitude librarians have to the information skills of PhD candidates further develops the conceptualisation of information literacy as a teaching topic. Macauley comments that the importance of information literacy is understood well in doctoral programmes. Nevertheless, he points out that the training librarians provide is focused on filling gaps in students' skills. Green (2010) found that librarians are convinced that training provided by librarians is necessary to handle the necessary information systems, and that a doctoral programme cannot be completed without such training. Green (2010) discusses 'information illiteracy', which is a way of characterising individuals as being information literate or not. Her definition of this concept covers the librarians' description of PhD candidates' information literacy. Green writes the following about 'information illiteracy': 'The assumption of information illiteracy implies that some people (learners) require information mediation while others (librarians) best understand resources, mechanisms, and access to information' (2010, p. 315).

For Green, this means that librarians see their PhD candidates as lacking competencies, and this negative starting point affects their teaching.

Several studies have shown us that the PhD candidates do not see themselves as competence lacking users of literature. It is the teaching librarian who defines the candidates as lacking competencies. They understand information searches as a more complex activity, and they assume that they use more advanced search methods than the PhD candidates and researches do. When librarians teach, they bring along their own conceptualisation of literature searches (Macauley, 2001).

When Green (2010) interviewed PhD candidates, she developed a different view. It became apparent that the candidates have a good range of techniques and ways of handling literature. In her interviews with librarians and PhD candidates, Green found a discrepancy between the information literacy the librarians believe that the candidates have (which they think of as inadequate), and the self-taught information literacy the candidates describe and which is independent of whether or not they have received any library training. Information literacy should not be a pre-defined set of skills that candidates must fit into. Green suggests that information literacy instead should be seen as the use of literature that the candidate demonstrates in his/her work. Green's interviews with PhD candidates show that they are confident and independent in their learning. They are able to and wish to develop their own strategies for literature searches and the use of literature. Though the interviewed PhD candidates did not use the information literacy concept, in practice they proved that they were information literate.

2.5.5 Library training and counselling services for PhD candidates

In the introductory reading for this project, the PhD candidates' literature review emerged as an appropriate arena of collaboration between the library and PhD candidates. A literature review (of various types) requires extensive literature searches, the evaluation of sources, and reference management. Library training and counselling services mainly focus on this topic.

From the literature review, two main models for offering literature review courses to PhD candidates stand out. One consists of running a library course concurrently with or integrated in compulsory courses that the candidates take (Garson and McGowan, 2010; Green, 2006). The other consists of the library offering open courses for the candidates (Rempel and Davidson, 2008). Instead of offering courses, the librarians can assume the role as mentor or co-supervisor for the PhD candidates (P. Macauley, 2001; Peter Macauley and Cavanagh, 2001).

Two older literature reviews (Ackerson, 1996; Libutti and Kopala, 1995) evaluate the services libraries offer PhD candidates. Libutti and Kopala looked at the

differences between the work experienced researchers do on literature reviews and the way PhD candidates handle the same process. In the literature they reviewed, there was little information available on how PhD candidates ought to start the literature review process. They recommend training in effective search techniques, as the candidates prefer to do their own searches.

Ackerson (1996) uses the literature review to create a model for the elements that should be included in library training and counselling of PhD candidates. This model consists of six elements and describes training and counselling services in connection with literature reviews. The model aims to provide PhD candidates with specific tools to manage the collection of relevant literature in their literature reviews. Overview articles enabling the reader to get to know the field are of special interest in this context, and citation searches should be used to find literature published both previously and subsequently. This can help identify key literature in the discipline. The last stage of the model relate to news updates in connection with searches and relevant journals (SDI, alerts, current awareness).

Participants in the libraries' open courses may come from multiple disciplinary areas and have different levels of information literacy. Experiences from Oregon State University (Rempel and Davidson, 2008) show that this can be used to promote learning in the group. It is better that participants share experiences with each other than that library employees talk through/demonstrate functionalities and advanced techniques. The creation of a learning community for participants in the course is also a point for Green (2006), though her courses are held within a learning support system. In her courses, PhD candidates work on varied writing activities, including an annotated bibliography. PhD candidates are expected to produce extensive research within their disciplinary areas in their doctoral work and later. They must therefore have the opportunity to develop their information literacy (Rempel and Davidson, 2008).

In library science, the phrase "embedded librarian" is used to describe a librarian's participation in teaching alongside the teacher of the academic content. This model forms the basis for Garson and McGowan's (2010) account of a course on literature reviews that they held. The course was developed on the basis of PhD candidates' informal feedback about difficulties they had with regard to integrating effective search strategies and their own research questions.

Liaison librarians can have many functions in the collaboration between academic communities and the library. Macauley and Cavanagh (2001) describe an initiative that aims to improve the progress of candidates through doctoral programmes at an Australian university. One of their suggestions is to have a librarian be a co-supervisor in the work on PhD candidates' literature reviews. The collaboration

between the candidate, supervisor and library is seen as central to ensuring effective use of information. In another study, Macauley (2001) asked supervisors and PhD candidates about their attitudes to having a contact person for their information needs. The library's assistance in the candidate's literature searches and use is seen as particularly valuable in the context of their literature review. Additionally, having a contact librarian as a co-supervisor may be important in terms of improving the candidate's understanding of the expertise and relevance of librarians.

In our materials, we have been particularly interested in studies or articles that discuss the online services libraries offer PhD candidates. Two articles (Boden, 2008; Mills, 2005) describe general courses for PhD candidates and researchers (postdocs). One course is online and open access, and the other is provided through a learning support system. Both courses were developed as a result of the increasing emphasis on services to PhD candidates, and a recognition that this user group does not use the physical library. The courses thus function as a communication channel between participants and libraries. Mills' (2005) starting point was that PhD candidates did not need any prior knowledge to take the course. Evaluations and feedback have shown that the level of the course has been seen as suitable. The postdoc course has been developed to give researchers a comprehensive overview of information resources. The course has modules on literature searches and the use of databases, reference management and the publishing process. Great emphasis is placed on making the course entertaining, and the course allows each participant to determine their own learning needs and development plan.

Reports on other courses in our materials are about single courses (Chu and Law, 2007a, 2007b), or are more generally about courses offered by libraries. Many libraries offer various types of training and counselling to PhD candidates, but many others do not have any services that specifically target this group (Fleming-May and Yuro, 2009). PhD candidates in this study are careful about how they use their time, and if a library service is to be used, it must be relevant. Their unwillingness to waste time means that they will not necessarily participate in courses or book time with a librarian. They prefer to drop by the library counter or use online services. It is worth noting that many PhD candidates have negative experiences with the library from their previous studies.

In order for library training and counselling services to be used, the library must actively build a presence in academic communities and a direct relationship to PhD candidates (Fleming-May and Yuro, 2009; Harrington, 2009; Kohl-Frey, 2007). The presence can be online, as this will make the service available when the candidates have time to use it. Direct contact via email and newsletters are also appropriate channels, for the same reasons.

Our data does not contain any studies on the role of the library in relation to plagiarism among PhD candidates. One of the reasons for this was our delimitation to PhD candidates only, as there is significant literature on plagiarism deterrence organised by the library and targeting other users. An American study (Anderson et al., 2007) examines the role that training and counselling plays in the ethical attitudes of researchers. The study shows that the correlation between counselling and ethical attitudes is stronger than the correlation between courses and ethical attitudes. Counselling on ethical issues can both increase and decrease the danger of unethical behaviour. The study showed that nearly a quarter of the informants did not feel equipped to handle ethical issues. PhD candidates give the impression of respecting ethical uses of information. Vezzosi (2009) sees this in the context of wanting to be included in an academic community. An important aspect of the PhD candidates' work situation is their responsibility for teaching and counselling lower-level students. Boden (2008) shows that awareness of plagiarism is related to the PhD candidate's experience of being responsible for his/her own students.

2.5.6 Conclusion: library services, teaching and counselling

Our literature searches were wide-ranging and we found a lot of relevant literature. We have not found all of the literature relevant, yet this compilation of the literature allows us to expand our evidence base for the development of training and counselling services for PhD candidates.

PhD candidates prefer electronic library services, particularly electronic copies of articles (Dumont, et al., 2005; Fleming-May and Yuro, 2009; Green, 2010; Green and Macauley, 2007; Kohl-Frey, 2007; Peter Macauley and Cavanagh, 2001; Rempel and Davidson, 2008; Sentio Research, 2010). This particularly applies to fields in which articles are the most important type of literature. PhD candidates must gain an overview of the research in their field, and prefer to use references as starting points and to follow these backwards and forwards in time (Fleming-May and Yuro, 2009; Green, 2006). According to Ackerson, this means that the library should include this technique in its teaching (1996).

PhD candidates see themselves as competent information users, but may use ineffective search strategies compared to the possibilities that are built into reference databases. Studies on the information use of PhD candidates show that they prefer simple searches (Harrington, 2009; Kohl-Frey, 2007; Sentio Research, 2010).

PhD candidates rarely ask for help from librarians. This is due to their independence and to a lack of information about what the library and librarians can provide assistance with. They do not use the physical library much. Services must be adapted to their needs and should preferably be usable regardless of time

and location. PhD candidates who have participated in courses organised by the library are more aware of the role of the library and find it easier to ask for help (Fleming-May and Yuro, 2009; P. Macauley, 2001; Rempel and Davidson, 2008; Sentio Research, 2010).

Literature reviews are central to doctoral work. Library courses and counselling services focus on searches for literature, evaluations of sources, obtaining literature and reference management. These elements are included in the candidates' work on literature reviews, and this can be an area where it is natural to establish contact between the library and PhD candidates (Ackerson, 1996; Garson and McGowan, 2010; Green, 2006; P. Macauley, 2001; Rempel and Davidson, 2008).

2.5.7 Summary of chapter 2.5: library courses and teaching

- PhD candidates prefer electronic access to literature
- PhD candidates use references as a starting point for their literature searches
- PhD candidates rarely ask for help from the library. This may be due to their independence in the literature searches, and that they are unaware of library services
- PhD candidates write literature reviews as part of their doctoral work. The literature emphasises that the work on the literature review is an appropriate area for collaboration between PhD candidates and the library
- PhD candidates see themselves as competent users of information. In library science literature, there is a widely held attitude that PhD candidates need counselling organised by the library in order to develop their information literacy

3 Focus group study

Mia Beck, Eystein Gullbekk, Hege Ringnes, Tove Rullestad, Maria Carme Torras i Calvo

3.1 Material and method

Using qualitative methods allows us to answer questions that we ask in this project. Questions include how PhD candidates find literature and how they *experience* the transition from being a student to being a PhD candidate. The purpose of a qualitative research interview is to get a sense of the individual's experience of and perspective on a topic, and conversations are a good tool in this context (Fog, 1994). Focus group interviews have been selected as a method because this research method is well suited to providing information on the contexts within which the informants' attitudes, knowledge and practices are developed. This is a method in which the data is collected through a group conversation about a topic that is introduced by the researcher (Kitzinger and Barbour, 1999). The core of the focus group interview research method is that it is the *interaction* between group members that is the source of the data.

The qualitative study in this project consists of three focus group interviews with PhD candidates and two focus group interviews with supervisors of PhD candidates in various disciplines at the universities of Bergen, Oslo and Aalborg. The focus group interview focuses on producing knowledge about processes, understandings and mechanisms in people's everyday life within specific settings rather than on producing generalizable, aggregated data. In the *Information Management for Knowledge Creation* project, modules are to be developed in order to support the learning and research of PhD candidates in diverse disciplines. In other words, the modules must be practical, and function didactically at the local level and in various contexts. Focus group interviews provide data that is appropriate for this purpose.

The interview guides (appendix 7.1) were developed by the project participants based on the first phase of the literature review and feedback from researchers in pedagogy who are members of the project reference group. Semi-structured interview guides were developed for PhD candidates and for the supervisors.

3.2 Planning and selection

Project participants at the universities of Bergen, Oslo and Aalborg contacted their academic networks to recruit participants. The recruitment of participants for the focus group interviews occurred through electronic letters that contained information about the project and a consent form. A simple lunch and a gift card for books were offered as incentives. The important factors in the composition of the focus group included: representation of different disciplines, participation of international PhD candidates, and participation of candidates at different stages of the PhD process. This selection strategy is referred to in the method literature as *purposive sampling* (Polit and Beck, 2004). In qualitative research, it is more important to obtain an appropriate selection than to determine the number of informants (Malterud, 2003).

Eight participants were recruited for focus group interviews from amongst PhD candidates at the University of Bergen, and all participated. The same number was recruited and participated at the University Library of Aalborg. At the University of Oslo, five PhD candidates were recruited and four participated. As for the focus group interviews with supervisors, six supervisors were recruited at the University of Oslo and ten at the University of Aalborg. All participated. In total, 21 PhD candidates and 15 supervisors were interviewed.

3.3 Interview

The focus group interviews were conducted in meeting rooms at the university libraries of Bergen, Oslo and Aalborg. The interviews lasted two hours, and were led by two project participants. Different project participants were the moderators and co-moderators in the different interviews.

The interviews started with lunch, introductions, general information about the project and the interview, and the signing of the consent form, as well as the completion of a form with information on participants' backgrounds (name, gender, age, nationality, institutional affiliation, disciplinary area).

An interview guide (appendix 7.1) was used to ensure that topics we wanted to address were discussed. The following overarching topics were developed for the guide:

- Expectations and challenges in the transition from being a student or employed and to becoming a PhD candidate

- Information needs and practices related to information searches. This topic includes questions about criteria for the selection of literature, preferred resources, and strategies for structuring the work
- Ethics and the use of sources. This topic includes questions related to participants' understanding of concepts such as academic integrity in relation to their own teaching and publishing
- Experience of support in the research process
- Use of social media in daily life as a researcher
- Experiences and expectations of library support

3.4 Transcription

The interviews were transcribed immediately after being completed. One of the interviews was transcribed by a project member who was present during the interview in question. The other interviews were transcribed by external assistants.

3.5 Analysis

The analysis of the data started during the interviews: during the interviews, the moderator summarised what the informants were saying. This was done to ensure that the moderator had understood what was meant, and to help stimulate further associations regarding the topic among the informants. Immediately after the interviews were completed, the moderator, co-moderator and the other project participants wrote down their first impressions from the interviews while listening to the recording of the interview. The analysis can be divided into four phases (Kvale, 1997): 1) In the first phase, project participants developed a comprehensive view of the data and identified relevant themes. 2) In the next phase, project participants identified the units in the text that provided meaningful content in relation to the themes. 3) In the third phase, these units were used as a basis for categorisations. 4) In the fourth phase, they were used to highlight and summarise the meaning of the material. The analysis can be described as an inductive approach, as the data was used to find answers to the questions (Malterud, 2003).

3.6 Verification

Verification concerns evaluating the reliability, validity and transferability of the study (Kvale, 1997). The verification should be an integrated part of the research

process. Here, we account for the most important verification aspects in relation to the focus group interviews.

Reliability is about how reliable the study is. Recording the interview strengthens the reliability by preventing data from being misunderstood or changed because time passes or the researcher forgets details. The reliability is also strengthened because the moderator can focus on the interview itself. Transcriptions were done by different people who with one exception were not present during the interviews. The validity of the study is also about evaluating the extent to which the information that emerges in the study is valid, and what or who it is valid for.

Validity is about questioning the literature, the research one conducts, and how valid the conclusions are. Research is always associated with uncertainty, and it is very important to continuously ask questions such as: 'Are we measuring what we think we are measuring?' 'What do we believe we will find?' 'What preconceptions do the researchers have?' With regard to the project participants in this project, our preconceptions and previous experiences may have affected our interpretations of literature and data from the focus group interviews. A weakness of the project participants' preconceptions may be that university and university college libraries see integrated services for students and PhD candidates as most effective. As previously mentioned, there is also a tendency to think that training and counselling services are a response to a 'deficit model', which perceives the candidates to lack competence and skills in e.g. information searching. Another bias we may have is that we may see ourselves as having greater information literacy skills than the PhD candidates.

One of the strengths of the literature review is that two people have read and extracted information from the included articles. One of the strengths of the focus group interviews is that multiple persons have been involved in the work. To avoid relationships that were too close, we decided that project participants would not conduct interviews at their own institution.

3.7 Ethical considerations

In reporting the results of the study, it is important to comply with the ethical guidelines for informed consent, maintain confidentiality and reflect on the possible consequences of an interview-based study (Kvale, 1997). In this study, our methods and findings are presented in accordance with criteria for confidentiality and ethical norms. The study was approved by the Data Protection Official for Research, Norwegian Social Science Data Services A/S, in November 2010.

The informants were given verbal and written information about the project. The information emphasised that participation in the project was voluntary, and that participants could withdraw from the interview at any time. The interviews were stored on a password-protected computer and were deleted after the transcription was complete. The informants were de-identified in the work with the data, and the material has been anonymised. The background information forms that participants filled in ahead of the interview were shredded once the transcription had been completed. The written consent of participants was obtained ahead of the interviews. The project manager stores the consent forms in a locked cabinet, and these will be shredded when the project has been completed.

The transcription of text raises ethical concerns. We therefore chose to write the quotes in a coherent and more written form than the oral language of the informants, though without changing the meaning. If quotes are retained in their oral versions, they can appear incoherent and naive, and such representations can be unfortunate (Kvale, 1997).

3.8 Analysis of the focus group interviews with the PhD candidates

In this chapter, we present the main findings from the focus group interviews. They are presented in the categories that emerged through our analysis of the interviews.

1. The candidates' experiences of expectations on work independence
2. Their experiences of time and their efforts to be efficient
3. Their skills and strategies in searching for literature
4. How they relate to requirements to academic integrity in their writing
5. The role of publishing in their PhD process
6. Their reflections on quality evaluations of literature
7. Their experiences of preferences for interactions with library research support

Each category is described in a separate chapter, and all main findings are summarised at the end of each chapter.

3.8.1 Independence: a challenge and a privilege

Independence is a prominent theme in all focus group interviews with PhD candidates. The candidates find that one of the differences from their previous experiences of studying or being employed is that they have greater independent

responsibility for doing the work required to complete the doctoral degree. Independence is also mentioned in conversations and discussions about several aspects of the PhD process, and appears as both a challenge and a rewarding part of being a PhD candidate. First, independence means having the freedom to shape one's own research, but this freedom is also associated with a challenging experience of responsibility. Second, independence provides the opportunity to develop individuality in the research, but this must also be balanced with the desire to be part of a research community.

3.8.1.1 Freedom vs. responsibility

> I think as a PhD candidate […] you are really an employee and you are treated as such. But it also means that you have a lot of freedom. You have your supervisor and occasional meetings, and it's not that. You have the 30 credits of course work you need. But in my faculty you are pretty much free to do what you are interested in. So there is a lot of freedom and there is a lot of responsibility that goes with it. […] I think you could not really do anything for two years and get away with it. I can't imagine why someone would want to do it, but it is perfectly possible. (Oslo P0)

Here, the candidate points to the tension between the *freedom* to be independent and the *responsibility* associated with this. The expectation that PhD candidates are able to complete a PhD project independently gives the candidates a sense of freedom but also of responsibility. Freedom is largely tied to positive words and phrases such as 'doing what you are interested in', but it also means that you must 'do what you believe is best for the project'. Candidates emphasise that freedom is one of the big challenges related to being a PhD candidate. Freedom means that the candidates have sole responsibility for completing their projects.

The freedom that PhD candidates have is both material and intellectual. Several of the candidates discuss *material conditions* that provide freedom. These may include privileged access to research resources, or being allocated an office, and in Norway having employee status and thus receiving a salary.

> You have keys, and that means also having keys to the strange archives in the department's collections. (Bergen P3)

> The greatest change is probably having your own office and receiving a monthly salary, actually. You also get operating costs, so you have different

> opportunities from those you had as a master's student. As a master's student, you had to study in the library or in a reading room, so the situation is much better. (Bergen P8)

> I think you get the feel of it from the beginning: You are employed, you get a salary and you don't have the exam. It's an immense change from being a student. (Oslo P3)

Freedom is nevertheless primarily defined as intellectual: "It makes it easier to think for yourself and to do something original" (Oslo P2). Intellectual freedom is experienced as a condition that ensures that the PhD process results in original contributions to research.

3.8.1.2 Freedom, community and ambivalent feelings

Belonging to a community is a topic that the candidates frequently mention in the focus group interviews. They have a stronger feeling of belonging to the academic community than they did as master's students. "I feel more attached to the larger something" (Oslo P0). The PhD candidates find that they are in the process of being accepted as members in the academic community. "They often express this through terms such as being part of the gang (Bergen P1) or 'giving a presentation to the congregation'" (Bergen P8). Beyond the sense of academic belonging, the candidates also emphasise the importance of the social setting. International candidates are particularly focused on the social community. They experience an especially challenging situation at the beginning, as they must integrate both in the Norwegian academic community and in Norwegian society generally. Having a social network simplifies this process. "Social activities that are not strictly academic are very important", says one of the candidates, "(. . .) having this kind of social network is tremendously important. Especially if you come from abroad" (Oslo P0).

The tension between freedom and responsibility creates ambivalent feelings about belonging to an academic community. The candidates emphasise the positive aspects of having a stronger network than only the supervising relationship, and would like to be closely followed up on by others in the academic community.

> It is not good to be alone or [only get advice from] your supervisor. It is good to be surrounded by colleagues, and faculties and supervisors. (Oslo P1)

> At the beginning, I was expecting that there would be more preparation in the department than there is, and it didn't take me that long to understand that this is my responsibility, it is my project and everybody is just as busy as I am. So there is a very fine balance between interacting with everybody who is there and expecting feedback the whole time and having a creative environment, and the fact that everybody actually has a lot to do. (Oslo P2)

At the same time, candidates say that the freedom of being a PhD candidate should not be restricted too much.

> [...] at the same time, I can see some tendency towards an American model and in the long term I can see us becoming PhD students, which I don't like. Freedom is important. (Oslo P2)

> I think that it is a very good thing, a very positive thing that we have so much freedom and that we have this responsibility. We really are considered researchers. We are not considered students any more. We are researchers. It's good to have some additional training, but it is research training rather than classes, as I think it is in England or in the US when you are doing a PhD. You are a PhD student and you are still considered a student. So your status is also very different. And here we are considered researchers and employees. (Oslo P0)

3.8.1.3 Summary of chapter 3.8.1: independence

- The candidates experience greater requirements to be independent in conducting their project than they have experienced during previous studies or employment
- Perceived requirements to independence is supported by the experience of great *intellectual and material freedom*
- At the same time, the candidates find that they have a responsibility to *manage their freedom* within the framework of the PhD period
- Being recognised as a member of an academic community means a lot to the candidates, both because they receive academic support beyond what can be provided in the individual relation to a supervisor, and because they gain a social network
- Nevertheless, the candidates are ambivalent about academic feedback and support within their local academic community, as they value the intellectual freedom they have in the PhD project

3.8.2 Time and efficiency

In the interviews, we have seen that the candidates value the intellectual freedom that independence provides. At the same time, they strive to manage the associated responsibility in the best possible way, particularly with regard to the use of time.

> First of all it is a matter of time management. You can use your time whatever way that you think is best for your project and you don't really have to explain to anybody what it is that you have been doing. (Oslo P0)

A simple word count of the transcribed interviews reveals that 'time' is a concept that appears very frequently. The word appears twenty times in different contexts in the first interview alone. Unsurprisingly, time is considered a critical and limited resource, and the management of this resource affects various aspects of the PhD candidates' work. The experience of time as a limited resource emerges through the informants' focus on efficiency in their own work and priorities. The candidates' supervisors confirm this. One of the supervisors who participated in one of the focus group pointed out that "it is noticeable when our candidates are under pressure; in other words pressed for time" (Oslo V3). Another supervisor points out that this is a challenge that has been on the increase in recent years. He compares the current situation to his own situation when he was a candidate.

> I don't think it is easy. When I was a doctoral student, there really wasn't a time limit. I used five and a half years, and after three years I felt I had lots of time. These [candidates] only have three years, and after two years panic breaks out if they have not yet published an article. And then it's not easy to sit down and read peacefully. (Oslo V4)

The supervisors notice that the time pressure affects the quality of the work. This is considered "a clear problem" (Oslo V6). As this supervisor says: "You are left with the enormous requirements to literature, the dissertation and the definition of a project […]. The quality of the thing has a lot to do with time pressure, among other things." (Oslo V6)

In the next section, we see that it is important for the candidates to identify aspects of the work in which efficiency improvements can be made.

3.8.2.1 The pursuit of efficient methods

For PhD candidates, it is important to find timesaving strategies. Some parts of the research take time, and it is acknowledged that research takes time. According to

one of the informants, the main activities in the research are "to read, write, think and drink coffee" (Bergen P6). Analytic thinking and understanding require time and a sense of calm. However, locating information or scholarly literature that must be read, analysed and put in context, is not something that candidates wish to spend a lot of time on. "If I really want to find something, I think of how to be efficient about it", says one of the candidates, before providing an example:

> If it is electronic and I know someone who has it, I can just send an e-mail and ask him to send it to me. Recently I needed a PhD thesis from Oxford and I knew a person who probably had it and I e-mailed the person and asked whether she had it. Two hours later, I had a copy of it. So this was very efficient instead of going to the library. That would have taken a week. (Bergen P5)

The efficiency requirements can affect and even change research practices. On being asked directly whether articles dominate in the discipline of one of the participants, the participant replies:

> I think so, but that is probably related to access. You can get most articles within seconds if you know about them, while you have to go the library and place an order to get a book. I think that does something to what type of information you collect. (Bergen P7)

This tendency to choose what is most easily available appears to be more prominent in disciplines in which *both* articles and monographs are significant. One of the participants who works in the humanities clearly states that: "I just get more set on it if I cannot get hold of something. Then I get angry and must have it" (Bergen P1). However, participants who do their PhDs in disciplines in which books dominate, also show some degree of change in their work methods. The candidates discover new tools that may be appropriate:

> Google Books can sometimes be very useful. You don't get the entire book but you get a number of pages. It can be extremely useful if you don't need the book that much but you want a general idea about what it is about. (Oslo P0)

The PhD candidates appear to simply assume that work on literature collection should be completed in a time-efficient manner. As we will see in the next section,

they therefore become aware of issues that inhibit efficiency as they find these to be very irritating interruptions in their work.

3.8.2.2 Issues that inhibit efficiency

In the focus group interviews, five issues that inhibit efficiency emerge. In this section, we look at these issues:

- systems that do not function appropriately
- competence areas that are not contextualised sufficiently
- cultural hegemony that characterises the accessibility of literature
- library routines for e.g. indexing, purchasing, inter-library loan and journal subscriptions
- copyright

First, candidates find that systems such as databases and inter-library loans are not always organised in a manner they find appropriate to their needs:

> I absolutely share your frustration regarding databases. When you use Google Books for instance, it can be useful but there are frustrations all along, and there may be some pages that are not shown and that is often the table of contents, so you can't find information about what the book contains. Should I spend energy on this book or not? In relation to BIBSYS, it is possible to order inter-library loan from the database, but then the frustration is that you can borrow them for two weeks and these are often not books that you can read and return. These are books that you need, and right now I have a huge book that I need, that I cannot read now and I do not need to read the book in its entirety, but I do need it as a reference. Am I to photocopy up to 300 pages, or what am I supposed to do with this giant book, right? I have to return it, and I have already started getting reminders about it, and things like that, and it is frustrating. (Bergen P1)

> I have mixed experiences, and I think it is really good that I can order articles, and I think they are good at loans and such things, but my great frustration is that the books must be returned at once and I feel like I am in a bit of a Kafkaesque nightmare these days: BIBSYS. All the books that I borrowed when I started hundreds of them, they now want them back, and it is not easy to do anything about it, I imagine myself with a shopping cart full of books going back and forth.

The candidate sees the tools and systems that are accessible as not always being on his side. Google Books often provide exciting results, but the road ahead to get the contents of the texts appears inaccessible. The library's borrowing regulations are not adapted to the needs one might have when working on a large project over a longer period.

Some are also unsure of the databases when they search for disciplinary literature because they do not have confidence in the way the databases organise information, particularly the keyword systems. "This thing about the keywords the database has", says one of the candidates (Bergen P8), "it is not a given that they are experts in the fields I research, so it is not a given that they have used relevant keywords for things that I am trying to find". The candidate notes that this often results in hundreds of results that must be assessed. Their concern is then that "these things take time!"

Second, the candidates are often unsure of whether they use the databases appropriately. They find that knowledge about literature and terminology in the discipline does not correspond sufficiently put with competence in using databases for literature searches. For instance, which databases are appropriate in various academic contexts, and what is the connection between disciplinary concepts and appropriate keywords?

The candidates find it frustrating that they are unsure of how to use the databases and feel unable to realise the potential that they believe the tools have to make their work more efficient.

> I notice that I should have been smarter about it, better at searching in different databases with the right keywords. Sometimes I think I should get better at searching in order to save time. (Bergen P7)

When the candidates say that they feel uncertain about the use of the databases, they are uncertain both about the way that information and library science organise the databases and of their own competency in using them. In the focus groups, these two aspects of the problem are discussed in relation to each other:

> I remember that I had a class with a librarian early in my candidacy period. She was really good at showing me how to make use of them, but she did not know the scholarly literature very well and also did not know the area I was writing about, so she did not know which databases were relevant. When I asked my academic supervisors, they just said "well, I just use Web of Science", so they were not up to date about the search engines available

> and the opportunities that are there. I felt that there was an area that was not covered there, and that required both information gathering and a relevant academic background to know which databases to search [...]. So I imagine that I have not been fully trained in it, and I could probably have saved time if I was better at searching. (Bergen P7)

> I had the experience with my library that although they are very accurate in their searches, I have discovered relevant articles that they did not find. So you can't actually trust these searches done by others, because they are people and mistakes may be made. (Oslo P3)

The candidates focus on different competency areas that must be seen in connection with each other. On the one hand, they emphasise a lack of knowledge about literature resources in the academic community, and on the other hand, they wish that the library staff they have been in touch with had better foundations in the candidates' disciplines.

Third, candidates find that the accessible literature is dominated by literature from English-speaking cultures.

Some of the discussions in the focus groups centred on available literature collections and databases that do not always conform to the source requirements of some of the projects. This particularly applies to research in the social sciences and humanities focused on themes outside the Anglo-Saxon cultural sphere. "English language books and articles are not that difficult to get hold of", says one of the candidates who is doing a doctoral degree in the humanities. He says that if relevant books in English are not available in the local libraries, the libraries can usually get these quickly through inter-library loan. "Usually it works quite well. So I have a pretty good overview of discussions published in English", he says. However, problems arise when he needs literature published in the language he researches for his dissertation. "What is written in [language][1] is much more difficult to get hold of." (Oslo P0)

This became a topic in the other focus groups as well.

> If I want to find something on a Danish case, then it is hard to find it in Web of Science […] I would say that it is heavily biased towards the UK and USA. And that is why I tend to use other databases than Web of Science. (Aalborg P1)

1 Anonymised language.

The candidate from Aalborg uses large interdisciplinary databases such as ISI Web of Science, but she has access to alternative databases. However, the candidate from Oslo has a problem that requires significantly more work to obtain the necessary information. This is a problem he shares with several others.

> In my field, and for my data, I use books that are not available in European libraries. I have to find them myself. They also have to be digitalised. […] They are published in the States, for example. Dictionaries, for example: there has been a lot of correspondence between the publisher and the university here, because they do not give us […], it costs a lot of money. And digitalized books is the data I need, […] so it is the individual researcher who must find books that they need for their databases. (Bergen P5)

Fourth, the books that candidates would like from their libraries are often those that are especially expensive, rare or old. They therefore find it frustrating that the libraries have not sufficiently prioritised the acquisition of such books.

> My primary sources are texts that are mainly in [anonymised language]. Thus my main challenge is finding good editions of such texts. It is not always easy; these tend to be expensive books that the library does not have. Sometimes they are also very old books. Occasionally, I get lucky and someone at Harvard has scanned them and uploaded them on the internet. Or, one can be unlucky and not get hold of them [...]. (Bergen P1)

Fifth, candidates sometimes encounter copyright issues that prevent them from obtaining the literature they need. Candidate P5, who spent time corresponding with publishers and international colleagues about literature not available in Europe, points out that getting these materials digitalised and sent presents copyright challenges.

3.8.2.3 Summary of chapter 3.8.2: time and efficiency

- Time is perceived to be a critical and limited resource in the PhD process
- It is important to the candidates that they find the most efficient methods for their projects
- The work on identifying literature is something that clearly can be made more efficient
- The need for efficiency can affect the choice of literature and may change research practices in some disciplines

- Issues that candidates believe to be unnecessary hinders when they are looking for literature include:
  - that in their view library systems, for instance the keyword system or inter-library loans, are not always appropriately organised
  - that academic competence does not sufficiently correspond with competence in the use of databases and other sources of literature
  - that the accessibility of literature is characterised by a cultural hegemony
  - that the libraries do not sufficiently prioritise costly, rare or old publications
  - that copyright sometimes limits the literature that can be obtained

3.8.3 The work on finding scholarly literature

3.8.3.1 Obtaining literature that has been identified as important

The candidates have many strategies at hand with regard to obtaining specific literature that they have identified as relevant or necessary. They often show great willingness to make extensive efforts to this end.

> You constantly need new literature and the system works. You write it down on a piece of paper and submit it to the librarians. They order it from other Scandinavian libraries. (Oslo P3)

> I usually use articles that I search for in various databases such as PsychINFO (Bergen P4)

> I work on [type of material] and this is a type of material for which there is an incredibly poor system. There is little overview of what is available here in this building, nationally and internationally. You have to expend quite a lot of effort to find it. You have to travel, look in attics, and then have it digitalised. (Bergen P3)

> Google Scholar links to the university, so I can open the articles later. That is very convenient. (Alborg P4)
> I can just send an email to a person and ask him to send it to me. (Bergen P5)

Based on their own experiences of what is most efficient, the candidates use a variety of strategies: they send emails to their academic network, they consult what they perceive to be the most relevant database, they visit relevant locations (archives, bookshops), or they go to the library. Google Scholar is used to get access

to materials in full text. It is also clear that they use different tools for different purposes. The PhD candidates express no expectation that one tool should meet most information needs.

3.8.3.2 To get an overview

The candidates know what to do to get identified literature to their desks. There is more uncertainty associated with the work on getting an overview of themes, academic debates, or fields of literature. The candidates find that they are required to have an overview of their research field, and they are unsure about this part of their work: have they selected the right databases? Have they used the databases appropriately? At what point do they have sufficient literature? Have they used resources that can provide exhaustive answers? The candidates say that they are often unsure about when they should move on in their work. In the interviews, they say they are unsure of two things: have they used the right *methods* to gain an overview of the field? Have they acquired a *sufficient overview*? However, we will see that the uncertainty is alleviated through the candidates' understanding of research as a process.

The first question is whether they have used the right methods. The PhD candidates describe various methods that they use to gain an overview of a topic or field of literature. They build academic networks at seminars and conferences, they maintain the networks by keeping others updated, they sign up for e-mail lists, they get alerts, and they search in various databases. There is one strategy that dominates across disciplines, and that is tracing references. This means that the candidates trace references forwards and backwards in time. Everyone actively follows reference lists and citations that create relations between the publications.

> I use the bibliographies of other books a lot. If I have a good book that is related to what I'm doing, then I always read the bibliographies carefully. (Oslo P0)

When tracing references, candidates are unsure of whether the methods they use to gain an overview provide results that are good enough. One of the candidates concludes the conversations about this with: "This is mostly an uncertainty about whether I do it in the most efficient manner possible" (Bergen P7).

The PhD candidates do not find their supervisors to be ideal role models or teachers when it comes to searching for literature.

> [...] the supervisors, I don't know whether they search databases much. It is difficult to get help from them. (Bergen P4)

The second question is whether they can be sure that they have gained a sufficient overview or control of a field of literature. Several see this as a challenge, as shown in this quote: "It is especially difficult to be sure that you are really up to date and you haven't missed something" (Alborg P2).

The work on the doctoral project requires a good overview of the field and of the relevant disciplinary areas of scholarship, and the ability to see one's contribution in the *context* of other contributions in the same and/or related fields.

> the most important things are first of all to know the state of research in what you actually do. And be able to place yourself in relation to what is going on in your field. At the same time, you must try to contribute something original, and something that expands the field. (Oslo P2)

> And to keep up with the broader literature, so you get the opportunity to place your current project in a broader field of research. (Oslo P3)

These candidates are aware that being in control of the literature, or in other words trusting that they have gained an overview of relevant literature, is important in order to ensure that their own contribution is of sufficient quality. They are clear that others have expectations of their overview of the discipline: "I consider it extremely important to be as in touch with the literature as possible of course." (Oslo P3). Some find the requirement to gain an overview to be very broad:

> For me it is very important, because if there is an article out there, even if it is in French or German, or wherever it comes from, if it is an article sort of touching on the same things that I'm writing about, and if I haven't consulted it or referred to it when writing, then it's not very good for the project at all. (Oslo P2)

The feeling of not being in control of the literature is often caused by being unsure of one's skills in the use of available tools.

> I think it is mostly about uncertainty about whether I do it in the most efficient manner possible [...] I needed to find literature about a discussion

> about [question][2]. I was in Google Scholar. I spent an hour looking around. I imagine that if I had a skilled assistant or was skilled myself, I could have done this in maybe ten minutes. (Bergen P7)

The possibility of missing something that is important to the project leads to some level of worry. Candidates wish to guard themselves against such loss of control. "It is difficult to keep up if you are to encompass the entire breadth of the field and avoid missing something" (Bergen P8). However, the extent of this worry falls within a rather broad range. As we saw above, for some it is nearly catastrophic if relevant articles exist that they have not consulted or referenced. Others are more pragmatic:

> at some point you just have to say okay, too bad I can't have everything in my bibliography. You just have to accept that it is not 100% complete. But you do still want to at least have all the major references. (Oslo P0)

The candidates find that there is a conflict between on the one hand having good access to literature, and on the other hand encountering practical problems with finding or obtaining the literature. However, most manage this conflict by seeing research as an on-going process. The feeling of not having an overview of the literature, the frustration of not finding or not being able to choose among what one has found, is partly normalised through this attitude. The feeling of uncertainty can be a stage of the maturation and the gradual sharpening of the focus in a research project:

> I don't feel afraid that I'm going to miss something. I did so in the beginning; I tried to search so I got all the new materials, and then I acknowledged that I couldn't have everything. And in any case I couldn't read everything. So by depending more on the snowball method, I think I get what is relevant and I definitely will get the big ones. Because they'll be cited a lot, right? So, I will definitely encounter them at some point in the process, and I have three years so hopefully I will get around and know what is relevant for me. (Aalborg P1)

2 Anonymised question.

3.8.3.3 Summary of chapter 3.8.3: work on finding scholarly literature

- The candidates find that there are great differences in accessibility depending on the type of literature they are looking for. Newer, secondary literature in English is the least problematic
- The age, price, origins, and copyright of the literature, as well as the infrastructure in databases and libraries, are factors that make access to literature difficult
- Depending on how difficult it is to obtain literature, the candidates use many different strategies to get hold of what they need. They often contact places other than the library
- The candidates see being in control of the relevant fields of literature as an important part of their research
- The candidates are far more unsure of how to gain an overview of a field of literature, than they are of how to obtain literature they have identified
- The conceptualisation of research as a process in which overviews and understanding gradually grows eases the sense of frustration and uncertainty in the work on searching for relevant literature

3.8.4 Challenges in the use of sources

'Academic integrity' was one of the topics we introduced in the focus groups. To us, 'academic integrity' meant complying with requirements to transparency and verification in academic text, not least through references to sources. However, in the interviews, different definitions of 'academic integrity' emerged.

For some candidates, questions about references to sources and citations relate to research methods:

> academic integrity is seen as taking full responsibility for your own interpretation of the sources the research is built on. One candidate in the humanities explains integrity to mean that "I check the sources and do not just cite the secondary sources" (Bergen P1). For this candidate, it is also important to be faithful to the original meaning of the texts he works with, because, as he explains, it is important "to try to not represent things inaccurately, and not force one's own interpretation onto the material". According to this candidate, a breach of academic integrity occurs when "people twist the sources so that they say what they want them to say, so this is something one must keep in mind at all times, so I need to think about that." (Bergen P1)

As an extension to this, integrity means making sure that others can fully check your interpretations.

> If you have a translation in the text, you need to have the original text in a footnote. This is a type of integrity in which people can check whether your translations are correct, or whether your interpretation is correct [...] This thing about ethics is more like what P8 and P2 said about the way sources are handled. My sources are just texts, so then it's about not erroneously taking them out of context, etc. (Bergen P6)

Both of the above candidates work in the humanities, and texts are central objects of research. We see that P6 distances himself from candidates in the natural sciences. He believes that academic integrity must be understood "more like" his colleagues in the humanities describe it in the interviews. In disciplines where the objects of research are not primarily texts and in which the literature primarily provide perspectives on the topic, the candidates are more likely to point to formal aspects of writing. Integrity is still about transparency, but this is ensured through the correct use of formal citation techniques:

> I know about quotations, and I am very familiar with plagiarism and that sort of thing. (Oslo P0)

> I think it is about the quotation rules that you don't cut and paste from places without referencing (Oslo P3)

The candidates generally find that the rules for handling references, quotes and citations to be unproblematic.

> Yeah, it is important but it is not something I have thought much about to be honest. It is something that just comes automatically, like learning a skill (Oslo P0)

Academic integrity is primarily ensured through writing well, and referencing texts correctly. These are skills the PhD candidates believe they have. "It is the new students who are having a hard time", they say. Yet after having completed a master's degree, students should be fully trained in citation and referencing.

This attitude is not as prevalent in cases where texts are the objects of research. All candidates believe the technical skills must be sound, and this includes the

candidates in the humanities. “If you have lasted through a bachelor’s and master’s degree and a doctoral degree, then you should be very well trained in these things and it should not be a problem”, says P6 in Bergen. However, an entirely different type of uncertainty emerges in relation to the use of sources. Citations and the representation of texts through direct or indirect quotes is so closely interwoven with the academic analysis in which new knowledge is generated, that the risk of producing poor research is seen as a risk of the writing process itself.

However, the supervisors do not agree with the candidates that they have internalised knowledge, skills and attitudes regarding the use of sources:

> I just want them to attend the information [searching] courses and also participate if something is offered on academic integrity. Of course, I must first take it myself, so that I know what is being said to them, and so that we have a common frame of reference. I have actually experienced sitting around discussing and explaining in a more or less pedagogic manner about plagiarism, and then the PhD student’s response is “What is that? What is plagiarism?” (Aalborg V11)

Furthermore, the supervisors believe that differences between PhD candidates lead to different understandings of academic integrity, reference handling, and the mastery of research methods.

> Well, our experience reflects the great diversity among our PhD group, so there is not a single model for how they learn to search for information. I agree with the students coming from our own ranks. They have a handle on it, because they have been exposed to journal articles previously for example, and are used to searching, but our foreign PhD students are an entirely different matter, and I would say that one year is not at all enough for them. There are three years of intense follow-up of the PhD students, because some of them come from completely different cultures – academic cultures – in terms of how you do research, how you search for information, how you cite literature. We must always be very attentive to make sure we don’t end up in a critical situation. It is a learning process for them to understand that they must not plagiarise. This applies to basic rules such as how, what good behaviour is, it’s not in place at all. So that is three years of intense work, and I don’t think anyone foresaw that. Sigh. (Aalborg V10)

3.8.4.1 Summary of chapter 3.8.4: challenges in the use of sources

- The candidates have different understandings of academic integrity in relation to the use of sources
- The use of sources in a manner that shows academic integrity can be seen as a technical writing question, but also as a question of research ethics related to the object of research
- The understanding of what academic integrity means varies across disciplines
- Different understandings also partly form a division between those who see a proper and correct use of sources as a practice one has learnt and gained confidence in previously, and those who see it as a complex field in which one must continue to develop skills
- The supervisors are more likely to see the candidates as novice users of sources

3.8.5 Publishing

As we have seen, there is agreement in the focus group interviews that producing an original contribution to the academic field is a core task for the PhD candidates. However, the candidates do have different opinions about the extent to which the original contribution must be published. Whether candidates prioritise publishing or not depends on their experiences of others' expectations, on the supervisor's attitudes, and on formal requirements to the doctoral dissertations. In the interviews, we found three main perspectives on publishing: 1) as important for future career opportunities, 2) as a part of the learning process when training as a researcher, or 3) as not possible within the framework of the PhD process. Those who want to publish ask themselves whether they have the time to do so. As we have seen previously, time is seen as a scarce resource. For that reason, some see *open access* as an interesting alternative.

3.8.5.1 Motives for publishing

First, publishing is sometimes seen as a necessary strategy to position the candidate for a future academic career.

> It is an implicit expectation. Yet my supervisor says that "you have one task, and that is to write your dissertation." But I have to think about having a life after the dissertation. So I do feel a pressure to publish, but it is not an explicit [pressure]. (Bergen P1)

This candidate is not alone in stating that there is a sense of expectation built into the system. He is writing his dissertation in a discipline in which there are no formal

requirements about publishing articles as part of the dissertation. Nevertheless, he believes it is necessary to get material from the dissertation published.

Secondly, publishing articles can primarily be seen as part of the learning process rather than as something that builds merit. Some candidates assign a different status to their writing than that given to the professional writing that researchers do at later stages of their careers. A candidate from Aalborg notes that her supervisor may say that: "okay, we will try to submit this paper to a journal that is interesting to us but it does not necessarily need to be a very high ranking journal". The candidate thus concludes that: "[…] It is an exercise in learning the process. That will be important in the future." (Aalborg P7)

Third, in the interviews we have seen that publishing is also seen as something that is not relevant.

Focusing on publishing in addition to writing the dissertation is not seen to be necessary; it is enough to contribute to the field through the dissertation. These views may also reflect the voice of the supervisors. In the Aalborg focus group, one of the candidates quoted their supervisor: "You should definitely write a monograph. I don't think about [publication] points. That is something you can do when you get a lectureship or something like that." (Aalborg P1)

3.8.5.2 Fast publishing

Some candidates consciously and strategically select a publishing channel. They often refer to their supervisor's attitudes and opinions and aim to publish in top-ranked journals. "My supervisor wants me to publish in journals that give numbers, points" (Aalborg P6). This is typical for candidates who write article-based dissertations in which the articles that are submitted for publication are identical to those included in the dissertation. We can also see that these candidates refer to expectations and support from their supervisors in the publishing process.

The candidates who aim to publish during their PhD period, but who are not formally required to do so, appear to be more focused on publishing quickly. They tend to prefer types of publications in which it is easier to get papers accepted, in contrast to publications that require more time and strict peer review. Such publications include conference proceedings, book chapters, smaller journals, or invited papers:

> To be honest, I think at this stage it is conference proceedings and maybe if you are lucky, a chapter in a book. These may be a bit easier to get into than some of the major journals that may take a lot of extra time and you have to show a lot of initiative. (Oslo P0)

> It is a bit by accident, because you may be thinking about writing something on [a specific topic], and then a journal comes and asks if you can write an article about that. So then you think that it sounds interesting and why not? Even though it might not be that highly ranked. (Bergen P6)

Further, the candidates may be strategic and submit an article to a journal in which a debate is already underway on a topic that is closely related to their dissertation topic.

> I have a set of journals that are relevant in the first place, and then I try to find a journal that has recently published something that is […] relevant to the subject I am writing about. (Oslo P3)

3.8.5.3 Is open access an alternative?

Time and the use of time is a significant aspect of any publishing process. To the extent that the candidates are familiar with open access publishing, saving time is often mentioned as an interesting aspect of such publishing. "[. . .] I have thought about publishing in Open access journals, because it is a lot easier, and it will probably be more worthwhile" (Aalborg P1). Open access seems to be an alternative because the publishing process is faster compared to traditional journals.

However, the extent to which candidates may know about open access publishing varies considerably. In general, it seems that this is a phenomenon that is quite peripheral in their daily life. As P4 says:

> For me, it has not been part of my discussions with my supervisor or in the PhD project. However, in the methods course and the introduction course, it was discussed although I have not thought much about it in relation to publishing. (Bergen P4)

An interesting division emerges in the candidates' attitudes to open access publishing. Open access is considered to be both a publishing channel and a source of information. As a resource for gathering academic information, the candidates are more sceptical due to academic quality. They cannot assume that the publications have the required academic quality. This leads to undesired extra work on evaluating the quality of the material. In contrast, in traditional journals there is a peer review process that provides quality assurance for the publications.

> I find it difficult to judge the quality of what's in open access journals. Is it peer reviewed? How many people peer reviewed it? Is there a community behind it that is strong enough to review it in a good way? (Aalborg P1)

That open access publishing is not free is another significant disadvantage for the candidates. This is an unpleasant surprise to some.

> For me it was a big surprise that you need to pay the journal to publish. Oh my god. We don't have that much money for publishing. (Aalborg P7)

3.8.5.4 Summary of chapter 3.8.5: publishing

- The PhD candidates believe it is important to contribute original research in their PhD projects
- Not everyone believes that *publishing* the original research contribution while working on the PhD project is equally important
- The candidates have various motives for their potential publishing:
  - Some publish because it is expected of them, either because they are required to produce an article-based dissertation, or because it is seen as strategically important to build merit for a future research career
  - Some publish because it is an important learning process
  - Some do not see it as relevant during the PhD process
- Peer review takes time, and the desire to publish quickly lowers the requirements to the ranking of the publishing channels. The candidates tend to publish when they
  - Are invited to contribute a book chapter
  - have a paper published in conference proceedings
  - are invited to publish about their topic in a journal
- Open access is seen as a quick publishing channel and seems attractive to some, but participants in the focus groups had little knowledge about open access

3.8.6 Evaluation using impact factor

In the focus group interviews, candidates discussed their experiences of impact factor (IF) and its significance to their PhD work. IF is not seen as a particularly relevant indicator of the relevance of the literature, but some nevertheless see it as an important mark of quality. There are great disciplinary variations, and IF is a parameter in which candidates have different kinds of interest. Many do not use IF as a tool in selecting a publishing channel or to select literature for their own work.

The starting point is whether the material is significant to them and their project, and not the IF the material has.

> Whether a text is interesting and provides you with something is more important than whether it is published somewhere important. At least that's how it is for me. Also, there are a lot of reasons why an article does not end up in the important journals, but it can be important to you and your field. (Bergen P8)

There is a clear division between the disciplines in terms of whether formal quality parameters are relevant. P8 in Bergen is backed by P6 and other candidates from the humanities and social sciences who participated in the focus groups.

> It is so much more difficult to assess Impact with regard to particular types of texts that some of the participants here work with. Therefore, it is very difficult to say whether a text that ends up in a particular journal is better than another. At least within my discipline [in the humanities]. (Bergen P6)

Thus, IF is a parameter that some candidates are not well aware of, and that is not seen as a relevant indicator of relevance. Others look at IF when they evaluate the quality of a journal.

> I think of it as a mark of quality that the article has been accepted in such a journal. Even though it depends a lot on how one writes. If you have a choice between one that has a high impact factor and one that has a low one, I would take the high one. (Bergen P2)

Here, this candidate sees IF as a relevant criterion when she selects where to publish, but not when she chooses what to read. This is a shared attitude in the focus groups, and is explicitly stated when the candidates talk with each other: "For me, I mostly think about it when considering where to publish. But with regard to what to read, I do not think about it." (Bergen P4)

3.8.6.1 Summary: evaluation using impact factor

- Many do not use impact factor as a tool for selecting a publishing channel or for selecting materials to read for their own work

- For some, impact factor is an important mark of quality, but primarily in choosing a journal in which to publish and not in terms of selecting literature to read
- There is a division between natural scientists and medical students on the one hand, and social scientists and students in the humanities on the other hand

3.8.7 Research support from the library

All focus group interviews concluded with a conversation about the informants' experiences of and preferences for research support from the library. In the conversations, the candidates provide ideas about what they see as appropriate research support from the library, based on services they already use and services they would like to use, both physical and online services.

3.8.7.1 Training needs

Based on their experiences of the library, the candidates provide several suggestions for training and advice. Relevant training areas include those focused on how to search for academic information and how to manage the information.

> I think I would recommend a course on EndNote. And on search engines, preferably tailored to each discipline, because the humanities and social sciences are quite broad. Actually, it could be more departmentally oriented. I think it could save a lot of candidates' lots of time. (Bergen P2).

It is not uncommon to do what this candidate does: making suggestions for training and counselling in the context of handling time pressure. Additionally, some candidates would like courses on copyright and training in research registration (such as the Norwegian research registration system CRISTIN).

New PhD candidates ask for more general introductory courses in library services, preferably in the form of an orientation that can be integrated in the other introductory services at the university. "For instance a few introduction days with all sorts of introductions including a library introduction" (Oslo P0).

The international candidates have particular needs for general information: "It might be useful to have some kind of other service for international students". (Oslo P3)

Candidates express a preference to receive library training early in their PhD programme ("during the start-up seminar", Bergen P3). This is partly because candidates have fewer responsibilities and thus more time available at this point in the programme: "It would be smart, and preferably at the beginning, because after a

while you get better at saying no to things" (Bergen P8). However, the supervisors had some concerns about introducing the tools too soon.

> It is about the timing in relation to when they can realistically start using these tools for anything, and it is about having a sense of the field they are working within. That is something that some of our PhD students do not have. They have an idea for a project, but they do not necessarily have a very developed idea about the field and I actually think that is a condition for them to be able to conduct meaningful searches. There is a balance there that I think we struggle with a bit, actually. (Aalborg V7)

This supervisor thinks that it is important that the candidates understand their own project before conducting broader literature searches.

3.8.7.2 Evaluation of current physical services

The candidates find library courses useful for a number of reasons. They say that they gain insight into, for example

- how to get an overview of information
- how to use alerts
- how to best utilise access to a journal
- how international candidates access important resources at the host institution when in their home countries

One of the candidates concludes that all these topics were "very interesting because really [the course] was very precise in ways you can scope information" (Aalborg P7). The supervisors also confirm that library courses are very useful.

> Of course I can see that it expands their knowledge and the way we launch them now , where we produce article-based dissertation [...] it is very important that they take those courses and I can certainly see that there is a great difference between their academic skills. (Aalborg V2)

When asked to provide a general evaluation of the role of the library as a support to their work, some say that the library is peripheral to their everyday life as a researcher*:* "In our everyday work we do just fine without [it], but it is good to know that the university library is there when it is needed" (Bergen P6). This may be due to the candidate's preferred mode of learning. Some are most comfortable with

independent learning. "[...] I like to manage on my own, to find my own way, but I could definitely save time by asking them" (Bergen P8). Online guides can facilitate these candidates' learning: "if only there was a website", one of the candidates says, "or something explaining things; to me, that would be much easier" (Oslo P2).

Other candidates would like online support to be combined with a face-to-face service.

> I like the concept of e-learning because it can help us learn independently. But sometimes I think […] I have limited knowledge about computers, how to use them. I still need people to guide me and to give the lecture, and as with your course on information management, to give me the idea. But it is also useful when we use the online learning. (Aalborg P4)

3.8.7.3 Online support

In addition to the preference for independent learning, we find two reasons why online services are particularly useful. First, online services make it possible for the candidate to showcase the complexity of the search processes.

In the following quote, a candidate suggests that a "video tutorial" would cover this need, and would provide better tailored support than a regular face-to-face course can offer. This candidate's suggestions also provide an interesting perspective on how online support for researchers can use different media to facilitate learning.

> I would like to see some practical examples of search strategies carried out. If you can follow the search strategies, you can apply your own strategy according to the strategy that you can see as an example. That would be really helpful. And it should be a real strategy, not a hypothetical example but an example that is complex. Because that is a problem when doing a standardised course in information management. […]Then [the question] is how to manage your search strategy. How to implement a search strategy. How do you manage the amount of information that you get? How do you make sure that you don't find the same things numerous times? You know, practical information about how to do it. I think it could be really helpful. Having a video tutorial on "how to do it", then you would see how it's done. That would be a lot easier, because that kind of teaching would take a lot of time if it was done by a person, but if you can access the information online, then you can get it when you need it. I think that would be really

> helpful: search strategies for finding sources, and the management of search strategies. (Aalborg P1)

Secondly, online support can strengthen communication between the PhD candidates. It can help build the social aspects of the PhD programmes. Several interviewees emphasise the importance of this social dimension: "Something that is important is the interaction with other people, in real time or virtually" (Aalborg P7). Several candidates make specific suggestions about how to strengthen communication by creating an online training that offers opportunities to create a community:

> We should build some kind of community,[…] to keep up to date is very important and *one* person cannot do that. Everyone must help each other. […] So building a community and letting them communicate with each other that is very important. (Aalborg P4)

Such a community is an arena where the candidate can participate in building an academic community. P4 echoes P2, and stresses that an online community can be an arena for social contact in an otherwise lonely everyday workday: "I think that what P4 talked about, a community, would be nice because it creates a connection with other PhD students" (Aalborg P2).

In the interviews, a tension arose between two criteria for good online services. On the one hand, candidates claim that relevant services require options to make disciplinary adaptations.

> You come from different backgrounds, you go for different things. (Aalborg P4)

> […] so I don't know if that would be possible; you could log on with your interests and it would feed you information on those journals, but also with conferences or whatever may come up. (Aalborg P2)

On the other hand, many candidates encounter the challenges that interdisciplinary research creates. For some candidates, adaptations of library services must be able to break through disciplinary boundaries.

> If you have this stress on interdisciplinary or multidisciplinary approaches, which I think is one of the things the university is actively trying to deal

> with […] Then maybe you need to look beyond the boundaries of the discipline also when it comes to the library and library courses. (Oslo P0)

3.8.7.4 Highlighting library services

In the interviews, candidates discuss services and functions that they value or miss. An interesting observation is that some of the services the candidates miss are currently part of the services offered by the library. The candidates are unaware of the services, and say that they get frustrated if they accidentally discover them.

> International journals, which I discovered two months ago – had I known about them right away it had been easier to go there immediately. If the departments collaborated with the library to create links, for example about databases we should know [...]. (Bergen P8)

In reality, the candidate is asking for a portal that the library has already developed to collect and share databases and other resources according to discipline. This suggests that the library has not succeeded in disseminating information about its services among PhD candidates. Several candidates ask for better information about support services that the library offers.

> But maybe it exists, they may be advertised somewhere, some website, but it doesn't seem to be communicated. (Oslo P0)

> Maybe a librarian could come to the start-up seminar and advertise it, so that you can see how good it looks – a course on searching for information in databases. I think that could be very useful. (Bergen P3)

Library advertising is even seen as a prerequisite for the use of the training and counselling modules.

> Make sure that all the faculties, all the PhD programmes, compulsory PhD education, the whole faculty know about these modules and that they actively work to inform the PhD students. 'Hey, look, this is what you can do.' I think information to the different faculties is absolutely crucial, so you don't end up developing something nobody knows about. (Oslo P0)

A clear message also emerges that the candidates cannot prioritise services they do not know whether will be useful.

> I think a lot of people do not know how good it is, so they don't know what they are missing. You get the information that there are voluntary courses at the library, but it's a bit like, if you don't know what it is, why bother going? (Bergen P7)

For international students, language can be a barrier. In order for them to get something out of existing courses, information in English must be strengthened. The use of English is seen as a natural consequence of the university's focus on internationalisation.

> There is much talk about internationalisation at the university. In reality there is still a lot of information that is only available in Norwegian, including many of these courses. (Oslo P0)

3.8.7.5 Summary of chapter 3.8.7: library support for researchers

- The candidates focus on a multitude of topics they see as relevant to courses and counselling: literature searches, copyright, the use of reference management tools, and general introductions to library services
- International candidates are particularly interested in general introductions to library services and systems at a new place of study and research
- Some candidates mention increasing time pressure, and suggest that the first semester of the PhD programme is an appropriate time for courses
- However, the candidates differ on whether they want organised courses or online support that they can use on their own
- Candidates stress that the complexity in searching for literature is a unique aspect of the PhD level. This complexity should be highlighted and discussed in courses and counselling
- The candidates become aware of tools and methods through library counselling and courses
- The candidates view the disciplinary adaptation of courses as important. At the same time the library can help facilitate interdisciplinary research
- Marketing of library services is seen as a success criterion . It is particularly important to disseminate information on library services in the compulsory parts of the PhD programmes

4 Recommendations for the development of library courses and counselling

The literature review and focus group study provide an evidence basis that Higher Education libraries can use to further develop and improve their services for PhD candidates. Each summary below therefore concludes with recommendations based on the target group's behaviour and needs as these have emerged in the two studies. These recommendations can serve as a starting point when libraries are to create specific local courses and counselling services for the target group.

4.1 Unique aspects of the educational systems

Within the Norwegian and Danish educational systems in which the interviews were conducted, the candidates state that there are high formal and informal requirements to the PhD candidate making independent and original contributions to research. The literature describes a shift from 'divestiture' to 'investiture'. This means that the candidate takes the step from a consumer of knowledge to becoming an independent producer of knowledge (Fleming-May and Yuro, 2009). This division is stronger within some educational systems (such as Norway, Denmark and Australia) than in others, e.g. the PhD training in the USA (Green and Macauley, 2007).

- Library counselling and courses should therefore be developed in accordance with the requirements the PhD programmes impose with regard to the candidate's independent responsibility for the production of original contributions to research.

4.2 Literature searches as complex processes

Research and training in the PhD process can be described as long-term and complex processes. In the interview study, we saw that the candidates use various methods to gain access to literature they have identified as relevant, and to get an overview of relevant literature. They experience a lot of uncertainty in relation to the work on gaining an overview in particular. However, they normalise this

uncertainty by references to research being a process in which an overview and understanding emerges slowly over time.

The literature review shows that this way of approaching the process works for 'serialists' in particular. In contrast to 'holistics', serialists have a cognitive style whereby they aim to gain an overview early in the work, so that the parts of the project can be adapted to the framework of the overview (Ford, et al., 2002).

In the focus groups, it emerged that database searches are especially intense at the beginning of the PhD process. In time, the searches become more delimited and targeted. Reference tracing is a method that is used throughout the research process. The candidates confirm the picture that emerges from the literature review. At the beginning of their PhD programmes, candidates rely heavily on interdisciplinary resources (such as ISI and Google Scholar) and library catalogues (e.g. BIBSYS). Disciplinary resources (such as PsychINFO, Sociological Abstracts, or specialist archives that are only available in their physical form) appear to dominate later in the process. When relevant articles are found, obtained and read, references are traced backwards through reference lists and forwards through citation services such as ISI Web of Science, Scopus or Google Scholar. Thus, resources are used for different purposes at different stages in a PhD project.

- Library counselling and courses must enable the candidates to make use of the databases and other resources as tools that can be used for various purposes in their research
- The counselling and courses must enable candidates to structure their literature searches as complex processes. For example, courses and counselling should not be based on carefully planned literature searches that provide good results. Instead, they should discuss how to solve problems during the searching process in which the search tends to move from chaos to order
- Counselling and courses should be designed to work for candidates with different working styles

4.3 Literature searching and publishing

4.3.1 Literature searching

The responsible management of intellectual independence appears to be a strongly felt expectation during the PhD process. Though supervisors and other senior academics do not necessarily have advanced skills in the use of databases, and though there is little systematic training or counselling in the area, there is an expectation

that the candidates should master these skills. Gaining an overview of the literature and obtaining relevant materials is therefore something the candidates see as an issue for which they are individually responsible. The literature review has uncovered a duality in the candidates' experience of their own abilities in this area. On the one hand, they have great confidence in their own skills and see themselves as more systematic than they have been previously. On the other hand, displaying a lack of skills is perceived as risky. It is important to appear competent. Data from the focus groups suggest that this confidence primarily relates to obtaining literature, and is less related to gaining an overview of the literature. The candidates have a well-established set of strategies to obtain materials that have been identified, but they are uncertain of whether they have used the right methods to gain sufficient overview of and control over relevant areas of literature. However, both studies show that there is a gap between the candidates' skills and their knowledge of the possibilities in the databases and other library services.

- The work on locating literature and academic information entails tacit knowledge and skills. Knowledge and skills should be made explicit as part of the research process
- The development of counselling services and courses should pay special attention to strategies to gain an overview of the literature
- Counselling services and courses should be organised in such a way that the candidates do not feel they have to disclose a lack of knowledge and skills

4.3.2 Publishing

Candidates have various motivations for publishing during their PhD programmes. Some are conscious of having to publish to improve their opportunities for a research career once they have completed their degree. This particularly applies to those who write a dissertation that is a monograph, and who do not have formal degree requirements regarding publishing. Already during the PhD process, students must present themselves as competent researchers who are in the process of contributing original research to their field. Others see publishing as an integrated part of their PhD training, and thus as part of the learning process. Publishing during the PhD programme is important in order to learn to manage the publishing process. The literature review suggests that time is an important factor when publishing. Those who select open access channels do so e.g. on recommendation from colleagues, and the shorter time required to publish the text is as a positive factor. Publishing should happen as quickly as possible. The focus groups confirm that time is an important factor when selecting a publishing channel. They also

assess the likelihood of getting something published through a specific channel. It is common to publish when invited to contribute to edited books, conference proceedings, etc. Candidates tend to see themselves as insufficiently established in their field to try to publish in the most central journals.

- Courses and counselling on publishing should aim at candidates with different motivations for publishing
- When they publish, candidates need to consider the time the publishing process will take. Giving the candidates a better overview of the publishing process through different publishing channels should be an important goal for courses and counselling on publishing

4.4 Making work processes more efficient: literature searches and source evaluation

Both studies clearly show that candidates see *time* as a scarce resource.

Completing a PhD project requires reading and familiarising oneself with scholarly literature. The candidates recognise that this work requires time for maturation and reflection. The work on a PhD project also requires identifying relevant literature and resources. Candidates are less likely to accept that this also takes a lot of time. They tend to think that this should be an area of their work where they can save time by being more efficient. At the same time, they say that better knowledge about search tools and methods would make them more efficient.

The candidates experience a number of factors that inhibit the efficiency they expect. They find strategies that help them avoid the inhibiting factors. Some of these strategies are rational and clearly appropriate. For example: A candidate needs material that is not available electronically through his/her library. S/he contacts the author directly and asks for an electronic copy. However, other strategies appear to reflect a lack of knowledge about existing options and possibilities that may be available.

The strategies used for selecting and identifying literature mean that chance plays a significant role in the projects. Formal quality criteria such as frequency of citations have no significance in some disciplines, and in disciplines in which they are significant, they have a relatively low influence on the readings selected. Tips from colleagues, supervisors and other resource persons are more important, though often easy accessibility to materials determines whether they are obtained. If materials are not quickly available, it is not uncommon to make no further attempts to obtain it. For example, candidates are more likely to follow up on a tip about an article that is likely to be available electronically than about a book that

must be obtained from the library or be ordered. The literature review supports the findings from the interview study, and also shows that chance often influences the progress of a project (Barry, 1997; Green and Macauley, 2007; Penner, 2009; Steinerova, 2008). The randomness in the selected materials does not only relate to whether materials are accessible or not, but also to individual factors such as mood or divided evaluations or perceptions within an academic community.

- In courses and counselling services, libraries should clearly state that knowledge about literature resources and skills in using these improve the candidates' ability to use their time more efficiently
- The candidates make decisions based on various criteria when they select literature. In their teaching and counselling, libraries should therefore avoid limiting the criteria for the selection of literature. For example, a singular focus on formal quality criteria such as impact factor should be avoided

4.5 Interdisciplinarity and disciplinary differences

In the focus group interviews, candidates state that the relevance of library services depend on whether they are adapted to the research fields they are working within. The literature review indicates that the experience of the relevance of courses and counselling increases in step with how well these structure work with databases and search tools around the research questions. The project research questions are very significant to how candidates search for information. For example, the questions affect whether candidates use general databases or disciplinary databases or resources and collections.

Candidates whose work is interdisciplinary need support to gain an overview of literature outside the discipline in which they originally trained. They gain such overviews through, for example, participating in interdisciplinary networks. The literature review shows that interdisciplinary projects and associated questions create a need to search a broader selection of databases.

- Interdisciplinary projects impose other requirements on the literature search than more traditional disciplinary projects. Libraries should offer courses and counselling that are relevant to both

4.6 The role of the library

According to the literature review, librarians who teach have a tendency to design their teaching and counselling based on an assumption that the PhD candidates lack search skills, or are not information literate. Both the literature review and the focus group interviews suggest that there is a gap between the candidates' confidence in their own abilities and their actual literature search skills. This relates to both previously identified literature and knowledge about which resources are available. However, PhD candidates arrived to their programmes with significant academic experience, and experience in orienting themselves in scholarly literature. Furthermore, the candidates are highly motivated for independent learning. Librarians are therefore warned against meeting the candidates with a "deficiency model". Findings from the literature review suggest that such approaches should be replaced by ensuring a closer connection to the candidate's research question. Librarians should also help strengthen the candidate's knowledge of the tools the library makes available.

The candidates in the focus groups express a need to develop a sense of control over the research process. Leaving a search to librarians or automated services is not necessarily desirable because it hinders the candidate's effective management of the work and its results. The candidates ask for support services that can help them solve immediate problems in their work. They suggest simple online guides and FAQs as examples. At the same time, they do not want library counselling to remove the element of collaboration. The literature review suggests that there is a wish that available counselling include the option to communicate and share with other candidates, and between candidates and other resource persons. The literature review also shows that confidence in library employees is strengthened through longer-term interactions with them.

- Library teaching and counselling should should be centred on candidates' needs in the research process. Library jargon should be avoided in counselling and teaching situations
- The libraries should further develop and strengthen their competencies within research methods and processes so that the design of courses and counselling can be improved
- The libraries should assess how courses and counselling services can strengthen the candidates' work and learning community. For example, services could be organised to better facilitate discussions between candidates and librarians and colleagues about challenges in their work

- Counselling made available online should also provide options to exchange experiences and knowledge between candidates and between candidates and librarians

4.7 Ethics and the use of sources

In the focus groups, candidates discuss requirements to academic integrity with regard to the use of sources in various ways.

On the one hand, they confirm the findings from the literature review. Correct citations and knowledge that reduces the risk of plagiarism are thought to be well-established and unproblematic at the PhD level. On the other hand, candidates with projects in which *texts* are the objects of research (such as history or literature) say that academic integrity is more complicated than just a question of writing techniques. Rather, it is a question that involves analysis and interpretation; the research method itself.

The literature review uncovers a third issue: Candidates, and particularly international candidates who write in a foreign language, are more likely to resort to language re-use (Flowerdew and Li, 2007) as a strategy to address their inability to express themselves the way they want to. Words and expressions borrowed from established researchers in the fields are recycled, which increases the likelihood of plagiarism.

- The library should be attentive to the division between the ethical use of sources as a technical writing issue and the use of sources as a research ethics issue within the various disciplines.

4.8 Language and accessibility

The increased internationalisation of education and the international exchange of candidates between institutions means that counselling and support services in English should be developed.

The candidates in the focus groups clearly indicate that they have varying experiences of the accessibility of library counselling services. International students find the English information to be lacking, especially on university websites. They also point out that training in and support for their work on literature and references should be promoted in their PhD programmes to ensure that the target group is reached. We have also seen that candidates are often unfamiliar with the services that libraries already offer.

- Courses and counselling services in English should be developed
- Courses and counselling services should be offered within the framework of the PhD programmes
- Libraries should advertise their services to a greater extent than they do currently

5 Conclusion

This report is the result of the first phase of the Information Management for Knowledge Creation project. The phase consisted of a study of the information behaviour of PhD candidates in their own PhD projects. The aim of the study is to provide a more solid knowledge base for developing services to train and counsel the target group.

We asked a number of questions in the introduction to this report (see chapter 1.2). Here, we summarise the findings from chapter 2 and 3 as well as the recommendations from chapter 4 in the light of these questions.

The first question was: Which *knowledge about information* do the candidates have when they select tools and methods to search for information? When they work on their research projects, candidates find information relevant when it is meaningful in the context of their scholarly knowledge. Information is selected if candidates find that it can be incorporated as a component of new scholarly knowledge. This criterion forms the basis for the candidates' choice of strategies to navigate information and literature. The candidates often use known references as the starting point for their literature searches. They follow references they consider relevant forwards and backwards in time. Information is transformed into knowledge through critical examinations and analyses that are conducted in the context of a disciplinary debate. In the context of literature searches, they see this debate materialised in references and in the relationship between references.

However, the potential to work efficiently based on such knowledge does not appear to be fully realised in the selection of tools and methods. The way information is organised in different disciplinary databases can reflect the different disciplines' academic debate and development, for example by using the relation between citations for further searches. Candidates are often unaware of this. Information management can be improved through better knowledge and skills related to databases and the use of their analysis functions. Several candidates have also pointed out that they do not receive the counselling they would like when they are looking for tools or efficient methods to survey the literature.

Our recommendation for library counselling of the target group has been to relate counselling to established ways of dealing with information, among other

things. The libraries are to contribute to making literature searches more efficient and appropriate to established research practices.

The second question was: How do candidates distinguish between relevant and irrelevant information? Being able to distinguish between relevant and irrelevant information can also be viewed in the light of the candidates' understanding of information as a component of scholarly knowledge. We found it interesting that formal criteria for evaluating the quality of publications do not appear to play a central role. Some academic communities make evaluations based on criteria such as impact factor. However, even in disciplines where evaluations made on the basis of impact factor are fairly common, the candidates primarily use this criterion when selecting a place to publish and do not use it to select literature to read.

For most candidates, the most important question is whether the information is a meaningful part of specific academic debates. Where the information was found or whether it was subject to formal measurements of quality and relevance is less important. However, peer review is seen as a relevant quality assurance system. For many candidates, peer review functions as a guarantee that the information has been handled appropriately in light of the relevant academic discussions. Yet there are differences across the disciplines here too. For example, peer review remains more important in the natural sciences than in the humanities.

If the library includes the evaluation of information and information sources in its teaching or counselling, we have recommended that it should avoid focusing evaluation solely on formal criteria or quality measurements.

The third question was: What *searching skills* do the candidates have to enable them to gain an overview of the literature? Independently of how difficult it is to obtain literature, candidates have many different strategies at the ready to obtain what they need once they have identified relevant literature or information. They often turn to places other than the library to obtain materials they have identified.

The candidates see gaining an overview of relevant fields of literature as an important part of their research. They are however more unsure of how to gain such an overview than they are of how to obtain literature they have identified. They are unsure of which databases it is important to consult. They are also unsure of whether they search the databases in the most efficient and appropriate manner. The candidates appear to have a lot to gain from improving their skills in the use of various databases for research purposes.

We have recommended that libraries prioritise teaching and counselling that addresses aspects of searching for literature that the target group finds challenging, and in particular various forms of searching to gain an overview of the literature. We have also recommended that libraries develop their own competencies. In

order to best adapt their teaching and counselling to candidates' research processes, libraries need knowledge about information literacy as it is expressed in research processes.

The fourth question was: How do the candidates' knowledge about and skills in information searching affect the *learning* that the doctoral programmes aim to achieve? We do not have sufficient materials to discuss the type of learning that the doctoral programmes aim to achieve. However, we can discuss how the different expectations the candidates experience in their development as researchers appear to affect their information behaviour, and how these create expectations to literature searches, the dissemination of research results, and services that can help them in these areas.

The candidates experience greater requirements to be independent in conducting their project than they have experienced during previous studies or employment. Time is perceived to be a critical and limited resource in the PhD process. It is therefore important for the candidates to find efficient methods in their projects whenever they can. The work on identifying literature is something the candidates see as an obvious area in which to make their work more efficient.

The need for efficiency can affect the choice of literature and may change research practices in some disciplines. For example, we see that PhD candidates often prefer electronic access to literature. The candidates are negative to factors inhibiting efficiency. For example, they stress that central competency areas, such as knowledge about disciplines, library services, and information systems are not harmonised in the courses they take and the counselling they receive. They therefore ask for increased *collaboration* between academics and libraries on courses and counselling. The candidates emphasise the importance of marketing library research support. They also believe that it is especially important to promote and disseminate information about these services in the compulsory course programme of the PhD programme.

The PhD candidates' suggestions for university library courses and counselling focus on a *multitude of topics* that they see as relevant: literature searching, copyright, reference management tools, and a general introduction to library services. International candidates ask for help to become familiar with the library services and systems at their new place of study and research. Some candidates refer to the increasing time pressure in the PhD programme and suggest that the first semester of the programme is an appropriate time for courses. Candidates differ on whether they want organised courses or online support that they can use on their own.

Our recommendation has been that library courses and counselling should be offered as early as possible in the PhD process, and preferably as a service provided within the framework of the formal course offer in the PhD programmes.

Candidates also stress that the *complexity* in searching for literature is a unique aspect of the PhD process. Instances of complexity are identifying relations between contributors to academic debates, and the complexity that arises because database searches are not linear processes. Many connections between literature and academic information lead candidates in and out of various sources. How are candidates to achieve a structured and methodical work process in such a terrain?

Candidates would like the complexity showcased in courses and counselling, and we have recommended that libraries do so to a greater extent than they do currently.

Candidates also want options for interaction with other candidates and other resource persons in online courses and counselling. At the same time, they want online counselling that they can access individually, as well as traditional courses and counselling situations where they obtain help from librarians.

In order to meet these different learning styles, we have recommended that the libraries make adaptations to this diversity of learning styles in their teaching and counselling.

The fifth question was: How does the candidates' information behaviour relate to established research practises within specific disciplines? Principles that are established in the various disciplines often form a basis for how candidates approach literature searches, academic integrity in reference handling, and questions of whether/where to publish.

Tracing references is an example of an established academic practise that forms the basis for strategies candidates select to identify information and literature.

We have also seen that candidates understand the question of academic integrity in the use of sources differently. The use of sources in a manner that observes academic integrity can be seen as a technical writing question, but also as a question of research ethics related to the object of research. The division between the two approaches is often discipline-based.

We recommended that in their teaching and counselling, libraries are aware of this division between methodological questions and technical skills.

Candidates have various motives for publishing. Some publish because there is a formal requirement to an article-based dissertation in their discipline, while others publish because it is an important learning process or because they see it as an important merit-building strategy that position them for a future career in research. Fast publishing is important to the PhD candidates, and this lowers their

requirements to the ranking of the publishing channels. The candidates tend to publish when they are invited to contribute with book chapters, when they have a paper published in conference proceedings, or when they are invited to publish on their topic in a journal. Open access publishing is a fast publishing channel and seems attractive for some, but in general, there is limited knowledge about open access among the PhD candidates.

We recommended that in their teaching, libraries help strengthen the candidates' overview of their publishing options for their own research.

The last question was: What is the relationship between candidates' information behaviour and established research practices within specific disciplines? This is largely about seeing information behaviour and the development of information literacy as tied to the contexts the candidates are working within. The context we have examined in this report is in many ways quite limited. However, both chapter 2 and chapter 3 suggest that information behaviour develops in the context of e.g. searching skills, established practises within the disciplinary traditions, and candidates' expectations to their learning. This is important knowledge in the libraries' future work on creating tailored teaching and counselling for the target group.

The report has in no way provided an exhaustive answer to the questions we initially posed. Our last recommendation should therefore be to pursue the question about variations in information behaviour and the importance of such variation to library services through further studies.

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7 Appendix

7.1 Interview guides for the focus group interviews

Interview guide 1 – focus group interview with phd candidates

Themes	Questions we want answered
Introduction/Welcome	- Welcome and thank attendees for participating - Information about the purpose of the project - Information on general questions we want to discuss - Information on privacy and consent - Information on recording - Information on anonymisation - Information on consent form - Practical information - Do the participants have any questions before we start?
Being a PhD candidate	- Have you experienced any changes in the transition from being a student/working to becoming a PhD candidate? - What are your most important tasks as PhD candidates? - How do you describe yourself: as a PhD candidate, PhD student, fellow, researcher? - What is particularly challenging about being a PhD candidate? Can you describe this in relation to other groups such as master's students, employees, researchers...? - What do you see as the goal of a PhD?
The PhD candidate's information search behaviour and information needs	- What types of literature sources do you need in your projects? - How do you find the literature and information that you use in your projects? - Where do you find literature/sources? -How thorough should you be when searching for literature? When have you done enough? - Which expectations do you find your supervisor has in terms of your searching for information independently? - How do you keep up to date about your field of research? (E.g. do you use alerts?) - What criteria do you use to decide whether specific literature or information sources are useful or important to your project? E.g. is impact factor important to your choice of literature? - Which types of literature are most central to your discipline (e.g. articles, books, grey literature)? - How do you keep track of references you find along the way? Do you use reference management tools? EndNote?

Awareness of ethics and the use of sources		- What do you think of when someone says "academic dishonesty"? - Is plagiarism/cheating/academic dishonesty something that your academic community is concerned about? (If they teach) Is plagiarism something you are concerned about in your teaching? How do you address plagiarism issues with your students? Do you take any measures?
Publishing		- Is publishing a topic in your doctoral programme? If so, how?
	Choice of where to publish	- What is important to consider when publishing? - In your research community, what determines whether one publishes or not? - Is your research community focused on publishing points or performance indicators? E.g. Research Council of Norway publishing channels (level 1 and 2): - Are you familiar with citation analyses as measurements of impact (e.g. h-index, impact factor)? - Does your research group or department have routines for reporting/registering research, for example in a research documentation system (FRIDA/CRISTIN)?
	Knowledge about and attitudes to open access	- Open access: do you know what it is? - Do you have any experience of open access publishing? - Do you have any experience of BORA or other open access research archives? - Which versions of articles have you submitted to open research archives (manuscript, author's last peer-reviewed version and/or the publisher's final, formatted version)? - Have there been any discussions about open access publishing in your academic community? - What are the arguments for and against open access? - Have there been any discussions about your university's or the Research Council of Norway's policy on open access to research results?
	Co-authorship and copyright	- Is co-authorship common or is it more common to publish individually? - Do questions about copyright or rights to academic publications arise in your research community? - What do you see as a fair division of rights to academic publications? Publisher vs. author? Assistant vs. main researcher?

Support in the research process	- Which persons are important to your work on the research project? In what way? - Which other factors are important in order to get support in your research? (e.g. physical/technical and virtual communities)
The use of social media	- Do you participate in social media in connection with your research? If so, which? - Do you participate in online networks of researchers? - Do you participate in other social media in connection with your research? Why? With what benefits? What do you use? - What types of information are shared in the social media you participate in?
Experience of and expectations to the library	-What role does the library play in your research? - What are your – negative and positive – experiences of the library? - As a new PhD student, do you get training in searching for literature? - Have you attended library courses during your bachelor's or master's degree? - How do you use services from the university library? - What type of support does the library provide you with in your PhD project tasks? - Which services would you like that you do not have access to today? - How can the library simplify your research tasks? - What can the university library do to help facilitate the dissemination of your research?
Concluding topics	- What are the most important points that have emerged through this discussion? - Do you have suggestions for the development of the websites/modules? Where should they be published? - Now that we have covered all our topics, is there something you would like to add? Is there anything you think it is strange that we did not ask you about?

Interview guide 2: focus group interview with phd supervisors

Themes	Questions we want answered
Introduction/ Welcome	- Welcome and thank the attendees for participating - Information about the purpose of the project - Information about the general topics we want to discuss - Information on privacy and consent - Recording: The reason the interview is being recorded is primarily to aid the interviewer's recollection of it when processing the material. The recording allows the researchers to return to the interview and listen to it again if they have forgotten something or are unsure whether they remember things correctly. - Anonymisation: Names and personal information will be anonymised. This means that if quotes from the interview are used, no names will be included. - Consent form - Practical information (introductions, project participation + role and informants; duration; break; possible food/drink; gift card) - Ask if they have further questions before we begin.
Experience of their own discipline/characteristics of their own field of research .	- What characterises the work of identifying and using literature in your disciplines? - What type of literature is most commonly used/published? Articles, books, open archives, raw data, pre-print, working papers New vs. established scholarly literature - How do you keep up to date? - Publication frequency - When are things outdated? - Which challenges do you find that the PhD candidates face in relation to the questions we have discussed? - Are any of these challenges also challenging for you?

Supervising PhD candidates a good learning process a good PhD candidate		- We would like to learn a bit about what it is like to supervise PhD candidates. Not just in relation to working on finding and using literature: we would like to know *what you do to promote a good learning process*. It might be convenient to begin by talking about what the goal is for the PhD candidate's learning process. - What is the goal of the PhD candidate's learning process? - Can you describe the differences between the master's degree requirements and the PhD requirements? - What is a good researcher?/How to become a good researcher? What do you see as a sign that a candidate is developing into a good researcher? - Disciplinary knowledge vs. other skills such as dissemination, writing, network building, searching for literature. - Today, many PhDs go into careers other than in research. Is this important to the PhD programmes? - What do you think your role is in promoting this kind of learning? - Can you describe some main differences between supervising PhD candidates and master's candidates? - What is a good supervisor? - Do you have any role models when you supervise, e.g. someone who supervised you?
Awareness of ethics and the use of sources		- Is academic dishonesty and plagiarism a topic in the doctoral programme or in the supervision of the PhD candidate? - What is your perception of the candidates' skills in using sources in academic writing? - Do you take any measures?
Publishing		- In what way is publishing a topic in the doctoral programme?
	Choice of where to publish	- Do you/the programme emphasise that PhD candidates should publish? - What is important to consider when publishing? - In your research community, what determines whether one publishes or not? - Is your research community focused on publishing points or performance indicators? E.g. Research Council of Norway publishing channels – level 1 and 2 – publishing indicators. - Are you aware of citation analyses that are used to measure impact (e.g. h-index. impact factor)? - Does your research group or department have routines for reporting/registering research, for instance in a research documentation system (FRIDA/CRISTIN)? - Are these questions the PhD candidates are included in?

	Knowledge about open access	- Do you have any experience of open access publishing? - Do you have experience of open research archives? (BORA/DUO) - Which versions of articles have you submitted to open research archives (manuscript, author's last peer-reviewed version and/or publisher's final formatted version)? - Have open access publishing been discussed in your academic community? - What are the arguments for and against such open access? - Have you discussed the University of Bergen or the Research Council of Norway's open access policy for research results? - Are these questions the PhD candidates are included in?
	Co-authorship and copyright	- What types of publications are common in your academic community (monographs, reports, articles...)? - Which genres are common (articles, book reviews...)? - Is co-authorship common or is it more common to publish individually? - Do questions of copyright or rights to academic publications arise in your academic community? - What do you see as a fair division of rights to academic publications? Publisher vs. author? Assistant vs. main researcher? - Are these questions the PhD candidates are included in?
The role of the library for PhD candidates		- What role does the library play in the PhD candidates' research process? - Can you describe situations in which PhD candidates have contacted the university library to get help? (What happened?) - Have you experienced referring PhD candidates to the university library for help? Negative and positive experiences? - In which situations do you use the library?
Concluding topics		- What are the most important points that have emerged through this discussion? - Do you have suggestions for the development of the websites/modules? Where should they be published? - Anything else?

7.2 Data extraction form

Data extraction form

Reviewer:

☐Fredrik ☐Gisela ☐Gunhild ☐Hege ☐Hilde ☐Ingrid

☐Kirsten ☐Susanne ☐Therese

Reference:

User group:

☐PhD candidates: general ☐ PhD candidates: early stage ☐PhD candidates: late stage

☐Postdoc ☐Junior researchers ☐Researchers ☐Librarians ☐Others, exclude study

Disciplinary area:

☐Mathematics/natural science ☐Social sciences ☐Humanities ☐Medicine/health sciences

Information behaviour: ☐Yes ☐No

☐Information needs ☐Information and user behaviour

☐Information seeking/searching ☐Plagiarism ☐Evaluation of relevance

☐Reference handling ☐Other, specify:

Library courses and teaching ☐Yes ☐No

☐Information literacy ☐User training ☐Online course ☐Course on plagiarism

☐Course on literature reviews ☐Integrated courses (in other courses) ☐Advising/reference

☐Liaison librarian ☐Other, specify:

Publishing: ☐Yes ☐No

☐Scientometrics/Bibliometrics ☐Citation analysis ☐Performance indicator

☐Research impact ☐Copyright ☐Open Access ☐Authorship/co-authorship

☐Other, specify:

Research method:

☐User survey/Questionnaire ☐Case study ☐Case control study ☐Cohort study

☐Course evaluation ☐Focus group ☐Interview ☐Literature review

☐Multi-centre (conducted in multiple locations) ☐Randomised controlled study ☐Student evaluations

☐Mathematical/statistical analyses ☐Other, specify:

Research quality: ☐1 ☐2 ☐3 ☐4 ☐5

Relevance: ☐1 ☐2 ☐3 ☐4 ☐5

If the study has a low score for quality and relevance, is it nevertheless interesting to include for discussion in the report? ☐Yes ☐No

Results and main findings, explain briefly

Relevant references for inclusion: (Paste the reference)

Type of publication:

☐Academic article ☐Popular review article ☐Dissertation

☐Book ☐Book chapter ☐Website ☐Report ☐Review

Country in which the study was conducted:

☐Australia ☐Denmark ☐Norway ☐Britain/Ireland ☐Sweden ☐USA

☐Europa, other ☐Rest of the world

Language:

☐Danish ☐English ☐Norwegian ☐Swedish ☐Other

7.3 Literature review Library course section: table

	Reference	Systematic search
1	Ackerson, 1996	Yes
2	Anderson, et al., 2007	Yes
3	Antell and Engel, 2006	Yes
4	Boden, 2008	Yes
5	Chu and Law, 2008	Yes
6	Chu and Law, 2007	Yes
7	Fleming-May and Yuro, 2009	Yes
8	Garson and McGowan, 2010	Yes
9	Grant and Berg, 2004	Yes
10	Green, 2006	Yes
11	Green, 2010	No
12	Harrington, 2009	Yes
13	Kohl-Frey, 2008	Yes
14	Libutti and Kopala, 1995	Yes
15	Macauley and Green, 2007	Yes
16	Macauley and Cavanagh, 2001	Yes
17	Macauley, 2001.	No
18	Mills, 2005	Yes
19	Rempel and Davidson, 2008	No
20	Sentio Research, 2010	No
21	Vezzosi, 2009	Yes

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Macauley, P., and Cavanagh, A. K. (2001). Doctoral Dissertations at a Distance: A Novel Approach from Down under. *Journal of Library Administration, 32*(1–2), 331–346.

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7.4 Literature review Information behaviour section: table

	Reference	Systematic search
1	Antell and Engel, 2006	Yes
2	Barry, 1997	Yes
3	Bornmann and Daniel, 2007	Yes
4	Bornmann and Daniel, 2008	No
5	Bornmann, Schier, Marx, and Daniel, 2011	No
6	Chaparro-Martinez and Marzal, 2008	Yes
7	Chu and Law, 2008	Yes
8	Chu and Law, 2007a	Yes
9	Chu and Law, 2007b	Yes
10	Dixon and Newlon, 2010	Yes
11	Earp, 2008	Yes
12	Evans, 2008	No
13	Fleming-May and Yuro, 2009	Yes
14	Ford, Wilson, Foster, Ellis, and Spink, 2002	Yes
15	Green, 2006	Yes
16	Harrington, 2009	Yes
17	Holbrook, 2007	No
18	Holbrook, Bourke, Fairbairn, and Lovat, 2007	Yes
19	Hamid R. Jamali and Nicholas, 2008	Yes
20	H. R. Jamali and Nicholas, 2010a	Yes
21	H. R. Jamali and Nicholas, 2010b	Yes
22	Kleinert and Stewart, 2007	Yes
23	Kuruppu and Moore, 2008	Yes
24	Lariviere, Archambault, and Gingras, 2008	No
25	Lariviere, Gingras, and Archambault, 2009	No
26	Larsen and von Ins, 2010	No
27	Libutti and Kopala, 1995	Yes
28	Macauley and Green, 2007	Yes
29	Macauley, 2001.	No
30	Penner, 2009	Yes
31	Sentio Research, 2010	No
32	Steinerova, 2008	Yes
33	Steinerova, 2007	Yes
34	Vezzosi, 2009	Yes
35	Wilson, 2008	Yes

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7.5 Literature review Publishing and bibliometrics section: table

	Reference	Systematic search
1	Bornmann and Daniel, 2007	Yes
2	Bornmann and Daniel, 2008	No
3	Bornmann, Schier, Marx, and Daniel, 2010	No
4	Coonin and Younce, 2010	No
5	Evans, 2008	No
6	Hagen, 2010	No
7	Haslam and Laham, 2010	Yes
8	Holbrook, 2007	No
9	Holbrook, Bourke, Fairbairn, and Lovat, 2007	No
10	Jamali and Nicholas, 2010	Yes
11	Ji-Hong and Jian, 2007	Yes
12	Knight, 2008	No
13	Kuruppu and Moore, 2008	Yes
14	Kurtz, et al., 2005	No
15	Lariviere, Archambault, and Gingras, 2008	No
16	Lariviere, Gingras, and Archambault, 2009	No
17	Larsen and von Ins, 2010	No
18	Louis, Holdsworth, Anderson, and Campbell, 2007	Yes
19	Norris, Oppenheim, and Rowland, 2008	No
20	Price, Dake, and Islam, 2001	Yes
21	Xia, 2010	No

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Eystein Gullbekk, Tove Rullestad,
Maria Carme Torras i Calvo

PhD candidates and the research process

The library's contribution

The topic of this report (a translation of "Ph.d.-kandidater og forskningsprosessen. Bibliotekets bidrag", *Skrifter fra Universitetsbiblioteket i Oslo* 7) is how PhD candidates work to identify and evaluate academic resources and relevant literature. The authors also discuss how PhD candidates relate to the publishing of their own research, what they find challenging in these processes, and what they expect in terms of support and counselling from the research libraries.

By looking at the PhD candidates' practices, challenges in their day to day research, and the candidates' experiences of library services, the authors provide libraries with evidence that can be used to develop library services. The report also provides PhD candidates and researchers the opportunity to reflect on their own challenges.

This report is based on research that was conducted as part of the "Information Management for Knowledge Creation" project (2010-2013). The project is a collaboration between the university libraries in Oslo, Bergen and Aalborg; the NHH library; and the Bergen University College Library. The project receives development funding from the National Library of Norway.

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