University for Continuing Education Krems
Continuing Education and Lifelong Learning

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Zusammenfassung

Die vorliegende Studie *Research Literacy in Continuing Education (ReaLiCE)* betrachtet akademische Literalität in einem doppelten Sinn: als ein Bündel an Kompetenzen, die als Voraussetzung notwendig sind, um an universitärerer (Weiter-)bildung teilnehmen zu können, aber auch als generische Kompetenzen, die im Zuge eines universitären (Weiterbildungs-)studiums aufgebaut werden und als Lernergebnisse am Ende eines Studiums vorliegen sollten. Um diese Untersuchung durchführen zu können, entwickelt das Projekt ein ganzheitliches Konzept von akademischer Literalität und untersucht den Unterstützungsbedarf bei der Entwicklung von akademischer Literalität aus der Sicht von Studierenden und Lehrenden in den wissenschaftlichen Weiterbildungsangeboten von vier österreichischen Hochschulen.

Während Literalität oft nur mit Einzelaspekten im Umgang mit Texten (etwa Lesen und Schreiben) gleichgesetzt wird, geht diese Studie von einem ganzheitlicheren Konzept akademischer Literalität aus, dass die folgenden Teilaspekte umfasst:

1. Recherchekompetenz:
   die Fähigkeit, wissenschaftliche oder professionelle Texte zu suchen, zu bewerten und auszuwählen
2. Lesekompetenz:
   die Fähigkeit, wissenschaftliche oder berufliche Texte zu lesen, zu verstehen und auszuwerten
3. Schreibkompetenz:
   die Fähigkeit, Informationen, Argumente und Untersuchungsergebnisse in unterschiedlichen Formaten, Genres und Komplexitätsstufen darzustellen
4. Verbreitungskompetenz:
   die Fähigkeit, Texte und Informationen in unterschiedlichen Kontexten zu präsentieren, weiterzugeben und zu veröffentlichen
5. Kollaborationskompetenz:
   die Fähigkeit, gemeinsam mit anderen Personen kontextrelevante Informationen und Texte zu erarbeiten

Zur Untermauerung dieses ersten Konzepts von akademischer Literalität und um den wissenschaftlichen Diskussionsstand seit 2015 zu erheben, wurde eine systematische Literaturrecherche in Web of Science durchgeführt. Dabei zeigte sich, dass der Begriff „akademische Literalität“ vergleichsweise gebräuchlicher ist, als der Begriff „forscherische Literalität“ und dass es zu diesem Begriff noch keine einheitliche Definition gibt. Sehr verbreitet ist aber die Vorstellung, dass es sich bei akademischer Literalität nicht um eine einzelne, monolithische Kompetenz handelt, sondern dass sie sich aus einer Mehrzahl an unterschiedlichen Fähigkeiten zusammensetzt. Diese sind unter anderem dafür notwendig, um an akademischer Kommunikation in unterschiedlichen institutionellen und sozialen Settings teilnehmen zu können.

In einer weiteren Recherche wurde die historische Entwicklung des Begriffs Literalität in politischen und institutionellen Grundsatzpapieren seit 1945 nachgezeichnet. So zeigt sich etwa in Dokumenten der UNESCO sehr deutlich der Übergang von einem ursprünglich eher statischen zu einem zunehmend dynamischen Verständnis von Literalität, aber auch, dass die durch Digitalisierung erzeugte Konvergenz der Kommunikationstechnologien ein ganzheitliches Verständnis von Medien- und Informationskompetenz notwendig macht. Ähnliche Konsequenzen sind in den letzten zwanzig Jahren auch von internationalen Bibliotheksnetzwerken und von der Hochschulpolitik gezogen worden. Interessant ist

in diesem Zusammenhang etwa die Diskursverschiebung in Deutschland, wo die fast 200 Jahre dauernde Debatte um die „Studierfähigkeit“ in den letzten Jahren zumindest ein Stück weit vom Diskurs um „Informationskompetenz“ an Hochschulen im digitalen Zeitalter abgelöst wurde. Damit rückten auch hier viele Aspekte der akademischen Literalität in den Fokus der Aufmerksamkeit.

Diese beiden Recherchen ermöglichten eine weitere Verfeinerung des Konzepts von akademischer Literalität. Um den Unterstützungsbedarf von Studierenden in diesem Bereich erheben zu können, wurden zwei komplementäre Fragebögen entwickelt. Der erste richtete sich an Studierende selbst und erhob deren Selbsteinschätzung, der zweite richtete sich an Lehrende und erhob ihre Fremdeinschätzung über den Bedarf der Studierenden.

Im ersten Abschnitt der Befragung wurde untersucht, in welchen sozialen Kontexten Fähigkeiten im Umgang mit wissenschaftlichen oder berufliche Texten besonders gefragt sind, welche Adressaten für selbstproduzierte Texte wichtig sind, welche Instrumente zur Suche von Texten verwendet und über welche Kanäle Texte bezogen werden. Im Hauptteil der Befragung wurde der Unterstützungsbedarf von Studierenden in den Bereichen Recherchekompetenz, Lesekompetenz, Schreibkompetenz, Verbreitungskompetenz und Kollaborationskompetenz mit breiter aufgefächerten Fragesets erhoben. Der Fragebogen für die Lehrenden enthielt noch ergänzende Fragen zur Vermittlung von akademischer Literalität. Abgerundet wurde die Befragung in beiden Fällen mit demographischen Informationen zu den Befragten.

Diese Online-Befragungsinstrumente wurden zuerst an der Donau-Universität Krems (DUK) erprobt und kamen in weiterer Folge noch an drei weiteren Hochschulen in Österreich zum Einsatz: an der Alpen-Adria-Universität Klagenfurt (AAU), der Universität Innsbruck (UIBK) und der Fachhochschule Oberösterreich (FHOÖ). Aufgrund der unterschiedlichen Organisation der wissenschaftlichen Weiterbildung an den beteiligten Institutionen wurden an der AAU und an der FHOÖ ausgewählte Lehrgänge in die Befragung einbezogen, während an der DUK und der UIBK alle Studierenden und Lehrenden der jeweiligen Weiterbildungsangebote adressiert werden konnten. In allen Fällen beruhte die Teilnahme an der Befragung auf Freiwilligkeit, die Ergebnisse sind daher für die Grundgesamtheit nicht repräsentativ.

Trotz der unterschiedlichen Zusammensetzung in Bezug auf die Vorbildung der Studierenden (13,3%-81,1% verfügen schon über einen Hochschulabschluss) und auf die inskribierten Studienprogramme (davon 25,0%-95,2% Masterprogramme) bestand zwischen den Institutionen eine überraschend große Ähnlichkeit in den Mittelwerten der Antworten.

Vergleicht man die Antworten von Studierenden und von Lehrenden in Bezug auf Fragen zu den sozialen Kontexten, in denen akademische Literalität für Studierende in den nächsten 2-3 Jahren relevant sein wird, dann herrscht große Übereinstimmung darin, dass der Umgang mit Texten im akademischen und im beruflichen Umfeld ähnlich wichtig ist. Auch werden Vorgesetzte und KundInnen als die wichtigsten AdressatInnen für selbstproduzierte Texte angegebenen, dicht gefolgt von KollegInnen in organisatorischen Arbeitszusammenhängen. Mit größerem Abstand dahinter, aber ebenfalls wichtig, wird die Öffentlichkeit als potentielle Adressatin eingeschätzt. Fragen nach den verwendeten Recherche-Instrumenten für und Verbreitungsformen von Texten machen deutlich, dass neben den akademischen Bibliotheken auch andere, meist online erreichbare Bezugsquellen für wissenschaftliche und berufliche Texte von großer Bedeutung sind.

Vergleicht man die Einschätzungen von Studierenden und von Lehrenden in Bezug auf den Bedarf von Studierenden, ihre akademische Literalität in den fünf Bereichen Recherchekompetenz, Lesekompetenz, Schreibkompetenz, Verbreitungskompetenz und Kollaborationskompetenz zu verbessern, dann

lassen sich mehrere Beobachtungen machen. In beiden Fällen sind die Einschätzungen sehr ähnlich: die Einschätzung des Unterstützungsbedarfs nimmt entlang der fünf Bereiche graduell ab, es wird also sowohl von Studierenden, als auch von Lehrenden der Unterstützungsbedarf bei Recherchekompetenz höher eingeschätzt, als etwa bei der Lese- oder Schreibkompetenz, etc. Während sich diese Trends ähneln, unterscheiden sich Studierende und Lehrende aber deutlich darin, wie hoch sie diesen Unterstützungsbedarf einschätzen. Beide Gruppen sehen den Bedarf, dass Studierende ihre akademische Literalität verbessern, doch Lehrende schätzen diesen Bedarf deutlich höher ein, als dies Studierende selbst tun.

Interessant ist in diesem Zusammenhang auch die Frage, wie sehr sich dieser Bedarf nach der Art der Vorqualifikation von Studierenden unterscheidet. Zu diesem Zweck wurden drei Gruppen für statistische Analysen gebildet: Studierende mit Hochschulabschluss, Studierende mit formaler Hochschulzugangsberechtigung (z.B. Matura) und Studierende ohne formaler Hochschulzugangsberechtigung. Wie erwartet gab es sowohl in der Selbsteinschätzung der Studierenden, als auch in der Einschätzung durch Lehrende Unterschiede im Bedarf. Die Unterschiede zwischen diesen Gruppen waren jedoch überraschend gering, sowohl in der Selbsteinschätzung der Studierenden, als auch in der Einschätzung der Lehrenden. Die Verbesserung der akademischen Literalität ist also für alle drei Gruppen von Studierenden relevant, selbst für solche, die schon über einen akademischen Abschluss verfügen.

Abschließend wurden Lehrende gefragt, welchen Unterstützungsbedarf sie selbst bei der Vermittlung akademischer Literalität haben und welche Maßnahmen sie für die Vermittlung für wichtig halten. Der Unterschied in den Antworten ist spannend: Lehrende sehen für sich selbst in ihrer individuellen Vermittlungspraxis im Durchschnitt einen mittleren Unterstützungsbedarf. Sie könnten zwar Unterstützung gebrauchen, sehen sich aber auch als ausreichend kompetent an. Bei den Vermittlungsmaßnahmen messen sie der Verankerung von akademischer Literalität in den Qualifikationszielen, der Vermittlung über den gesamten Studienverlauf und der Einbindung zentraler Einrichtungen (z.B. Bibliothek, Lernzentren) relativ hohe Wichtigkeit zu. Im Vergleich dieser Antworten lässt sich also sagen, dass die Vermittlung von akademischer Literalität nur zum Teil eine Frage der individuellen Kompetenz von Lehrenden ist und der organisatorischen Verankerung dieses Themas in den Zielsetzungen und den Prozessen der Hochschulen deutlich größere Bedeutung zukommt.

Executive summary

This study on *Research Literacy in Continuing Education (ReaLiCE)* addresses research (or: academic) literacy as a bundle of skills, which on the one hand is regarded as a prerequisite for studying in university (continuing) education, but which also can be regarded as a core learning outcome that every learner should have attained when completing an university (continuing) education program. The ReaLiCE-project has developed a holistic concept of research literacy and investigates students' need for support for developing research literacy skills by asking both students and lecturers of four higher education institutions in Austria for their assessments.

While simplistic concepts of literacy often focus on a few aspects of dealing with texts (e.g., reading and writing), this study starts with a more comprehensive concept of research literacy that comprises the following sub-skills:

1. Searching skills:
   ability to search, assess, and select academic or vocational documents
2. Reading skills:
   ability to read, comprehend, and extract information from academic or vocational documents
3. Writing skills:
   ability to express information, arguments, and results in different formats, genres, levels of complexity
4. Distributing skills:
   ability to present, share, and publish information in different contexts
5. Collaborating skills:
   ability to collaborate and to co-create texts and publications

To substantiate this preliminary concept of research literacy and to reflect the scholarly debate since 2015, a systematic literature review in Web of Science has been executed. It turned out that the term "academic literacy" is more commonly used than the term "research literacy" and that no codified definition of either term exists. But the perception is widely spread that research literacy is not a monolithic competence, but rather composed from different skills. These skills are necessary for participating in academic communication in various institutional and social settings.

Another part of the literature review deals with the historic development of the term literacy in policy documents of different institutions since 1945. By analysing documents from UNESCO, one can clearly demonstrate the change from a static to an increasingly dynamic understanding of literacy, but also the impact of digitisation, which leads to a convergence of communication technologies, and – subsequently – to a comprehensive understanding of media and information competencies. In the last 20 years, similar consequences can be found in international library networks and in higher education policies. Another interesting observation is the change of discourse in Germany, where 200 years of debate about the "Studierfähigkeit" (ability to study) of students is giving way to a new discourse on "Informationskompetenz" (information literacy) in higher education. This shift of discourse guides the focus of attention towards various aspects of research literacy.

Both literature reviews lead to further improvements of the concept of research literacy. To investigate students' need for support for developing research literacy, two complementary questionnaires have been developed. The first addressed students directly and asked for their self-assessment, the second addressed lecturers and asked for their external assessment of the needs of students.

The first part of the questionnaires focuses on the research environments relevant for students in the upcoming 2-3 years, in particular on the social contexts which are relevant for the use of academic or professional text, on audiences or addressees for self-produced texts, on instruments for the search, and on channels for the acquisition of texts. The main part of the questionnaires deals with the students' need for support for developing their searching skills, reading skills writing skills, disseminating skills, and collaborating skills. Additionally, the lecturers' questionnaire contains some sets of questions about the transmission of research literacy. Both questionnaires are completed with questions on demographic information.

The two online questionnaires have first been tested at Danube University Krems (Donau-Universität Krems – DUK) and later been implemented at three other higher education institutions in Austria as well, namely at the University of Klagenfurt (Alpen-Adria-Universität Klagenfurt – AAU), the University of Innsbruck (Universität Innsbruck – UIBK), and the University of Applied Sciences in Upper Austria (Fachhochschule Oberösterreich – FHOÖ). Given the differences in organising university continuing education at the given institutions AAU and FHOÖ involved selected study programs in the survey, while DUK and UIBK addressed all students and lecturers in their respective continuing education offerings. In all cases the participation in the surveys was voluntary, therefore the results are not representative for the addressed populations.

Even if the composition of respondents at the different higher education institutions varied strongly with respect to prior educational attainment of students (13.3%-81.1% already hold a higher education degree) and with respect to enrolled study programs (25.5%-95.2% are enrolled in master programs), the means of the responses look surprisingly similar.

Comparing the responses from all students and lecturers regarding the social contexts, in which research literacy will be relevant for students in the upcoming 2-3 years, there is a strong conformity in the assessment that research literacy is of similar importance for academic and for professional environments. Superiors and clients are the most important addressees for self-produced texts, closely followed by colleagues in organised working contexts. A wider public follows in larger distance, but is still regarded as a relevant, potential addressee. Asked for the importance of various search tools and channels for the acquisition and/or distribution of texts, respondents make clear that academic libraries are complemented by other, mostly online available sources for academic and professional texts.

Comparing the assessments from students and lecturers regarding students‘ need to improve their research literacy in the five sub-dimensions searching skills, reading skills, writing skills, disseminating skills and collaborating skills, several observations can be made. In both groups assessments look very similar: the assessment of support needs gradually declines in the five sub-skills, which means that both students and lecturers see more need to improve research skills than reading skills, writing skills, etc. While these trend lines as such look similar, the assessments of students and lecturers differ in their extent. Both groups see a need to improve students' research literacy, but lecturers see a much higher need than students themselves do.

It is also interesting to ask, in how far prior qualification of students influences their need to improve their research literacy. To investigate this question, three groups of students have been distinguished: students, who already hold a higher education degree, students with formal higher education entrance qualification, and students without such a formal higher education entrance qualification. As expected, both students and lecturers see differences between these groups regarding their need to improve. However, differences in the assessments for these three groups are surprisingly small, both regarding

the self-assessment of students and the external assessments by lecturers. The improvement of research literacy is relevant for all three groups of students, even for those, which already have an academic degree.

Finally, lecturers have been asked, which need for support they have for transmitting research literacy to their students and which measurements for the transmission they regard as important. The difference in the responses to these two sets of questions is astonishing. Lecturers only see a medium need for support for their individual teaching activities. They can do with some support, but basically see themselves as sufficiently competent. In contrast to that, lecturers assign comparatively high importance to organisational measures, such as an explicit inclusion of research literacy in the goals of curricula, the transmission of respective skills throughout the entire course of studies, and the involvement of central support units (e.g., the library or learning support units). Comparing these responses, one can say that only to a lesser extent the transmission of research literacy can be seen as a question of competences of individual lecturers. Rather, the transmission of research literacy has to be regarded as an organisational task of high importance, which has to be implemented into the goals and processes of higher education institutions.

Part 1:
Exploring the state of the art in research literacy

1 Introduction

The goal of this part of the research project was two-fold: on the one hand, it investigated the state of the art of the "research literacy" in continuing education and on the other hand, based on the results of the first step, it attempted to provide a comprehensive definition of "research literacy" in continuing education based on the preliminary definition. The main goals of this work package ("Part 1") were:

1. To search systematically existing literature for conceptualisations and definitions of "research literacy"
2. To search systematically policy documents (including international reports, NQFs, and EU policy documents) in relation to research literacy in adult education and continuing education
3. To substantiate the preliminary working definition of "research literacy" and to understand the relevance of this and related concepts for different stakeholders and environments, which can be related to university continuing education

2 Working concept of research literacy

The study *Research Literacy in Continuing Education (ReaLiCE)* aims at conceptualising and analysing "research literacy" in a twofold sense: as the study skills that are required to participate in university continuing education and as the intended learning outcomes at the end of this type of educational offering. In this sense, research (or: academic) literacy has to be understood as a continuum of generic skills, which are to be enhanced through university continuing education. Thus, this project aims at investigating the conceptualisations and practices of "research literacy" in academic continuing education.

One particular element of this study is the question, in how far differences between traditional and non-traditional students of university continuing education with respect to research literacy exist.

Based on our research in the preparation phase of the project, a preliminary definition of "research literacy" was constructed to guide the study. Research literacy is based on the following main groups of skills:

6. Searching skills:
   ability to search, assess, and select academic or vocational documents
7. Reading skills:
   ability to read, comprehend, and extract information from academic or vocational documents
8. Writing skills:
   ability to express information, arguments, and results in different formats, genres, levels of complexity
9. Distributing skills:
   ability to present, share, and publish information in different contexts
10. Collaborating skills:
    ability to collaborate and to co-create text and publications

While the term literacy is predominantly used in the context of information literacy for skills to search and evaluate information, and here mainly in libraries or scholars in library sciences, other aspects are often missing. Therefore, we want to enrich our definition of research literacy with other components, namely with reading, writing, distributing and collaborating skills.

However, we deliberately focus on text-based forms of literacy, since we do not want to overload or blur the concept and/or exceed our research capacity. Therefore, we isolate our definition of research literacy from numeracy, or from any discrete (quantitative and qualitative) research methods. Similarly, we do not deal with media-specific literacies (visual literacies, computer literacy, gaming, etc.) or with content-specific literacies (health literacy, news literacy (Fletcher, 2018), financial literacy (Xu & Zia, 2012), sustainability literacy, etc.).

2.1. New literacies

Already the emergence of audio-visual media in the 20th century, but even more importantly the emergence of digital media since the 1990s, the differentiation of new media formats, media products and information ecosystems made it necessary to reconsider the traditional notion of literacy and its significance for (higher) education.

It is obvious that print and the ubiquitous availability of printed media products were an essential prerequisite for the emergence of the formal education system, a system that has become accessible,

even compulsory for the entire population. Print allowed for the "universal" inclusion into the formal education system at primary and secondary education, and for mass enrolments in higher education. However, the use of script and print is not just a constitutive requirement. Rather, it is its centrepiece. One has to regard literacy, the ability to read and write, as the core of formal education. (Pfeffer, 2014, pp. 12-13).

During the last 20 years, the public debate on literacy has become more complex, due to the emergence of new media, as we will show in our chapter Literacy in policy documents. The reason for this lies in the fact that each new information technology comes with new media formats and genres, new layers of reality, new forms of distribution, and new possibilities for communication and sense-making. Additionally, the introduction of the digital code led to convergence and interoperability between formerly distinct media formats and products. All these developments have relevance for formal education, not because of potential efficiency gains, but because of new forms of sense making and text production, which also became relevant for scholarly communication.

2.2. Literacy in higher education

Basically, literacy can be understood as the ability to read and write, or – in a more modern sense – to competently use and produce media products. Frequently, literacy is used in a binary understanding of either literate or illiterate, which would locate the development of literacy in primary schools only.

In contrast to that one could accepted literacy as the centrepiece of formal education, as an ability that can be increasingly improved and further developed across different stages of the formal education system. From the perspective of competencies, the sequential structure of the formal education system (e.g., primary, secondary and tertiary education; or 1st, 2nd and 3rd cycle in higher education) can be described as a way of continuous development of literacy, not just as a mere accumulation of knowledge.

Consequently, this allows us to investigate literacy at universities, in particular research or academic literacy, as a central task of higher education, not as a mere deficit of some students. The term "research literacy" therefore especially refers to tertiary education, the highest level of the formal education system. This makes it clear, that research literacy should be a concern of every higher education institution, especially in times, when the digital transformation influence and change the relevant media formats and ways of academic communication.

2.3. Literacy in university continuing education

Even if definitions vary across countries, university lifelong learning (ULLL) can be defined as learning *"at university level and [as] research-based"*[1]. According to Austrian legislation, university continuing education courses such as Master programs (the vast majority of all university continuing education offerings in Austria) are obliged to set the same entrance requirements, comprehensiveness and academic requirements as comparable foreign Master programs (UG § 51 (2) 23). In other words, the "normal" student of university continuing education is expected to be at post-graduate level.

Compared to traditional students, which enter college immediately (or at least: soon) after high school, and which tend to enrol at university in their early twenties, continuing education students tend to be

[1] EUCEN-website: http://www.eucen.eu/aims-and-objectives/

much older. In the case of DUK, the average age of new entrants is approximately 40 years (Dornmayr et al. 2017, p. 13).

Continuing education students are also non-traditional regarding their educational background. Since most certified or Master programs in university continuing education can be characterised as being designed for post-graduates, the majority of students in these programs already hold a tertiary degree.

When a formal tertiary degree (at least at bachelor level) is taken as the typical educational background, and the formal entrance requirement for certified or Master programs in continuing education, access without this formal qualification can be regarded as atypical and can only be granted on the base of complementary assessment of prior learning. Therefore, students at university continuing education can have the following educational background:

- Formal higher education degree
- Formal higher education entrance qualification (+ assessment of prior learning)
- No formal higher education entrance qualification (+ assessment of prior learning)

The main question regarding our target group – students in university continuing education – is, if and how much these sub-groups differ regarding their needs for research literacy.

3 Literature review 1: Research literacy in the academic literature

3.1 Introduction

To date, research literacy has not been studied conceptually in academic continuing education even though it has gaining recognition in the practice. The aim of our review was to identify the concepts and area of competences related to research literacy in continuing education in order to substantiate and further develop the draft concept of research literacy in academic continuing education. In case no study was found regarding research literacy in adult/continuing education, we focused on higher education and postgraduate education to find out the basics of the concept. Details of the review are presented below.

3.2 Method

3.2.1 Design

A systematic literature review is a review of *"a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research and to collect and analyze data from the studies that are included in the review"* (Moher, Liberati, Tetzlaff, & Altman, 2009, p. 264). This approach was adopted as it provides a clear, accurate and reliable framework for conducting a review on "research literacy". This review roughly followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement (Moher et al, 2009). We did not conduct quality appraisal as we aimed at examining the theoretical and conceptual aspects concerning "research literacy in continuing education". Figure 1 presents the seven steps of the systematic review.

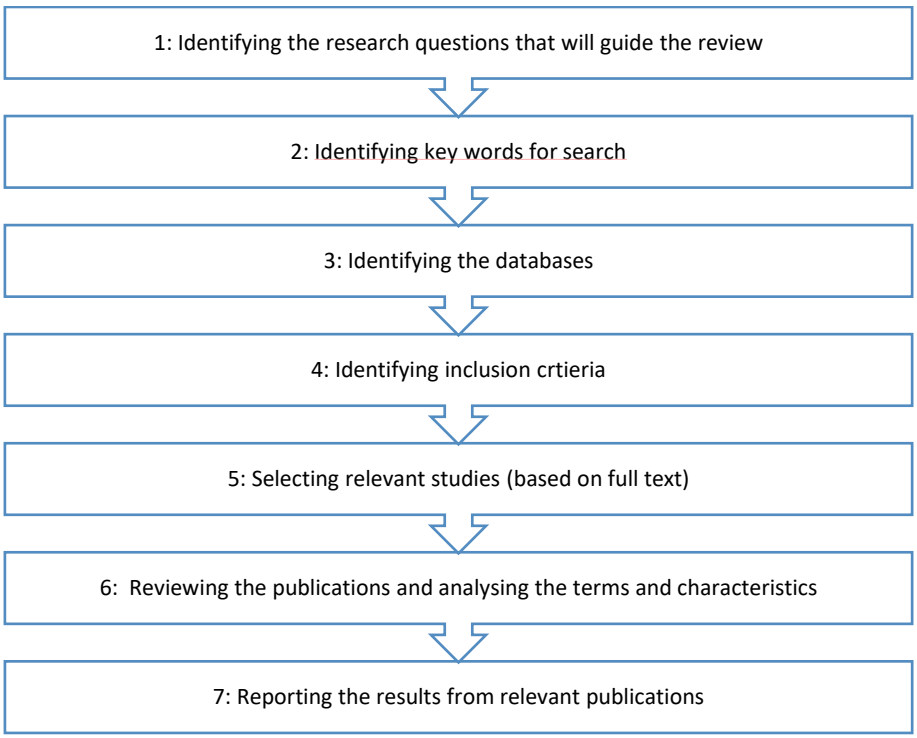

Figure 1 Steps in our systematic review according to PRISMA guideline

3.2.2 Research questions

As the first step, we identified our research questions that would guide the review. Based on our initial discussions and preliminary literature search we determined six research questions. Our systematic review addressed the following questions:

1) How is "research literacy" defined in the literature?
2) What types of studies exist on research literacy that can be related to continuing/higher education (and/or professional occupations)?
3) Which sub-literacies, skills and competencies can be ascribed to research literacy?
4) Which measurement tools exist in the literature to study research literacy? How is research literacy measured?
5) Which theories and concepts are used to study research literacies?
6) Which disciplines, fields and actors deal with questions of research literacy?

An overview on the guidelines for the review can be found in Appendix A1.

3.2.3 Search terms

After the initial literature search, a list of search terms was formed according to education level and concept of research literacy. The initial list of search terms was altered after the pilot search. For example, "study skills" and "learning skills" did not yield results related to the concept of research literacy, as well as "lifelong learning". These key words were removed from the list. Moreover, "information literacy" was also removed due to large number of unrelated articles. We focused on the concept of academic and research literacy as the generic term and did not include sub-competences such as academic writing, academic reading. Table 1 presents the list of the search terms.

We separated the level of education, as we wanted to see first the studies in the area of continuing education. Another search was conducted with the higher education search terms.

level of education #1	continuing education, adult education, postgraduate education, further education, non-formal education, adult training, adult education
level of education #1a	higher education, university, college
key concepts #2	research literacy, academic skill*, academic literacy*ies, research skill*, academic competence

Table 1 List of search terms

3.2.4 Search strategy

For this review, Web of Science with all databases option was used. After pilot searches in some databases, we decided that Web of Science is the most comprehensive data base which includes several of

the most important citation databases in education and social sciences such as Science-Citation index Expanded, Social Sciences Citation Index, Arts & Humanities Citation Index, Conference Proceedings Citation Index, Emerging Sources Citation Index, and many more. Scopus and Web of Science had a high degree of overlapping. Thus, Scopus is not included in the list of databases.

Search was conducted using Boolean operators AND and OR. First, the key word search for education level was conducted and then the key words for the concept of research literacy. As a third step, these two searches were combined. Search results are presented in Table 2.

database searched	search terms	filters applied	# of records retrieved	# of records included after abstract screening	# of records included in the full-text screening
Web of Science	#1 and #2	2020-2015	319	19	3
Web of Science	#1a and 2	2020-2015	538	92	69
Total studies			857	111	72

Table 2 Search strategy and results

2.3.1. Selection criteria

A review guide and table for inclusion criteria were developed by the research team. Table 3 presents the criteria for the inclusion of the studies. These criteria were followed both at the abstract screening and full-text screening stages.

criterion type	inclusion criteria
topic	research literacy, academic literacy studies focused on continuing education, adult education, postgraduate education, or higher education/university NOT: study skills, learning skills, generic skills, lifelong learning, academic writing, information literacy, academic writing, academic reading, media literacy
recency/dates	2015-2020
age-range/sample	continuing education/university students/new entrants/post graduate education,
language	English
research base	all empirical studies (theoretical, quantitative, qualitative, mixed, case,)
type of publication	peer-reviewed articles, book chapters, project reports, thesis, conference proceedings

Table 3 Inclusion criteria for the review

2.3.2. Study selection

Study selection was conducted in three steps. First titles of all the articles were screened according to inclusion criteria listed above. Then as the second step, abstracts were screened for the eligibility using the same criteria. Included articles' full-texts were retrieved. At this stage some of the articles were excluded due to the language. Some of the articles that emerged with English abstracts turned out to be written in another language. As the last step, full texts were screened and required information was retrieved. Following information was extracted from each article as much as possible: name of the author(s), year of publication, country, the purpose, type of publication, research design, data collection methods, definition of key concept, key skills, measurement tools/scales used, theories adopted, concepts adopted, and discipline/area. Not all of the articles yielded all the necessary information. A list of the articles included in the full text review can be found in Appendix A2.

3.3 Results

In total, our search identified 857 citations after exclusion of duplicates. Based on title and abstract review, we considered 111 articles for review out of 857. After scrutinising the full-text articles, we included 72 publications for the extraction of the data.

3.3.1 Study characteristics

The tables below present the basic characteristics of the publications in the study. Publications were mainly articles from peer-reviewed journals, whereas two conference proceedings among the publications were reviewed (see Table 4). Those that lacked the full-texts were mainly conference proceedings as well.

peer-reviewed article	67
commentary	1
conference proceeding	2
editorial	1
study book	1
total	72

Table 4 Selected texts by type of publication

One of our search criteria was recency and we focused on the last five years to be able to have a more current look at the literature. Most of the publications were published during the last two years (see Table 5).

2015	8
2016	12
2017	15
2018	20
2019	17
total	72

Table 5 Selected texts by year of publication

Another interesting feature of the publications included in the review is that majority of the publications originated in South Africa and Australia (see Table 6). It is clear that there is a rich context and community that work on academic literacy and academic literacy is an issue for higher education in these countries.

Australia	13
Bostwana	1
Canada	2
Chile	1
China	1
Denmark	1
Ecuador	1
Fiji Islands	1
Germany	4
Indonesia	1
Israel	1
Lebanon	1
New Zealand	3
Portugal	2
Russia	1
Singapore	1
South Africa	20
Spain	3
Sweden	1
UK	8
USA	5
total	72

Table 6 Selected texts by country of origin

The following parts present the findings of the review according to the research questions.

3.3.2 Research question 1: How is the concept of "research literacy" defined in the literature?

The first research question addresses the conceptualisation of the term "research literacy". To be able to find out the definition, publications were searched. It is important to note that not every publication provided a clear definition of the key concepts they work it. Based on the existing ones the analysis was conducted.

"Research literacy" is very fluid concept and it is difficult to provide a clear definition. Moreover, as our review indicated, "academic literacy" is used widely in comparison to "research literacy" in the literature. In our full text review, only seven of the 72 articles were based on the concept of "research literacy". "Academic literacy" is more comprehensive in terms of skills and competences it focuses as well. Thus, we mainly used the term "academic literacy" for reporting the results.

Our review of the literature indicated that it is a complex task to define academic literacy. There exist several different conceptualisations based on contrasting theoretical frameworks. Lea and Street (1998) present a useful classification of three views that also serves our purpose. The first group views academic literacy as normative, unitary and monolithic which is based on a generic set of skills that students have to master in order to be successful in the "academic" life. This traditional approach to academic literacy is neutral and uncritical of the complex nature of academic literacy as well as its relation to identity, power, class and inequality (see Bourdieu (1991), and Gee (1996) regarding academic discourse, habitus and competences). This approach is called "study skills" approach (see Lea

and Street, 1998) and the focus is on the technical and instrumental skills such as grammar and spelling. Academic literacy is considered as an "autonomous" subject to teach. The second approach to academic literacy is built on the idea of multiple literacies, and multimodalities as well as a sociocultural lens, which emphasises the dynamic and contested nature of academic literacy. In this approach, plural version of the term "academic literacies" is preferred to underline the epistemological differentiation to its singular counterpart. It is based on "new literacy studies"; critical discourse analysis; systemic functional linguistics; and cultural anthropology. They discuss the meaning making, identity, and power issues especially at the legitimate knowledge to teach/learn and views academic literacy as a "social practice". It also takes into consideration that there are other types of literacies, which are not limited to words, such as numeracy and visual literacy.

The third conceptualisation is called "academic socialisation". In this approach academic literacy is seen as an acculturating process through which students acquire the necessity skills to adapt to the academic culture. This distinction emerged from our review as well.

Not every article provided a clear definition or a conceptual framework, but based on the provided ones, we classified the definition into three categories following Lea and Street's (1998) classification: study skills, academic socialisation and academic literacies.

Study skills approach:

> *"The focus of this discussion, however, will be academic literacy, the ability to use language competently in higher education…" (Weideman, 2019, p. 35)*
>
> *"For the purposes of this article, "literacy" refers to a student's ability to read English texts fluently and with comprehension, write English texts coherently, synthesise different information sources and offer a critical awareness of the information at a grade-appropriate level to ensure access to knowledge and success in education (UNESCO, 2011)." (Millin, 2015, p. 107)*

Academic socialisation approach:

> *"The term "academic literacy/ies" in this paper follows Wingate's definition: "the ability to communicate competently in an academic discourse community" (Wingate 2015, p. 6). It includes attention to the conventions and communicative purposes of Year 1 essays in particular disciplinary contexts; however, it did not focus on issues of identity and power relations as found in literature from the United Kingdom." (Wette, 2019, p. 36)*
>
> *"Developing academic literacy involves harnessing both the linguistic tools and the conceptual tools that organize the social activity of academic life. In this sense, developing academic literacy can be understood as acculturating into the social language that enables legitimate participation in formal academic settings." (Imbrenda, 2018, p. 319)*
>
> *"Academic literacy, the ability to cope with the demands of academic discourse in the language of teaching and learning, …" (Sebolai, 2016, p. 58)*

Academic literacies approach:

> *"Although many definitions and interpretations of 'academic literacy' have been offered by theorists in the field, this study draws on Lea and Street's (1998: 160) view that "academic literacy in higher education points to reading and writing in the different disciplines where such reading and writing constitute the central process through which students learn new subjects and develop their knowledge."" (Scholtz, 2019, p. 107)*

"The concept of academic literacy has a number of interpretations. However, this study uses the concept of academic literacies (plural) as outlined (Street in Baker, Clay & Fox 1996, p. 118): Academic writing is not a single thing but an aggregation of literacy practices that make, and are made, by the epistemologies and practices (including the use of power) of specific disciplines and other institutional formations; that it mediates identity struggles; that it is largely transparent to instructors socialised in a discipline, assumed; that technical solutions such as study skills do not get at the problem." (Hackmack, 2019, p. 1)

"The article draws on an understanding of academic literacy as a local practice situated in the social and institutional contexts in which it appears." (Clemensen & Holm, 2017, p. 34)

"To do so, the article develops an analytical framework by synthesizing and extending the concept of literacy practice based on insights from NLS, AcLits, and practice theory as proposed by the philosopher Theodore Schatzki (1996)." (Kaufhold, 2017, p. 74)

Other terms that emerged in the review are research literacy, social-scientific research competence, and educational research literacy.

Research literacy:

"'Research literacy' (RL) includes the acquisition of information access and retrieval skills, and more importantly it emphasises ''the learning of discursive practices within the context of an academic discipline'' (Simmons, 2005, p. 299)." (Han & Schuurmans-Stekhoven, 2017, p. 31)

Social scientific research competence:

"The definition of social-scientific RC used in the present paper bears on an understanding of competency as "domain-specific cognitive dispositions that are required to successfully cope with certain situations or tasks, and that are acquired by learning processes" (Koeppen, Hartig, Klieme, & Leutner, 2008, p. 68). Accordingly, RC is defined as cognitive dispositions that are required to successfully cope with situations or tasks in empirical social-scientific research, and that are acquired in higher education learning processes." (Gess, Geiger, & Ziegler, 2019, p. 738)

Educational research literacy:

"Educational research literacy can be defined as the ability to purposefully access, comprehend, and reflect on scientific information, as well as to apply resulting conclusions to problems, is important for social participation. When making educational decisions, this ability is referred to as Educational Research Literacy (ERL; cf., Shank & Brown, 2007)." (Groß Ophoff, Schladitz, & Wirtz, 2017, p. 39)

Our review showed that the conceptual terrain of the academic literacy is quite fragmented and it is not possible to indicate one single comprehensive definition. Moreover, in line with this conceptual fragmentation, the practices are also fragmented. Some institutions adopt the single subject approach, while others prefer an embedded approach where academic literacy is taught within/along with the discipline specific subjects and courses. It totally depends on the institutional policies, goals and values as well as the academic culture.

Another important result of our review regarding definitions of academic literacy is that traditional and monolithic approach to academic literacy has not been adopted, while multi-literacy approaches and socio-cultural views gain importance. It can be concluded that academic literacy is not one single set of skills that one can teach/learn in distinct modules. Moreover, it is not only about writing and

reading, but it is about communication, different genres of academic production as well as different modes of production parallel to global trends and drivers.

3.3.3 Research Question 2: What types of studies exist on research literacy?

From a methodological perspective, there is no clear tendency concerning the dominant methodological framework. Even though the majority of the publications used a qualitative approach, other approaches including quantitative and mixed methods, were also applied (see Table 7).

mixed methods	15
qualitative	25
quantitative	19
review	8
not clear/not available	5
total	72

Table 7 Selected texts by applied research methodology

The most widely used method for data collection is a questionnaire/survey, followed by interviews-focus group or individual (see Table 8). A common research practice is the use of assessment tests to measure students' level of academic literacy. Especially studies from South Africa adopted Test of Academic Literacy Levels (TALL) and Test of Academic Literacy for Postgraduate Students (TALPS) (see du Plessis, 2016; Nizonkiza & van Dyk, 2015; Sebolai, 2018). These two tests are used nationwide to measure students' academic skills. Another group of studies draw on pre-test-post-test design and try to measure the effectiveness of intervention programmes to improve academic literacy (Han & Schuurmans-Stekhoven, 2016; Lear, Li & Prentice, 2016). Another group of studies analyses student data, such as writing samples, essays or exam papers. The majority of the studies collected data through multiple data collection methods. Most of the studies target students/learners, while few of them focus on the perspective of the lecturers/teachers/programme coordinators (see Stebbing, Shelley, Warnes, & McMaster, 2019; Marshall & Walsh Marr, 2018).

curriculum development	2
document analysis	3
interviews	18
pre-post tests	4
questionnaire	21
student data	1
assessment tests	10
not clear/not available, review articles	13
total	72

Table 8 Selected texts by applied data collection method

3.3.4 Research Question 3: Which sub-skills can be ascribed to research literacy?

Sub-literacies, skills, and competencies that were studied are also as complex as the definition of the concept. There are several lists of skills and competences that were identified as sub-skills comprising

academic literacy. We classified these skills under eight competency areas. Table 9 presents these areas and the number of the studies that mention or list these areas as sub-competencies or skills of academic literacy. The most dominant sub-literacy is writing. Considering the origins and historical development of the literacy concept and academic literacy, writing and academic language is still the most emphasised competence area. 20 studies focus on writing, academic writing to examine academic literacy. Vocabulary, grammar, right use of words and organise and structure academic texts are among the writing skills. Plagiarism, paraphrasing and referencing were identified only in two studies. Information literacy is another important sub-literacy. Especially reaching, accessing information and critically evaluating this information are mentioned several times. 14 studies list reading as one of the sub-skills of the academic literacy. There are a few studies that focused only on the reading as the main area of analysis. But parallel to writing, reading is also an inherent part of several conceptualisations of the academic literacy. "new literacies" as we described above, such as visual literacies, media literacy and technology related literacies are also getting popular. The study from García-Quismondo, Cruz-Palacios, & Castros Morales (2019) is a good example to recent attempts to programme development for integrating visual literacy into higher education curriculum as part of academic literacy. In contrast to emerging ICT based literacies, publication and dissemination skills were listed only in two studies. Moreover, collaborative learning/writing, which is part of our academic literacy model, is listed as a skill in one article only. We believe it is important to discuss collaborating skills as part of the academic literacy and discourse.

writing	20
information literacy	16
reading	14
visual literacy	9
critical literacy/thinking/analysis	9
numeracy	5
digital/media / technology	5
oral literacy / academic speaking	4
total	82

Table 9 Frequencies of sub-competencies mentioned in the selected publications

Among the skill and competence models described and adopted in the studies, one model is cited four times. Thus, we wanted to present this model distinctively. Van Dyk and Weideman (2004a, p. 10) the following ten competencies as the core skills of the academic literacy:

1. Understand a range of academic vocabulary in context;
2. Interpret and use metaphor and idiom, and perceive connotation, word play and ambiguity;
3. Understand relations between different parts of a text, be aware of the logical development of (an academic) text, via introductions to conclusions, and know how to use language that serves to make the different parts of a text hang together;
4. Interpret different kinds of text type (genre), and show sensitivity for the meaning that they convey, and the audience that they are aimed at;
5. Interpret, use and produce information presented in graphic or visual format;
6. Make distinctions between essential and non-essential information, fact and opinion, propositions and arguments; distinguish between cause and effect, classify, categorise and handle data that make comparisons;

7. See sequence and order, do simple numerical estimations and computations that are relevant to academic information, that allow comparisons to be made, and can be applied for the purposes of an argument;
8. Know what counts as evidence for an argument, extrapolate from information by making inferences, and apply the information or its implications to other cases than the one at hand;
9. Understand the communicative function of various ways of expression in academic language (such as defining, providing examples, arguing); and
10. Make meaning (e.g., of an academic text) beyond the level of the sentence.

This model was used as a base for the development of TALL and TALPS tests which assess the academic literacy level of university students in South Africa.

3.3.5 Which measurement tools exist in the literature to study research literacy?

As it was mentioned before, our review yielded some tools to measure and assess academic literacy. List of the measurements and their constructs are presented below.

- *Test for Academic Literacy Levels (TALL)*
  This test is the most used assessment tool. One reason for that is a compulsory test for higher education candidates in South Africa (see Sebolai, 2018 for an example study based on TALL). TALL is constructed on the literacy concept identified by Van Dyk and Weideman (2004a, 2004b). It consists of 100 multiple choice questions from a set of seven subtests as indicated in
  1. Scrambled text
  2. Vocabulary knowledge
  3. Verbal reasoning
  4. Interpreting graphs and visual information
  5. Register and text type
  6. Text comprehension
  7. Grammar and Text relations
- *Test of Academic Literacy for Postgraduate Students (TALPS)*
  (see du Plessis, 2016). TALPS is very similar to TALL and is constructed on the same theoretical and conceptual framework but it is adapted for postgraduate students.
- *Research Literacy Self-efficacy Scale (RLSES)*
  developed by Kurbanoglu et al., 2006 (as cited in Han & Schuurmans-Stekhoven, 2016)
- *Educational Research Litereacy (ERL)*
  assessment tool developed by Groß Ophoff, Wolf, Schladitz & Wirtz, (2017)
- *Measuring the Academic Skills of University Students (MASUS)*
  developed by Bonnano and Jones (2007), (as cited in Palmer, Levett-Jones, & Smith, 2018). The MASUS is composed of four elements:
  1. use of source material,
  2. structure and development of answer
  3. writing style
  4. grammatical correctness
- *AL Test for National Benchmark Tests*
  (see Sebolai, 2016). The nine sub-constructs of the benchmark test are:
  1. Separating essential from less essential information
  2. Extrapolation, inferencing and application
  3. Academic discourse features

4. Metaphorical and analogous language
5. Academic and general vocabulary
6. Text genre
7. Grammar and syntax
8. Textual cohesion features
9. Communicative purpose

- *Social-Scientific Research Competency Test*
  (see Gess, Geiger, & Ziegler, 2019). Three knowledge domains were identified for the test
  1. research process knowledge
  2. knowledge of research methods
  3. knowledge of methodologies

3.3.6 Which theories and concepts are used to study research literacies?

Our review analysed the theoretical background of the studies as well. Two dominant frameworks are identified. First one is the "New Literacy Studies" "Academic literacies" movement. Within this movement, Lea and Street (1998) are the most frequently cited authors, followed by Lillis and Scout (2007). Second dominant framework is the "Discourses" model which originated from Bourdieu and Passeron's (1994) "academic discourse", "habitus" and "competence" discussion. Within this model Gee (2008) is the mostly cited author.

Other theoretical frameworks that were adopted in the studies are: Van Dyk and Weideman (2004), Wingate (2015), the Research Skill Development (RSD) framework (Willison & O'Regan, 2018), theory of systemic functional linguistics (SFL) (Halliday & Matthiessen, 2004), the information literacy integration model (Wang, 2011), self-efficacy (Bandura, 1986), Skehan's (1998) socio-cognitive model of communicative competence.

3.3.7 Which disciplines, fields and actors deal with questions of research literacy?

Only a small number of studies had a specific discipline as the context of the research. The majority of the studies conducted in educational sciences and health sciences, nursing and population health. Table 10 presents the disciplines and the number of studies contextualised in these disciplines.

nursing	4
population health	2
education	6
engineering	4
business	1
several disciplines	2
total	19

Table 10 Disciplines as contexts for research literacy, if specified

3.4 Discussion of the review

It is important to note that our systematic literature review did not appraise the quality of the studies reviewed. We focused mainly on the conceptual and theoretical framework that is used in the research/academic literacy studies to form a basis for our own definition. Main finding of the review for us is the lack of research in continuing education. Our search did not yield any single study that focused

on academic continuing education. Second important finding is the lack comprehensive and holistic concept of academic literacy, not only for continuing education, but also for higher education. Especially with the global trends and changes altering ways of production and research, it is important to provide an up to date definition of academic literacy and the right set of skills and competences.

4 Literature review 2: Literacy in policy documents

Policies to foster the development of literacy and adult education, as well as research on these topics and on data about literacy rates have been provided by a range of international organisations.

4.1 UNESCO

Since the right to education has been recognised in the *Universal Declaration of Human Rights* (United Nations, 1948), literacy can be regarded as implicit part and prerequisite of this human right. Later on, literacy has been recognised as an explicit human right more formally (for an overview, see UNESCO, 2005, pp. 136-149). Many initiatives of the UN and of UNESCO embraced the goal of literacy development and tried to promote it, e.g., Education for All (EFA), the United Nations Literacy Decade (UNLD), and the Literacy Initiative for Empowerment (LIFE). Literacy also became an important topic of the Sustainable Development Goals (SDP).

4.1.1 Adult education and literacy

Since its foundation in 1945, UNESCO (United Nations Educational, Scientific and Cultural Organisation) has moderated and fostered the global dialogue on Adult Learning and Education (ALE). Starting in 1949, UNESCO has organised the CONFINTEA (Conférence Internationale sur l'Education des Adultes) conference every 12 years. UNESCO also has a long history of dealing with literacy, in particular since the conference of ministers in Teheran in 1965 which has been followed by a range of consecutive conferences since. Both threads – adult education and literacy – have been officially merged during the CONFINTEA V conference in 1997, a decision documented in the Hamburg Declaration. (UIE, 1997)

During the CONFINTEA VI conference in Brazil, 144 UNESCO member states adopted the BFA (Belém Framework for Action) and agreed to improve adult education in their countries in five dimensions: policy, governance, financing, participation, inclusion and quality (UIL, 2010). In the same year, the UNESCO published the first GRALE (Global Report on Adult Learning and Education) report, which is mainly based on national reports of contributing countries to take stock of the situation regarding the goals stated in the BFA. In 2013, GRALE II devoted a whole chapter on the topic of literacy as foundation for adult learning and education. (UIL, 2013, pp. 17-38)

4.1.2 Evolving notions of literacy, from static condition to dynamic continuum

So far, no global consensus on a definition of literacy could be reached. There exist several reasons for this lack of a stable and commonly shared definition.

One of the reasons are differences in cultural contexts. While many European languages (e.g., German, French, Spanish) associate literacy with the ability to use the alphabet in coding and decoding words and text (e.g., in German: "Alphabetisierung"), other languages (e.g., English, Chinese) understand literacy as familiarity with literature or – more generally – as a status of being well educated. (UIL, 2013, p. 20).

Another reason is the changing notion of literacy towards an increasingly complex and multidimensional understanding. These changes are reflected in three different operational definitions provided by UNESCO over time, as has been described in the 2nd Global Report on Adult Learning and Education (UIL, 2013, pp. 20-21):

- In 1958, UNESCO defined *"a person as literate who can, with understanding, both read and write a short simple statement on his or her everyday life"*.
- In 1978, UNESCO defined a person as *"functionally literate, who can engage in all those activities in which literacy is required for effective functioning of his or her group and community and also for enabling him or her to continue to use reading, writing and calculation for his or her own and the community's development"*.
- In 2003, UNESCO defined literacy as *"the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve his or her goals, develop his or her knowledge and potential, and participate fully in community and wider society."*

By making use of the earliest of these definitions, literacy could be understood as a limited set of discrete skills, which could be developed in a short period of time (e.g., in primary school) to become a static condition of a context-free individual for the rest of his or her life. Such a simplistic – but for some probably comfortable – understanding also fosters the traditional dichotomy of "literate-illiterate". Compared to this, it is stunning, how much the later definitions have evolved to a more dynamic understanding of literacy that situates literacy in social practice. One can see, how much the idea of participation in and the contribution to different groups, communities and contexts gained prominence, and how the understanding of literacy gained complexity, also reflecting changes in media and information technologies.

By signing the Belém Framework for Action on adult learning in 2010, 144 Member States of UNESCO affirmed *"that literacy is the most significant foundation upon which to build comprehensive, inclusive and integrated lifelong and life-wide learning for all young people and adults"* (UIL, 2010, p. 5). This document is of particular importance for the evolving notion of literacy in the public discourse, since it recognised *"literacy as a continuum"* (UIL, 2010, p. 6) and therefore argued to foster the development of literacy beyond basic literacy skills.

4.1.3 Media and Information Literacy (MIL) as a composite concept

Even if the notions of literacy have changed over time, most of the efforts and policies mentioned above still have by and large been focused at the eradication of illiteracy and at the promotion of basic literacy skills. This focus is different in UNESCO's policies regarding the growing importance of mass media, and more importantly regarding the rapid emergence of digital information and communication technologies. While first steps can be dated back to the early 1980s, the topic became more prominent on UNESCO's agenda and intensely discussed since the turn of the century, and wide range of declarations, recommendations and framework documents. The Prague Declaration, for example, already recognised that information literacy *"a prerequisite for participating effectively in the Information Society, and is part of the human right for lifelong learning"* (UNESCO, 2003). The participants in the First International Forum on even got a step further by acknowledging that *"today's digital age and convergence of communication technologies necessitate the combination of media literacy and information literacy"* (UNESCO, 2011, p. 2) into one composite concept.

This composite concept of Media and Information Literacy (MIL) is an important strategic step. By bringing together the formerly distinct fields of information literacy and media literacy, it is UNESCO's strategy to create convergence across all different media formats and technologies, at least regarding the relevance of literacy. Regardless of media formats, the increasing exposure to information and

media products is recognised as a challenge of current society. Across both analogue and digital information sources, the development of media and information literacy is therefore seen as a crucial prerequisite for accessing information, to critically evaluate content, to participate in communication and to make use of the freedom of expression. These considerations of high relevance for formal and non-formal education. E.g. the Fez Declaration advocated to integrate media and information literacy, in particular media and information ethics, in all kinds of educational curricula (UNESCO, 2011, p. 2).

As a consequence, UNESCO set up a comprehensive strategy to foster the development of media and information literate societies. This strategy comprises documents and guidelines, such as the Media and Information Literacy Curriculum for Teachers, guidelines for national MIL Policies and Strategies, and a Global Framework on MIL Indicators, but also infrastructures and networks, such as the International Clearinghouse on MIL and the MILID (MIL and Intercultural Dialogue) University Network, which serves as the research arm of GAPMIL (Global Alliance for Parnership on MIL).[2]

4.2 Library associations

4.2.1 IFLA

Libraries are among the most important actors in the field of information literacy. It is therefore not surprising, that the International Federation of Library Associations and Institutions (IFLA), the most important international body for libraries and information services, which has been founded in1927, has a strong interest in the topic and has a distinct information literacy section. In 2006, this section published guidelines on information literacy for lifelong learners, which also contain *"a proposal for information literacy standards for the IFLA international library community"* (Lau, 2006, p. 16). These information literacy standards are grouped under three basic components, the access, evaluation and use of information:

- *Access*
  1) Definition and articulation of information need
     (recognising and expressing need, initiating search process)
  2) Location of information
     (identifying potential sources, develop search strategy, select and retrieve information)
- *Evaluation*
  1) Assessment of information
     (analyse and extract, generalise and synthesise, evaluate information)
  2) Organisation of information
     (arrange and categorise, structure and organise information)
- *Use*
  1) Use of information
     (learns, applies, and presents information)
  2) Communication and ethical use of information
     (respects ethical and legal use of information, acknowledges intellectual property)

It is probably the professional bias of librarians that these standards are rather more specific regarding the access and evaluation of information, and comparatively less specific with respect to the use of

[2] More information on UNESCO MIL and further links can be found here: http://www.unesco.org/new/en/communication-and-information/media-development/media-literacy/mil-as-composite-concept/

information and knowledge resources. It is more concerned with the consumption of information and less with its use and production. The document as such also seems to reflect an understanding of literacy that still is predominantly related to traditional media formats libraries have been dealing with, books and journals.

At least this last point changed, when the governing board of IFLA endorsed the IFLA Media and Information Literacy Recommendations (IFLA, 2011), which promoted concept of Media and Information Literacy very similar to that of UNESCO. *"The concept extends beyond communication and information technologies to encompass learning, critical thinking and interpretative skills across and beyond professional and educational boundaries. Media and Information Literacy includes all types of information resources: oral, print, and digital."* (IFLA, 2011, p. 1)

4.2.2 ACRL

The *Association of College and Research Libraries (ACRL)* has been founded in 1940 as the largest division of the *American Library Association (ALA)*. As such, it has been serving as association and representation for both academic libraries and library workers for decades. It is part of ACRL's mission to strategically contribute to higher education, scholarly communication, and civic development. For this purpose, ACRL develops standards, guidelines and frameworks on different topics and collaborates with other institutional stakeholders, such as the American Association for Higher Education and the Council of Independent Colleges. Also regarding information literacy in higher education, ACRL has developed two important documents.

The *Information Literacy Competence Standards for Higher Education* (ACRL, 2000) have been an early reaction of ACRL to the increasingly complex information environment. The document defined its standards for information literacy with a strong focus on the information literate individual that should be able to:

- Determine the extent of information needed
- Access the needed information effectively and efficiently
- Evaluate information and its sources critically
- Incorporate selected information into one's knowledge base
- Use information effectively to accomplish a specific purpose
- Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally

For each of these six standards, the document suggested a range of performance indicators, which where complemented with outcomes that could be used for assessment. In the meantime, however, due to the rapidly changing formats of information ecosystems, ACRL found these standards outdated and put them out of force in 2016.

Instead, it substituted the old standards by the new *Framework for Information Literacy for Higher Education* (ACRL, 2015). Interestingly, the document does not refer to only one rapidly changing information environment, but to a multitude of *"increasingly complex information ecosystems*", and highlights the *"vital role of collaboration … for increasing students understanding of the process of knowledge creation and scholarship"*. It is probably this more differentiated view that encouraged ACRL to back away from the definition of standards.

The Framework is organised around six *""frames" […] or portal concepts through which students must pass to develop genuine expertise within a discipline, profession, or knowledge domain"* (ACRL, 2015,

p. 26). The characteristics of these six frames as stated in the ACRL framework can be summarised, as follows:

Authority is constructed and contextual

- *Definition:*
  Authority of authors or experts is contextually constructed, various groups may identify different types of authority, information needs have to be determined
- *Knowledge practices:*
  Learners identify different types of authority, use indicators of authority to determine credibility, understand differences between disciplines, develop own authoritative voice and sense of responsibility, understand social nature of information ecosystems
- *Dispositions:*
  Learners maintain an open mind vis-à-vis varied perspectives, search for authoritative sources, critically assess content, recognise diverse views, apply frequent self-evaluation

Information creation as a process

- *Definition:*
  Information can be created and expressed in various formats and shared via different delivery methods to convey a message. Apart from the final product, the varying *"iterative processes of researching, creating, revising, and disseminating information"* have to be considered and critically evaluated
- *Knowlede practices:*
  Learners understand the varying implications of different information formats, e.g., on how information is perceived in different packaging or contexts, as well as the varying implications of different information creation processes on capabilities and constraints of the resulting information.
- *Dispositions:*
  Learners seek to understand underlying creation processes of relevant information products, match information need with appropriate product, accept the need to communicate in a range of formats, understand that different modes of dissemination may be used for different purposes.

Information has value

- *Definition*:
  Information is of value in a variety of contexts and dimensions. As a consequence, various legal and socioeconomic interest can influence the creation, dissemination and use of information and information products.
- *Knowledge Practice:*
  Learners understand and distinguish various forms of intellectual property regimes, understand that mechanisms for the production and dissemination of information create issues of privacy, of control and of access to information, decide where and how to publish information.
- *Dispositions:*
  Learners respect ideas of others, value efforts needed to produce knowledge, and regard themselves as active producers of information, which they contribute to the information marketplace.

Research as inquiry

- *Definition:*
  Research is an iterative process of inquiry in scholarly or professional fields, where answers can lead to new, increasingly complex questions.
- *Knowledge practices:*
  Learners formulate questions for research by identifying information gaps or by re-examining existing findings, determine scope of investigation, use various methods to gather information, synthesise ideas and draw conclusions.
- *Dispositions:*
  Learners consider research as open-ended, value intellectual curiosity, are open minded and critical, seek multiple perspectives, follow ethical guidelines and demonstrate intellectual humility.

Scholarship as conversation

- *Definition:*
  Research is a discursive practice, where scholars, researchers or professionals engage in sustained discourse in communities of scholarly and professional fields. Distinct discourses may be shaped by established perspectives, authority structures, various venues of conversation, and information ecosystems.
- *Knowledge practices:*
  Learners are able to identify and refer to relevant contributions in the field or discipline, contribute to the scholarly conversation at appropriate levels, critically evaluate contributions by others
- *Dispositions:*
  Learners seek out ongoing conversations in their research area and search for ways to contribute, recognise the variety of venues for scholarly conversation, understand responsibilities in conversations, are sensitive for power disparities in the field/discipline and their influence on the ability to participate and engage.

Searching as strategic exploration

- *Definition:*
  The strategic search for information is a contextualised experience, and often nonlinear and iterative. It requires mental flexibility, in particular when new understanding develops during the exploration.
- *Knowledge practices:*
  Learners determine information needs and scope of research efforts, identify interested parties, informants, collections or recorded information, understand information systems, match information needs, strategies and research capacity in the searching processes.
- *Dispositions:*
  Learners understand that searching strategies need to be adaptable to varying information sources, seek guidance from experts, persist in pursuing their research goals even in case of challenges.

4.3 Literacy in higher education policy debates

4.3.1 Academic literacy: competencies expected of students in California

In 2002, the Intersegmental Committee of Academic Senates (ICAS), which represents the academic senates from the three higher education sectors in California, namely the University of California, the California State University and the California Community Colleges, sponsored the document *Academic Literacy* (ICAS, 2002), which reported about a study that investigated the expectations of faculty members from all three sectors about their students' ability to read, write and think critically.

The paper defines academic literacy expected of entering freshmen as composed of the following interrelated competencies, which are *"understood as larger, more holistic "abilities" rather than a list of discrete "skills""* (ICAS, 2002, p. 2):

- *Habits of mind and critical thinking* (ICAS, 2002, pp. 12-15):
  (e.g., exhibit curiosity, experiment with new ideas, challenge own beliefs, generate hypothesis, ask for clarifications, etc.)
- *Reading* (ICAS, 2002, pp. 17-20):
  (e.g., literal comprehension and retention, depth of understanding, analysis, interaction with text, etc.)
- *Writing* (ICAS, 2002, pp. 20-27):
  (e.g., critically analyse arguments of others, summarise information, synthesise information from several sources, etc.)
- *Listening and Speaking* (ICAS, 2002, pp. 27-28):
  (e.g., understand verbal directions, listening and simultaneous note taking, fulfil different roles in group work, participate in class discussions, etc.)
- *Use of technology* (ICAS, 2002, pp. 31-35):
  (e.g., email, office-software, search engines, evaluate authenticity and credibility of information from the internet, etc.)

In difference to literacy definitions from library associations, this definition of academic literacy does not include the search for information as an important element. This might have to with the history of this document on academic literacy, which is an update of the 1982 *Statement on Competencies in English Expected of Entering College Freshmen*. One can safely assume, that this definition of academic literacy, which is used by faculty members of the Californian higher education system, is deeply rooted in that of a proficient command of the language of instruction and of scholarly communication.

Even if this document is intended to be a recommendation to the school sector, it is based on collaboration between secondary and tertiary sector and shows impressive self-reflection of the tertiary sector, in particular regarding the quantity and the characteristics of reading and writing assignments in higher education institutions. It is also very precise and detailed regarding learning outcome definitions of competencies related to literacy.

Last, but not least, the document is also very outspoken about the significance of academic literacy and critical about the college student's levels of literacy, as the following two statements might demonstrate:

> *"83% of faculty say that the lack of analytical reading skills contributes to students' lack of success in a course."*

"Only 1/3 of entering college students are sufficiently prepared for the two most frequently assigned writing tasks: analyzing information or arguments and synthesizing information from several sources, according to faculty respondents."
(ICAS, 2002, p. 4)

Even if the document is very explicit, precise and detailed in formulating the expectations of faculty members regarding all elements of academic literacy, it is also very sober and realistic regarding the extent to which these expectations are (not) met in practice. Still, this does not reduce the value or relevance of this document. One can admit to its claim that it is *"truly groundbreaking in its approach and far-reaching in its authority"* (ICAS, 2002, p. V).

4.3.2 The debate on "Studierfähigkeit" [ability to study] in Germany

Apart from networking activities among academic librarians around the topic of academic literacy (Hapke, 2008), no broader debate exist in higher education institutions in German speaking countries with explicit reference to literacy. On the other hand, there has always been critique about the lack of scientific preparedness of freshmen, often framed as the lack of ability to study (*"Studierfähigkeit"*), at German universities, which can be dated back at least 200 years to the beginnings of the Humboldtian University.

A subject that dealt with the ability to study at universities is the mediaeval tradition of *Hodegetik* (instruction into how to study). As a consequence of the Humboldtian university reform, this tradition had been changed fundamentally. Before the reform, Hodegetik focused on highly structured introduction into the – at this time – encyclopaedic character of university studies and highly prescriptive instructions on how to study and how to properly behave as a student in general (Stary, 1994, pp. 160-161). In the early phase of the Humboldtian Reform, Hodegetik developed a new focus. Following the ideals of the enlightenment, it denounced passive-repetitive forms of learning and instead favoured active and autonomous forms that should lead to generally educated, independent minds, to fully developed, free individuals. Hodegetik literature of this time dealt much with the general purpose of university studies, but was thin on practical advice (Stary, 1994, pp. 161-161). The further development of the Humboldtian University System, in particular the differentiation of specialised academic disciplines eroded the unifying claim of the formation of autonomous human beings, devaluating it to a mere idea that lost substance. Now, the understanding of general education became more encyclopaedic rather than empowering. In parallel, the training in a scientific profession became the new, at least equally important goal of studying at universities. (Stary, 1994, pp. 162-163). As a result, the Hodegetik has lost much of its orientating value and of its prominence as a subject in Germany, while it has remained a core element of studies in the U.S. or the Soviet Union (Kunze, 1958, p. 5). Its modern remains are formats titled *„"Eingangsphase", "Orientierungsveranstaltung" oder "Einführung in Studientechniken""* (Stary, 1994, p. 163).

The topic of insufficient preparation of students for universities gained new prominence in the 1980s, mainly caused by reform of upper secondary education in Germany. The debates in and around higher education was characterised by ideological conflicts. Some political initiatives asked for entrance selection to generate homogeneous learning groups and a differentiation of higher education in an elite-sector and a broader sector for the less gifted. Other actors voted for embracing heterogeneity and for introducing didactical measures, such as bridging courses, internal differentiation and complementary measures (Hanft, 2015, pp. 14-17). Twenty years later, the situation has changed in so far, as participation in higher education has changed from an elite to a mass phenomenon. Heterogeneity has further increased, due to more social diversity, but also due to new regulations to acknowledge secondary

vocational qualifications as entrance entitlement to higher education, which broke the former monopoly of the *Abitur* as only form to acquire access entitlements (Hanft, 2015, pp. 16-20).

The discussion on heterogeneity also changed the debate on *Studierfähigkeit*, since a range of factors could influence the ability to study. For example, Schulmeister et al. listed the following factors:

- *"Social heterogeneity (age, marital status, children, migration background, educational background of parents)*
- *Cognitive heterogeneity (abilities, talents, competencies)*
- *Study expectations (occupational and practical orientation)*
- *Motivational heterogeneity (avoiding, pragmatic, self-organising)*
- *Heterogeneous circumstances (employment, part-time studies, commuting)"*
  (Schulmeister, Metzger, & Martens, 2012 as quoted Hanft, 2015, p. 20, own translation)

Compared to the aforementioned examples on literacy, in particular the Californian case with its focus on academic literacy, one can claim that the German debate on study skills and the factors influencing the ability to study is rather broad and unfocused. Already in earlier times, when the emphasis laid on intellectual autonomy or encyclopaedic general education, one could criticise both the lack of independent thinking among freshmen and their lack of particular knowledge, in particular if a representative of a discipline regarded it as a prerequisite for studying his/her discipline. Current lists of factors influencing the ability to study are even broader and can lead to a multitude of didactical recommendations and/or complementary measures, but do not provide a common ground for discussing literacy in higher education. Even if the debate on *Studierfähigkeit* in Germany is somehow related to the topic, the explicit focus is missing.

4.3.3 The German debate on "Informationskompetenz" [information literacy] in higher education

Library associations 1: Emergence of the topic literacy

Following (Hapke, 2008, pp. 165-167), one can trace the emergence of the debate on "information literacy" among German academic libraries back to the 1990s. Since then, libraries started to network by arranging conferences, setting up the central portal *informationskompetenz.de*, which is coordinated by the association of german libraries (Deutscher Bibliothekenverband – DBV). At this time, libraries started to regard themselves as teaching libraries and shared their respective practices. Additionally, the federal ministry BMBF, the German Research Foundation (DFG) or some of the German federal states funded projects for the development of learning materials, e.g., LOTSE (Library Online Tour and Self-Paced Education)[3], or VISION (Virtual Services for Information Online)[4].

The dominant educational formats for imparting information competence at universities were independent courses and one-shot sessions integrated in regular study courses. Full integration into curricular was a seldom phenomenon in the first decade of the century. However, accreditation agencies increasingly started to ask for "generic competencies" as learning outcomes, which could be seen as a potential opportunity for integrating more literacy into curricula (Hapke, 2008, p. 167).

Library associations also developed official guidelines, declarations and statements. In 2009, the DBV published its *Standards der Informationskompetenz für Studierende* (DBV, 2009). In the same year, its sister association, the society of German libraries (Verein Deutscher Bibliotheken – VDB) published the *Hamburger Erklärung* (VDB, 2009), demanding the integration of these standards into the curricula of

[3] https://www.ulb.uni-muenster.de/lotse/
[4] http://www.vision.tu-harburg.de/

bachelor and master programs. In 2011, the federal assembly of library associations in Germany (Bundesvereinigung Deutscher Bibliotheksverbände – BDB) published the position paper *Medien- und Informationskompetenz – immer mit Bibliotheken und Informationseinrichtungen* (BID, 2011) claiming the imparting of information literacy as a core task of libraries. In 2013, the DBV published a statement to endorse the decision of the German rectors conference HRK (Hochschulrektorenkonferenz) to fully embrace the topic information literacy (DBV, 2013).

Library associations 2: Concepts of information literacy

In 2016, DBV and VDB jointly adopted the *Referenzrahmen Informationskompetenz* (DBV & VDB, 2016), which is intended to be used by all kinds of public libraries (from schools to universities) as a common framework for reference, as a tool for daily work, but also for strategic planning. This framework for information literacy defined information literacy as an ability composed of five sub-skills: search, validation, knowledge, presentation and disclosure. Each of these sub-skills is split up in four steps or criteria.

Suchen	**Prüfen**	**Wissen**	**Darstellen**	**Weitergeben**
Wissensbedarf formulieren	Thematische Relevanz	Formulieren	Einfachheit	Nutzungs-bedingungen klären
Quellen finden	Sachliche Richtigkeit	Vergleichen	Semantische Redundanz	Zitate kennzeichnen
Quellen auswählen	Formale Richtigkeit	Einordnen	Kognitive Strukturierung	Quellen nennen
Information isolieren	Vollständigkeit	Strukturieren	Kognitiver Konflikt	Netzwerke nutzen
Arbeitsschritte	**Kriterien**	**Arbeitsschritte**	**Kriterien**	**Arbeitsschritte**

Figure 2 Reference framework for information literacy [Referenzrahmen Informationskompetenz]

Source: (DBV & VDB, 2016, p. 4)

Each of these steps or criteria was further described in six different competence levels with explicit level descriptors, which sums up to a list of coordinated 24 descriptions. The six competence levels are organised from A1 to C2, which emulates the structure of the Common European Framework for Languages. Unfortunately, these competence levels cannot easily be translated into the level descriptors of the QF EHEA.

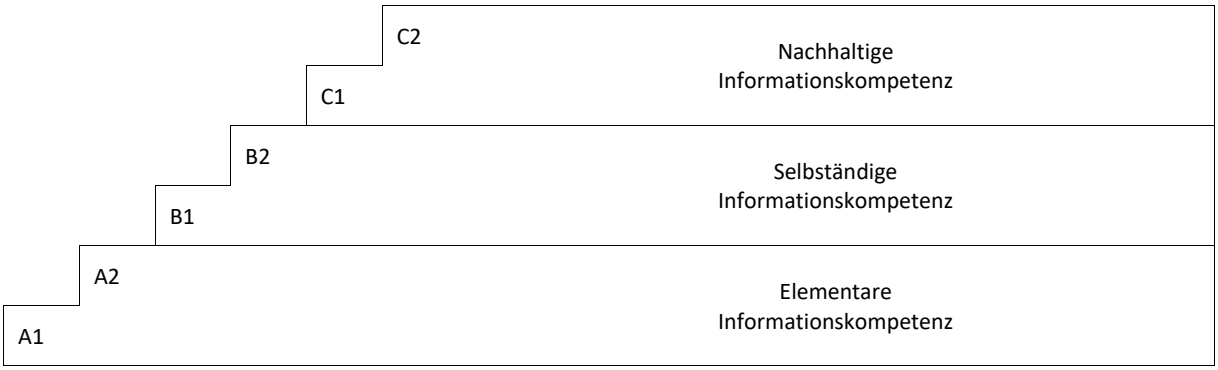

Figure 3 Six levels of competencies for information literacy

Source: (DBV & VDB, 2016, p. 5)

Higher education and science policy: Emergence of the literacy as a topic of policy

In 2006, the German rectors conference HRK (Hochschulrektorenkonferenz) published the *Leitfaden für Hochschulstrategien zur Informationskultur* (HRK, 2006) as first recommendations for general management and IT management at higher education institutions on how to deal with information, which was complemented by *Herausforderung Web 2.0* (HRK, 2010), a further recommendation, comprising an overview on the topic and examples in research, teaching and administration. These papers were important for the development of the landmark document *Hochschule im digitalen Zeitalter: Informationskompetenz neu begreifen – Prozesse anders steuern* (HRK, 2012), which we will describe more extensively further below. The latest policy document of the HRK in this context is called Informationssicherheit als strategische Aufgabe der Hochschulleitung (HRK, 2018), which deals infrastructure and data protection at higher education institutions.

These documents of the HRK are also influenced by the statements and declarations of other important stakeholders. The Wissenschaftsrat, an advisory council for science policy in Germany published *Übergreifende Empfehlungen zu Informationsstrukturen* (Wissenschaftsrat, 2011), highlighting the significance of scientific information infrastructures for science policy, and the role of higher education institutions as providers of these infrastructures. One year later, the Wissenschaftsrat published further recommendations, the *Empfehlungen zur Weiterentwicklung des wissenschaftlichen Informationsinfrastrukturen* (Wissenschaftsrat, 2012), which contain – among other things – the advice to develop media and information competence in higher education.

Similar claims are made by DFG (Deutsche Forschungsgemeinschaft), the German funding agency for basic research, in its position paper *Die digitale Transformation weiter gestalten* (DFG, 2012). On the one hand, DFG gears its funding activities towards a coordinated system of information infrastructures (DFG, 2012, pp. 2-3). On the other hand, DFG asks for a stronger focus on information literacy in graduate and postgraduate programs, to enable students to deal with increasingly complex information and communication requirements (DFG, 2012, p. 4).

HRK's concept of information literacy

Reflecting on higher education institutions in the digital age, HRK expands the notion of information literacy in a way that it comprises organisational competencies as well. HRK claims that the academic core activities learning, teaching and researching have to be seen in close interrelation with the organisation of the higher education institution. Therefore all efforts to strengthen information literacy have to address both the academic core and the organisation. (HRK, 2012). As a consequence, information

literacy has to address distinct stakeholder groups within the higher education institution and all internal processes. In brief, the HRK recommends the following (HRK, 2012, pp. 3-4):

- *Information literacy of students*
  Courses for information literacy should be further elaborated, comprehensively provided and stronger integrated into curricula. Different educational offerings for imparting information literacy should be better coordinated and connected.
- *Information literacy of teachers*
  Teachers should continuously improve their on literacy by attending training and professional development measures, the management of higher education institutions has to take care for attractive provision and of adequate incentives.
- *Information literacy of researchers*
  To foster the information literacy of researchers, professional development provision has to be provided and should be integrated into curricula of graduate and postgraduate programs. Researchers also should develop their literacy in competence networks.
- *Governance of higher education institutions*
  Higher education management needs to be able to steer structures and processes of the organisation. Therefore, one person in the management board should be responsible for information infrastructure and for strengthening information competence.
- *Support services*
  Libraries and computing centres need to expand their competences to be able to support researchers in their data management.

4.4 Bologna Process and qualification frameworks

As a response to global competition and to make European higher education more attractive to the world, the Bologna Process was started in 1999 to create a coherent *European Higher Education Area (EHEA). "[T]he objectives of the Bologna Process include the creation of a common framework of internationally understandable and comparable degrees, undergraduate and graduate levels of study in all countries, a European approach to quality assurance, and a European Credit Transfer System (ECTS)."* (Pechar, 2007, p. 133).

This introduction of a joint degree structure of undergraduate and graduate levels, which comprises three cycles (bachelor, master, and doctoral degrees) also made a realignment of study programs across all signatory countries necessary. However, one has to agree that the *"Bologna Process does not specifically mention information literacy, but it has provided avenues for dialogue as educational institutions work to align themselves with the Process's tenents."* (Mackey & Jacobson, 2014, p. 111). These "avenues for dialogue" were mainly opened by the introduction of qualification frameworks and their influence on the (re)design of study programs in higher education across Europe.

4.4.1 Qualification frameworks

A qualification framework is a tool to sort and compare different qualifications or degrees. During the first decade of the new century, two qualification frameworks have been developed. In 2005, the *Qualification Framework for the European Higher Education Area (QF EHEA)* (Bologna Working Group on Qualifications Frameworks, 2005), which covers three cycles of higher education degrees (bachelor, master, PhD), has been developed as one of the cornerstones of the Bologna Process. Partly as a reac-

tion to (and largely compatible with) the QF EHEA, in 2008 the European Union introduced the *European Qualifications Framework for Life Long Learning (EQF LLL)* (European Parliament & Council, 2008), which expands its reach to all levels of formal education, comprising the three cycles of higher education plus five prior cycles covering the primary and secondary school system. Both qualification frameworks require nation states to develop their own, national qualification frameworks and to sort their national qualifications accordingly. As a result of this, each of the involved countries should provide a grid of ideally eight levels, where all national qualifications can be located. On the basis of these sequentially structured grids (from lowest to highest level of formal education), comparisons of qualifications (e.g., horizontally across countries, but also vertically between different levels) should become easier.

Regarding potential effects on the topic of literacy, the most important similarity between the two qualification frameworks lies in the fact that they ask for a fundamental shift in perspective, from traditional descriptions of qualifications that have focused on teaching input towards new forms of descriptions that should focus on learning outcomes by defining which abilities and achievements can be expected by the holders of a qualification. Qualification frameworks offer level descriptors, which have to be generic enough to cover different types of qualification at the same level. They can and should be used by qualification providers for more specific definitions of learning outcomes to describe each of their particular qualifications. Unfortunately, the level descriptors of both European qualification frameworks differ both in their structure and their extent. The descriptors of the EQF are structured into only three dimensions (knowledge, skills and competencies), while the descriptors of the QF EHEA distinguish five dimensions in which to describe potential learning outcomes (knowledge and understanding, application of knowledge and understanding, ability to make judgements, ability to communicate, and learning skills).

Ideally, learning outcome definitions at different levels are developed in reference to each to each other, to allow for comparisons of "step changes" of the same ability between different qualification levels, e.g., to describe consecutive increases in the proficiency of a particular ability or skill. In the case of the level descriptors of the QF EHEA, these step changes are described like that (Bologna Working Group on Qualifications Frameworks, 2005, pp. 148-150):

> *"At completion of the cycle students will have / can demonstrate:*
>
> *knowledge and understanding [..]*
>
> *1st cycle ..* *[that is] supported by advanced text books [with] some aspects informed by knowledge at the forefront of their field of study ..*
>
> *2nd cycle ..* *provides a basis or opportunity for originality in developing or applying ideas. often in a research context ..*
>
> *Doctorates ..* *[includes] a systematic understanding of their field of study and mastery of the methods of research associated with that field*
>
> *application of knowledge and understanding [..]*
>
> *1st cycle ..* *[through] devising and sustaining arguments*
>
> *2nd cycle ..* *[through] problem solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts ..*
>
> *Doctorates ..* *[through the] ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity ..*

[that has] made a contribution that extends the frontier of knowledge by developing a substantial body of work some of which merits national or international peer-reviewed publication ..

ability to make judgements [..]

1st cycle .. [through] gathering and interpreting relevant data ..

2nd cycle .. the ability to integrate knowledge and handle complexity, and formulate judgments with incomplete data ..

Doctorates .. [through] critical analysis, evaluation and synthesis of new and complex ideas..

ability to communicate [..]

1st cycle .. information, ideas, problems and solutions ..

2nd cycle.. their conclusions and the underpinning knowledge and rationale to specialist and nonspecialist audiences ..

Doctorates.. with their peers, the larger scholarly community and with society in general about their areas of expertise ..

learning skills [..]

1st cycle .. needed to study further with a high level of autonomy ..

2nd cycle.. to study in a manner that may be largely self-directed or autonomous..

Doctorates .. expected to be able to promote, within academic and professional contexts, technological, social or cultural advancement .."

These level descriptors of learning outcomes already allow for some cautious links to definitions of literacy, for example, when particular sources of knowledge are mentioned ("textbooks" rather than the most recent scholarly publications for the 1st cycle), or when appropriate formats for text production are suggested ("peer reviewed publications" as a proof of competence at PhD level). At this stage, however, these potential links to literacy are rather isolated and cannot consequently be run through across different qualification cycles.

4.4.2 Literacy in learning outcomes at national and program level: The case of Norway

The development of National Qualification Frameworks (NQF) as a consequence of and in conjunction with the two European frameworks would have offered an opportunity to elaborate on the topic of literacy. Alas, one has to admit that not much evidence can be found in national level descriptors, as a quick scan across the NQFs of the 28 EU member states (Cedefop, 2018) allows to say. For sure there exist isolated links to literacy (e.g., when abilities to search for knowledge or to communicate findings are mentioned), but often they lack coherent development across different cycles.

One exception from this pattern can be found in a non-EU country, in the case of the Norwegian NQF. Even if this NQF also does not mention the term literacy, it deals with aspects of literacy at sequential levels in a differentiated, consecutive way. Here are some examples of selected learning outcomes to demonstrate this sequential relationship (based on NOKUT, 2014, pp. 24-26).

Knowledge

Bachelor has knowledge of the history, traditions, distinctive character and place in society of the academic field

Master can analyse academic problems on the basis of history, traditions, distinctive character and place in society of the academic field

PhD can contribute to the development of new knowledge […] in the field

Skills

Bachelor	*can find, evaluate and refer to information and scholarly subject matter and present it in a manner that sheds light on the problem*
Master	*can analyse and deal critically with various sources of information and use them to structure and formulate scholarly arguments*
PhD	*can formulate problems, plan and carry out research and scholarly and/or artistic development work*

General Competence

Bachelor	*can communicate important subject matters such as theories, problems and solutions, both in writing and orally, as well as through other forms of communication*
Master	*can communicate extensive independent work and masters language and terminology of the academic field*
PhD	*can communicate research and development work through recognised Norwegian and international channels*

Norwegian stakeholders made use of the NQF as a tool for embedding information literacy. E.g. Bergen University College introduced elements of information literacy in all degree description documents at bachelor level, and set up strategic educational initiatives to develop tools and courses for information literacy and academic writing, which addressed all study cycles, including the PhD level (Kavli et al., 2012).

Other universities and study programs also embedded aspects of information literacy in a consecutive way, by adapting the NQF to the particularities of distinct disciplinary contexts. One example are consecutive levels of study programs in Sociology at the University of Oslo[5]. This principle is again demonstrated on the basis of selected learning outcomes:

Knowledge

Bachelor	*understand sociological perspectives that explain similarities and differences within and between societies in different parts of the world*
Master	*is able to position sociological works based on the subject's history, traditions, uniqueness and place in society*
PhD	*can position own research within a larger academic and scientific context*

Skills (example 1, search for information)

Bachelor	*is able to find and familiarise oneself with relevant professional literature, and have correct source and citation usage*
Master	*is able to acquire knowledge of current topics by obtaining existing information and new data in a systematic and critical way*
PhD	*is able to formulate problems, plan and carry out research and scholarly development work*

[5] Sources are the respective websites of the study programs, partly translated by Google translate:
Bachelor: https://www.uio.no/studier/program/sosiologi/hva-lerer-du/
Master: https://www.uio.no/studier/program/sosiologi-master/hva-lerer-du/
PhD Social Sciences: https://www.sv.uio.no/english/research/phd/structure/learning-outcomes/

Skills (example 2, understanding and evaluating)

Bachelor	*is able to see relationships between issues, methodological approaches, choice of analysis tools and representation of results*
Master	*is able to critically assess how well-founded the conclusions in social science studies are*
PhD	*can provide qualified feedback on others' contributions within his/her own academic field*

General Competence

Bachelor	*is able to give a clear and orderly presentation of sociological material, both written and oral*
Master	*is able to communicate own work to others and receive feedback in a critical and reflected way*
PhD	*can communicate research and development work through recognised Norwegian and international channels"*

4.5 Literacy support services at university websites

Most universities provided services to their students, which can be regarded as support for fostering aspects of literacy. In the majority of cases, these services do not explicitly mention literacy and only deal with discrete aspects of literacy. As examples for academic writing support, there exists a list of writing centers in German speaking countries[6], hosted by the University of Bielefeld, and associations of specialist in the field, e.g., the European Association for the Teaching of Academic Writing (EATAW)[7] or the European Writing Center Association (EWCA)[8]. As example with focus on information competence, one can mention the portal *Informationskompetenz.de*[9], which is hosted by the German association of academic libraries DBV (Deutscher Bibliothekenverband).

In contrast to that common pattern, the following two cases can be taken as examples which both explicitly dealing with literacy, based on holistic concepts taking different aspects of literacy as a set of interrelated skills and provide support accordingly. Additionally, both cases offer services not only to students, but to faculty as well as a means to embed literacy instruction into regular courses.

4.5.1 Research literacy at Grinnel College, Iowa, U.S.

Grinnel College provides a broad set of services to support research literacy, mainly offered by the library and by the writing lab. Both units offer distinct services for students and for teaching.

Library services for students[10]

Apart from a general information about the local library's resources, the website contains a range of clear guidelines and manuals as well as specialised services for doing literature-based research, which comprise –a among others – the following sub-topics:

- Choosing a research topic
- Creating a search statement
- Finding data and statistics
- Library lab
- Scholarly and popular sources
- Subject guides
- Citing sources
- Academic posters

Library services for teaching[11]

As a sub-topic of its services for faculty & staff, the local library provides a list of services for teaching, which covers the following topics:

- Teaching research literacy
- Feedback forms
- Course reserves
- Affordable course materials

6 https://www.uni-bielefeld.de/einrichtungen/schreiblabor/vernetzung/
7 http://www.eataw.eu/
8 http://www.writingcenters.eu/
9 http://www.informationskompetenz.de
10 https://www.grinnell.edu/academics/libraries/services-students
11 https://www.grinnell.edu/academics/libraries/faculty-staff/teaching/course-materials

- Copyright and the classroom
- Teaching spaces

Particularly remarkable is the subtopic on teaching research literacy[12], which refers to a mission statement that puts literacy in the core of the teaching mission of the institution. Additionally, it provides a list of sample academic research assignments (based on different literature search goals and text types to produce), and tips for planning productive research literacy sessions in cooperation with librarians. The list of sample academic research assignments[13] comprises for example:

- Executive summary of a scholarly article
- Anatomy of a research paper
- Annotated bibliography
- Biographical sketch of an author
- Briefing paper
- Compare reference sources
- Credibility of a course reading
- Comparison of primary and secondary sources on a topic

Writing lab[14]

The writing laboratory at Grinnel College offers resources for students, resources for faculty and a writing mentors program. Resources for students consist of a range of course offerings. Resources for faculty consist of individual consultations on how to make writing part of subject-specific courses, and of writing lab instructors, who are available to lead in-class workshops. In the writing mentors program, experiences students with good writing skills can serve as mentors for others. They have to be nominated by faculty members.

4.5.2 Academic literacies at York University, CA

Maybe the most important structure at York University regarding literacy is the e-learning resource *SPARK*[15] *(Student Papers & Academic Research Kit)*, which *"focuses on the development of academic literacies, such as research, writing and learning skills. Academic literacies are a set of interrelated skills. As a result we take a holistic approach by organizing the content around the process of completing a written assignment, rather than treating each skill (research, writing, etc.) as a separate domain."*[16]

SPARK was collaboratively developed by the University Libraries, the Writing Lab and the Learning Skills Services at York University. Loosely modelling the process of producing a paper, the SPARK e-learning resource is composed of 13 self-learning modules, each of which requires about 8-10 minutes to be completed, and provides a range of supplemental resources.

Getting started

- Understanding the assignment
- Time management
- Academic integrity

12 https://www.grinnell.edu/academics/libraries/faculty-staff/teaching/research-literacy
13 https://www.grinnell.edu/academics/libraries/faculty-staff/teaching/assignments
14 https://www.grinnell.edu/academics/centers-programs-and-resources/writing-lab
15 https://spark.library.yorku.ca/
16 https://spark.library.yorku.ca/about-spark/

- Choosing a topic
- Books, journals & more

Exploring

- Gathering & noting ideas
- Research strategies
- Effective reading strategies
- Essay structure

Pulling it together

- Creating bibliographies
- Writing strategies
- Revising your arguments
- Essay editing

In addition to SPARK, University Libraries, the Writing Lab and Learning Skills Services provide further support. E.g. Learning Skills Services provide an impressive range of workshops, services and materials to foster the learning of students which partly go beyond literacy. From the perspective of literacy, it is interesting that they offer distinct materials on reading[17, 18, 19] and on note taking[20, 21], as well as on collaboration in group assignments[22].

The Writing Lab[23] offers the a range of services, which comprise one-to-one writing, online writing drop-in support, writing workshops and courses, pre-university programs and faculty support for connecting writing support services with their regular courses.

Apart from the normal services regarding the use of library resources, University Libraries[24] offer many complementary services, such as writing and publishing guides for graduate students, digital scholarship support (digitisation of analogue documents, digital journal and repository platforms), scholarly communication and research support (open access publishing, journal selection, data services), academic integrity instruction (copyright, use of e-resources) and citation management tools.

4.6 OERs

Open Educational Resources (OER) are learning and teaching materials that can be accessed, used and modified by anybody without being charged. The development of OER is an important international trend in (higher) education, which has become particularly prominent in Anglo Saxon countries. Higher education institutions, charities, governments and public funding agencies invest in the development of OERs. The rationale behind these investments can be briefly explained by the following statement: *"Governments are by far the biggest suppliers of education worldwide. They have the most to contribute to the OER movement and the most to gain in terms of cost savings and economic growth."* (Daniel

17 http://lss.info.yorku.ca/resources/reading-skills-for-university/
18 https://lss.info.yorku.ca/handouts-and-worksheets/
19 http://lss.info.yorku.ca/files/2013/08/Reading-Skills-Brochure.pdf
20 http://lss.info.yorku.ca/resources/note-taking-at-university/
21 http://lss.info.yorku.ca/files/2013/08/Note-Taking-Brochure.pdf
22 http://lss.info.yorku.ca/files/2013/08/LSS-Mastering-Group-Assignments.pdf
23 https://writing-centre.writ.laps.yorku.ca/services/
24 https://www.library.yorku.ca/web/

& Killion, 2012) The distribution and free sharing of (mostly) publicly funded learning and teaching materials can reduce the costs for publicly funded education, and increase access to education.

As a result of this development, OER increasingly become potentially valuable sources for learning and teaching in higher education. However, their use requires particular literacy skills, including the ability to evaluate collections and resources, knowledge about options and limitations for use, access requirements and the type of interaction assumed by the resource (Robertson, 2010, p. 5).

Higher education institutions, and their libraries in particular, gain new responsibilities in the context of OER. On the one hand, in teaching literacy skills they need to go beyond their primary focus on scholarly publications and textbooks and extend it to OER and open access materials. On the other hand, they also should foster the production of OER by offering support services to teachers and students. Especially the second part would be essential to empower teachers and students for participation in the OER community.

5 Defining research literacy: Theoretical considerations

5.1 General considerations

5.1.1 Literacies for the "new work order"

In the last few decades, globalisation and digitalisation have brought about so disruptive changes in the ways work is organised that scholars started to talk about a *"new work order"* (Gee, Hull, & Lankshear, 1996). For the purpose of analysing digital literacies at work, Jones & Hafner (2012, pp. 175-178) identified five main changes that are brought about by this new work order.

- *Shift from manufacturing to "knowledge work"*
  The world economy has experienced a major shift from mass-production towards customisation of production for niche markets, and towards differentiated service jobs. This shift requires an expansion of "knowledge work" on a global scale.
  Literacy practices required for this kind of jobs involve the ability to *"evaluate and find patterns"* in large amounts of data, *"create new information and new knowledge",* but also to *"successfully manage social relationships and social identities".*
  (Jones & Hafner, 2012, p. 176)
- *Distribution of work across large geographic distances*
  Increased outsourcing, geographic expansion of workflows and service relationships, and the differentiation of niche markets also leads to geographic distribution of work across large distances.
  Literacy practices required in this situation are effective communication to *"co-ordinate teams and manage tasks",* which involves a sound understanding of digital technologies, intercultural communication, and *"the process of mediation itself".*
  (Jones & Hafner, 2012, pp. 176-177)
- *De-emphasis of the workplace as a common physical space*
  A complementary development to the distributed nature of work is the tendency to increasingly work from home, which decreases the importance of the workplace as a common physical space.
  Literacy practices required in this new situation are a *"high degree of self-management"*, the ability to balance between *"work and personal life"*, dealing with *"feelings of isolation"* and *"compensating for a relative lack of visibility"* within the organisation.
  (Jones & Hafner, 2012, p. 177)
- *Flattening of hierarchies within organisations*
  Traditional production has been organised mainly in vertical hierarchies. The new work order does not completely abolish hierarchies, but seeks to increase productivity and creativity by flattening hierarchies within organisation, e.g., by reducing middle-management positions, and by handing over more responsibility to self-managing teams.
  Literacy practices required for participating in self-managing teams are the ability to *"identify important problems", "generate solutions"* and effectively communicate them to the team. They also require *"each member to make a unique contribution"*, as well as the ability to sanction *"failure to contribute results"*.
  (Jones & Hafner, 2012, pp. 177-178)

- *Weakening of the relationships between employer and employee*
  Two phenomena contribute to the weakening of relationships between employer and employee: On the one hand, employees increasingly change jobs and employers, which results in a reduced duration of appointments. On the other hand, companies increasingly offer temporary contracts instead of permanent employment contracts.
  Literacy practices required for this kind of flexibility at the labour market is the ability to *"make use of the 'strong weak ties' in […] social networks"*, to *"create 'profiles' which bring together evidence of past achievements […] in effective […[ways that command the attention of potential employers"* or clients.
  (Jones & Hafner, 2012, p. 178)

5.1.2 Changing notions of literacy

As can be seen from our research in policy documents and in the scholarly literature, the notion of literacy has evolved over the last 70 years, from a static condition, based on a binary concept (literate/illiterate) towards a dynamic concept of literacy as a continuously evolving continuum, from a print based understanding to one that comprises all kinds of media formats, from context free, universally applicable knowledge towards context-specific, relevant information in distinct information ecosystems, from authoritarian authorship to collaboration, from focus on consumption of static media formats to the dynamic production, mix and sharing of media, etc.

What also can be seen are two complementary developments in the notion of literacy. On the one hand there exists a tendency to find a multitude of discrete literacies, e.g., regarding the focus on certain media or on specific aspects of their use (including media literacy, computer literacy, digital literacy, visual literacy, etc.), or with focus on particular fields of interest (including health literacy, financial literacy, sustainability literacy, etc.). On the other hand, one can observe the emergence of more comprehensive concepts of literacy, e.g., UNESCO's media and information literacy concept, or HRK's use of the term information literacy as an umbrella term across all media formats, that also covers different stakeholder groups (students, teachers, researchers) as well as the organisation as information infrastructure and information environment. This trend towards comprehensive concepts, which covers all kinds of media formats and different aspects, can also be found in the academic literature, most prominently in the case of *Metaliteracy*, a term coined by Mackey & Jacobson (2011, 2014).

> *"Metaliteracy expands the scope of traditional information skills (determine, access, locate, understand, and use information) to include the collaborative production, and sharing information in participatory digital environments (collaborate, participate, produce, and share). This approach requires an ongoing adaptation to emerging technologies and an understanding of critical thinking and reflection required to engage in these spaces as producers, collaborators and distributors. Metaliteracy is not about introducing yet another literacy format, but rather reinventing an existing one – information literacy – the critical foundation literacy that informs many others while being flexible and adaptive enough to evolve and change over time."* (Mackey & Jacobson, 2014, pp. 1-2)

A last observation from both the literature review and from the review of policy papers is the impression that even if concepts are intended to be comprehensive, they still can have a certain bias that has to do with the position of the respective author and/or the application context of literacy definitions. For example, librarians tend focus more on the identification of information, while being rather vague in defining forms of use. Educators, on the other hand tend to focus more on

critical thinking, writing and argumentation and are comparatively less concerned with the search for information.

This observation may also serve as a justification for our own definition of literacy. While building on existing debates on literacy, we therefore develop our own definition of academic/research literacy, which is broad in scope, but focused on the purpose of our study.

5.2 Research contexts

We assume that – beyond the university – other social environments might be relevant for systematically dealing with texts and information, and that students of university continuing education might address different audiences for sharing and disseminating texts.

Students in university continuing education are not just members of the education system, they typically also have extensive professional experience. Their information and communication needs are therefore not only determined by academic, but also by professional requirements. Additionally, there may exist private or civil society contexts, which are of relevance for these students. Depending on their particular situation, they have to act in distinct information environments.

Similarly, the addressees of information and texts a person has developed, be it superiors, lecturers or clients, be a limited number of people in a class or team, or be it a wider public of potentially unknown people.

Depending on the particular situation of a person, differences may also occur regarding different search platforms (where to get the information about texts or documents), and regarding channels for the acquisition of full texts or complete documents.

All of these different research contexts may influence the characteristics of information ecosystems and the extent to which certain sub-skills of literacy are required.

5.3 Five sub-skills of research literacy

5.3.1 Searching skills: ability to search, assess, and select academic or vocational documents

Literature search refers to all activities for the search and selection of scientific or professional texts.

One can differentiate between the information about documents and the information manifested in documents. Given the overabundance of media formats and media products, and the resulting information overload, it cannot be enough anymore to just rely on the reference books provided by a lecturer, or the physical stock of the local library. Increasingly, one is confronted with a multitude of collections, search engines, library catalogues, websites and online repositories of scientific institutions, or web-services for disseminating materials.

Therefore, it can be a relevant skill to find, assess, and select collections, platforms and sources for relevant documents in a field. Only if this has been done, other skills, such as the ability to define objectives and a strategy for searching relevant documents. Most probably, one will receive a long list of suggested items as a result of a research query, a list that has to be narrowed down and condensed to produce a shorter list of items acquire. There also exist different strategies for obtaining documents, for storing them to keep them available, and for organising their metadata in reference management software.

5.3.2 Reading skills: ability to read, comprehend, and extract information from academic or vocational documents

Reading refers to all activities that are necessary for understanding and exploiting scientific or professional texts.

Since reading is a common and time-consuming task of every knowledge worker, the ability to set and pursue clear reading objectives and effective strategies for reading individual texts. Sometimes it is more important to find answers to a distinct question, or specific information and statements than to fully understand the entire document. At other times, it might be necessary to identify whole lines of arguments.

Depending on reading objectives, one will also need to develop the ability to assess the relevance of texts or information, the ability to place a text in a wider context (author, discipline, publication context), the ability to connect statements and information of different texts (e.g., via a comparison of authors, or via literature review). These are all abilities necessary for text critique and for critical thinking.

The technical skills to draw from reading and document results of the reading process (e.g., via paraphrase, quote and excerpt, which have to be adequately complemented with own comments, ideas, considerations) are often underappreciated, but important links to writing.

5.3.3 Writing skills: ability to express information, arguments, and results in different formats, genres, levels of complexity

Writing refers to all activities that belong to the production of scientific or professional texts. Writing assignments are an important form to demonstrate understanding, learning progress, and critical thinking and to express one's position on a topic.

We distinguish between content-related and formal aspects of writing.

Scholarly communication and academic writing have their own characteristics, which distinguish them from entertaining, fictional literature. Content-related aspects of writing comprise the ability to introduce the topic of a text, to formulate the main question the document deals with, to name the research objects to be investigated. Other content related aspects are the ability to make one's assumptions explicit and to guide the readers' expectations about possible results, to describe the methodological approach and to present results, which in total should allow for finding a common thread from goal, theory, and method towards results and conclusions of a text.

There also exists a range of formal aspects of writing and producing scientific or professional texts. To begin with, scholarly texts can come in different genres (e.g., seminar paper, thesis, presentation, abstract, etc.) and formats (Word, PowerPoint, etc.), which makes it necessary to know about different formal requirements. It also may come as an important, sometimes eye-opening experience to present the same content in different length, which requires the ability to unfold and reduce complexity. Another important aspect is the ability to clearly structure a text, and to distinguish between main and secondary aspects. Other necessary skills are the ability to develop and/or employ clear-cut concepts, categories and generalisations. Last but not least, the abilities to isolate and refer to other people's statements in an appropriate way, and to develop one's own voice are crucial for any academic author.

5.3.4 Distributing skills: ability to present, share and publish information in different contexts

The development of digital media is creating more and more opportunities for the sharing, dissemination and publication of scholarly or professional texts and information. However, these new opportunities also create some insecurities and traps, as well as ethical issues.

While in analogues times the distribution of documents has been rather complicated and slow, digital technologies make the distribution of documents and information much easier and a more common practice, not just in academia, but also in the workplace. One of the first challenges is the ability to assess the information ecosystem, in which documents and information are to be distributed, in particular if it is a rather private, controllable and confidential context, or if it is rather public and uncontrollable. Both contexts come with different ethical and legal implications, e.g., with the danger to infringe the rights of third parties (e.g., copyright, data protection, trade secrets, business interests), and with implications regarding own interests (e.g., own data, copyright, acknowledgement for own achievements, etc.).

The publication to a wider audience might become an issue for more experienced students and for graduates. To be effective in this activity, the ability to assess different publishing opportunities (e.g., book, journal, document repository, self-publishing platform, etc.) with regard to the desired effects (e.g., concrete target audience, reach, accessibility) is essential. Here it might also be important to assess the trustworthiness (e.g., unsolicited publishing offers, excessive sales prices), the quality of service (e.g., editorial review, editing, advertising, etc.) as well as the business conditions (e.g., copyrights, embargo regulations, etc.).

5.3.5 Collaborating skills: ability to collaborate and to co-create text and publications

In the production of scholarly or professional texts and information, the collaboration with other people is becoming more and more important. In particular for text-based knowledge work this development is observed both by employers and by policymakers.

Research collaborations can be described in a wider range of dimensions, e.g., if collaboration takes place within an academic discipline or learned profession, academically driven in interdisciplinary contexts, or even transdisciplinary, among academic researchers on the one hand, and practitioners on the other hand. Collaborations can take place within an organisation, regionally, nationally or even internationally. Collaborative research projects can be proposed or commissioned, basic or applied. All these constellations combine participants with different backgrounds, cultures and goals.

Additionally, these collaborations can use and produce different types of media formats, e.g., joint journal articles, edited volumes, research reports with contributions from different members, but also other by-products, such as meeting minutes, summary minutes, flipchart protocols, press releases or project websites, to name a few.

Challenges can be differences between participants regarding working cultures and professional understanding, disciplinary perspectives, project management challenges, differences in commitment, incentives and opportunity structures, availability of benefits and potential sanctions, confidentiality and authorship, etc.

There also exists a wide range of (digital) tools for collaboration, ranging from traditional office software and local servers to web-based workspaces and learning environments (Moodle), communication and conference software (Skype, Zoom), and cloud-based systems (Google Docs, Dropbox).

To meet these complex challenges of collaboration, traditional and new abilities are required, from the ability to work in teams and to improvise, the ability to change perspectives and to moderate, to more technical abilities such as the use of different digital tools and to establish standards for the communication within the team.

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Part 2:
Research literacy at Danube University Krems

1 Introduction

This work package ("Part 2") aimed at examining the concept of research literacy through the perspective of different target groups at Danube University Krems (DUK) which was analysed as a case and best practice example for academic continuing education. It is important to clearly describe not only the concept of "research literacy" as it commonly adopted at DUK, but also how it is taught and what kind of skills and competencies students acquire. Specific interest will be placed on non-traditional students who do not have a first degree or Matura. The specific goals were:

1. To describe the basic structure of DUK in terms of student demographics, alumni demographics and portfolio of study programmes
2. To understand and describe how students/alumni perceive the concept of research literacy and their own competencies and skills in research literacy
3. To understand and describe how different aspects of research literacy are perceived and taught by the study programmes at DUK
4. To assess the needs of the target groups at DUK in relation to research literacy.

2 Methodology

This part of the study was conducted as a mixed method design. Quantitative data collection was followed by a qualitative data collection. Survey and focus group interviews were used to collect data from the students and the lecturers of the university.

2.1 Quantitative data collection

Quantitative data were collected through an online survey. This survey aimed to identify perceived skills and investigate needs for special measures in different aspects of research literacy. Two complementary questionnaires were developed, one for the self assessements of students, the second for the external assessment of students by lecturers.

2.1.1 Constructing the survey

The survey was created by the core team, the authors of this report, based on the results of the literature review and conceptual analysis. As a result of our review, 5 sub-competencies of research literacy were formulated: *searching skills* (ability to search, assess and select academic or vocational documents); *reading skills* (ability to read, comprehend and extract information from academic or vocational documents); *writing skills* (ability to express information, arguments and results in different formats, genres, levels of complexity); *distributing skills* (ability to present, share and publish information in different contexts); and *collaborating skills* (ability to collaborate and to co-create text and publications).

The survey was drafted incorporating all these skills. An item was constructed for each subskill. All subscales used 5-point Likert-type scales ranging from 1 (*no need*) to 5 (*very high need*). The first draft was reviewed by six different experts from different departments such as quality assurance, education, migration, and e-learning. It was then translated to English for international students by a native speaker. The final version was transformed into an online survey with the use of internal EvaSys online assessment system.

A survey parallel to the student survey was developed for the lecturers and programme coordinators by the project team, and it was reviewed by the same experts who reviewed the student survey. The survey for the lecturer includes the same skills, and an additional part regarding measures for transmitting research literacy. This questionnaire was also translated to English by the same person who translated the student survey.

2.1.2 Internal consistency of the survey

We calculated Cronbach's α for all scales developed in this survey to check the internal consistency. Cronbach's α describes how well the internal consistency of a survey made up of several Likert-type scales and items was achieved. The resulting α coefficient of reliability ranges from 0 to 1. If all scale items are completely independent of each other, i.e. are not correlated or share no covariance, then α=0. The minimum acceptable value for Cronbach's alpha is about .70; below this value, the internal consistency of the common range is low. The maximum expected value is 1; however, this value indicates redundancy or doubling, so alpha values between .80 and around .95 are usually preferred. It should be noted that Cronbach's α is neither a measure of dimensionality nor a measure of validity.

In our analysis of the survey´s internal consistency, the Cronbach's α result of scale 1, *searching skills* was .93, without any exclusion. Excluding items 8, the Alpha of scale 1 would reach .94.

In scale 2, *reading skills*, a Cronbach's α of .95 was obtained, without any exclusion.

For scale 3, *writing skills*, the Cronbach's α was quite high; a Cronbach's α of .97 was obtained, without any exclusion. However, the Cronbach's α after exclusion was similar for all items; it was between .968 and .969, indicating that we could/should shorten the scale.

The Cronbach's α for scale 4, *disseminating skills* proved to be optimal. We achieved a Cronbach's α of .89, without any exclusion.

The Cronbach's α was also quite high for the scale 5, *collaborating skills*, but still within acceptable limits. It reached a Cronbach's α of .94.

Based on the Cronbach's α values, it is possible to state that the scale has a sufficient internal consistency.

2.1.3 Data collection procedure with the survey

Survey was transformed into online version by the university's professionals who are expert on online assessment systems "EvaSys". Online version was sent to a few colleagues to test. After some minor revisions in both versions, survey was sent to students on 02.07.2019 for the first time through EvaSys system and it stayed online until 30.09.2019. Two reminders were sent to increase the number of returns. All students who were registered in 2019 summer semester received the link. The questionnaire was sent out to all 7,736 enrolled (and approachable[25]) students at DUK and returned by 174 (2.2%). For the lecturers, survey was sent to programme coordinators and lecturers who manage/teach research literacy in the currents study programmes on July 11, 2019. It stayed online until October 16, 2019. Two reminders were sent to increase the participation. Out of the 3,083 lecturers (all that had been teaching at DUK during the last three years), 247 (8.0%) responded and completed the survey.

2.2 Qualitative data collection

Following the online survey, a focus group and a workshop was conducted with the programme coordinators and lecturers. Study programme coordinators have experiences in dealing with their students and their own concepts regarding study skills and research literacy. They also have developed instruments to test and train research literacies. In order to receive more in-depth and more comparative data we conducted a focus group interview with the programme coordinators. Brief description of the focus group and the workshop is presented below.

2.2.1 Focus group with programme coordinators

Focus group took three hours and was held at the Danube University Krems on 25th November 2019. Whole session was audio-recorded. There were six participants from the three faculties, Business and Globalisation, Health and Medicine, and the Department of Education, Arts and Architecture. They all had experience in supervising term papers and final theses.

On this day, parallel to survey, following five topics regarding students' needs were investigated:

1) literature research,
2) reading comprehension,

[25] Actually, 7,956 students have been enrolled at DUK in summer term 2019. However, only 7,736 have been addressable via eMail, probably because some have chosen to opt-out from receiving automated eMails from the university.

3) their scientific writing skills,
4) their opportunities for dissemination, and
5) the importance of collaboration in scientific work.

The workshop started with a discussion on 1) whether there are differences between traditional and non-traditional students, i.e., perceived differences in research literacy between students holding a higher education degree (Bachelor or above), students without formal higher education degree and students without formal higher education entrance qualification. Furthermore, we addressed the question of what are the needs of DUK students in terms of 2) their literature research, 3) reading comprehension, 4) scientific writing skills, 5) their opportunities for dissemination and 5) the importance of collaboration in scientific writing, and which measures could support students in improving these research literacy skills.

2.2.2 Collaboration workshop

A workshop was conducted on December 2nd, 2019 with the lecturers and study programme coordinators from Danube University Krems. Whole session was audio-recorded. A brief description of the workshops is below:

The collaboration workshop took place on 2nd December 2019, and lasted three hours. There were three researchers from Faculty of Business and Globalisation, Health and Medicine, and the Department of Education, Arts and Architecture. The participants are long-standing scientists who work in research projects and regularly produce scientific publications in teamwork.

The focus of this workshop was on how to ensure collaboration in scientific writing. Thus, we addressed 1) the question of what skills seem necessary when people work together in scientific work and 2) the need for online and offline collaboration in academic writing. Another focus of the workshop was 3) the definition of useful tools that can support students in working together on term papers or research projects.

3 Demographics

3.1 Students' characteristics at Danube University Krems

This research was conducted in Danube University Krems as a case study due to the specialisation and scope of the university. Danube University Krems is the only public university in German-speaking countries specialised in academic continuing education. It offers academic degree programmes to professionals alongside their work life. University provides more than 200 study programmes in 17 departments under three faculties: Faculty of Health and Medicine; Faculty of Business and Globalisation; and Faculty of Education, Arts and Architecture. This part presents descriptive information[26] for the student population and for pursued studies at Danube University Krems. During the summer term 2019, 7,952 students have been enrolled, which pursued a total of 8,221 studies[27].

It is important to note here that survey results are not representative for the entire population of students and lecturers at DUK, due to two reasons. On the one hand, the return was too low in quantitative terms. On the other hand, due to reasons of practicability and of confidentiality, participation in the survey was voluntary; no sampling strategy to control the composition was applied.

Since the data are not representative, we are cautious not to generalise to the whole population of students and lecturers. However, the number and quality of returned questionnaires is high enough for methodologically sound calculations and statements about the group of respondents.

Student body has more or less a balanced gender distribution (Male: 49.3%; Female: 50.7%). The average age is 40.6 years. Figure 4 indicates the distribution of students according to age groups. It is noteworthy that almost 19% of the students are above 50 years old.

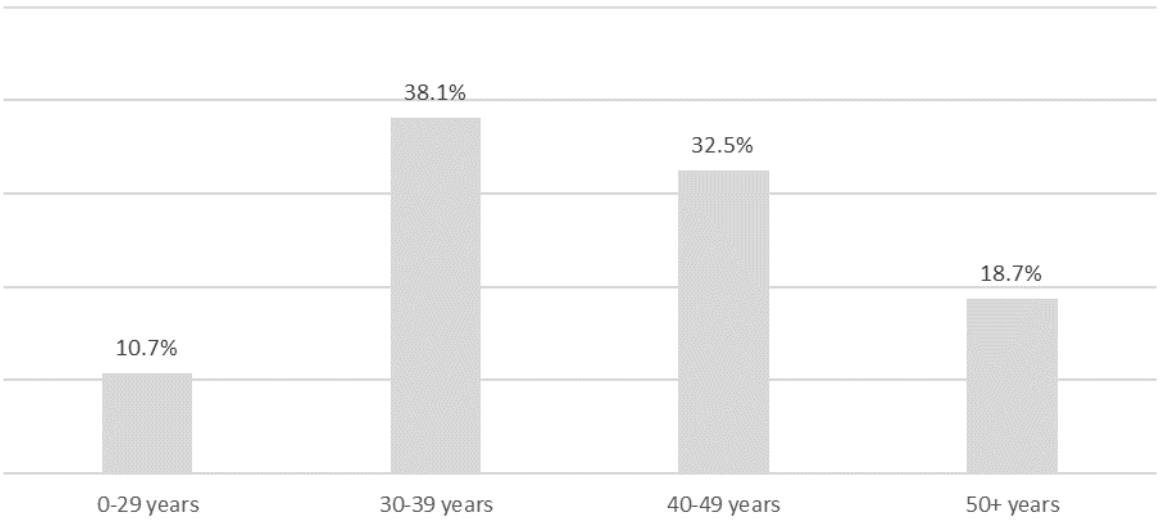


Figure 4 DUK's student population by age group

Source: DUK student data, summer term 2019, N=7,952

[26] Statistics and graphs in this part were produced by the researchers from the data set provided by the Office for Quality Management and Teaching Enhancement

[27] Some students pursue more than one study, which explains the difference between the number of students (headcounts) and the number of pursued studies.

Approximately a quarter (1,990) of all students enrolled at Danube University Krems are international students. 68.5% of the international students are from Germany, 15.2% originate from other EU member states, 7.5% from non-EU countries in Europe, 6.6% from Asia and the Middle East, and 2.1% from other world regions.

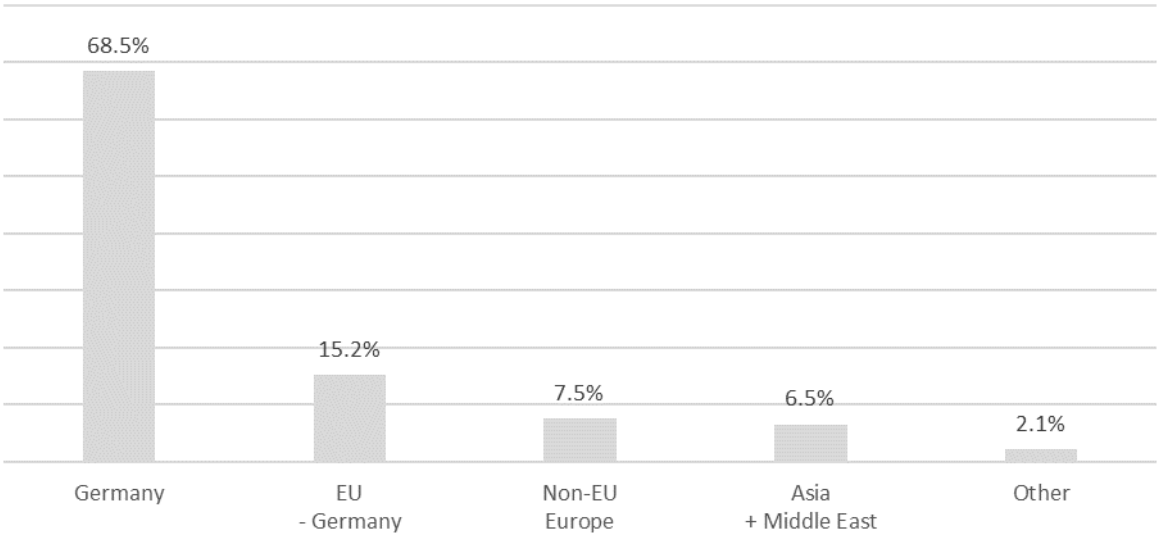


Figure 5 DUK's student population of international students by country of origin

Source: DUK Marketing Cockpit, summer term 2019, international students' n=1,990

Danube University students come from very diverse educational and professional backgrounds. Due to its accredited measures for recognition and validation of prior learnings and permeability principle, students without an academic background can apply for a Master's degree programme. Table 11 presents the distribution of students according to the highest educational level they completed prior to application to their study programmes.

	Frequency	Percentage
without formal higher education entrance qualification		
apprenticeship	390	4.9
VET without HE Entrance Qualification	372	4.7
with formal higher education entrance qualification		
Kolleg/Akademie	538	6.8
HE Entrance Qualification (Reifeprüfung)	1,464	18.4
HE degree		
UoAs/ PHs	880	11.1
University	2,200	27.7
Continuing Education	1,054	13.3
undefined		
other	496	6.2
missing	558	7.0
total	7,952	100.0

Table 11 DUK's student population by highest educational attainment

Source: DUK student data, summer term 2019

Since the educational background of the students in continuing education is a particular focus of our study, we are especially interested in the needs of non-traditional students[28] in academic and research competencies. Thus, educational levels are categorised into three groups: without higher education (HE) entrance qualification which includes apprenticeship programmes and vocational education and training (VET) programmes without matriculation examination; with HE entrance qualification but without any higher education degree; and last is any bachelor degree (BA) and above (MA and PhD) from universities, university of applied sciences and teacher colleges. This last category also includes continuing education degrees as in Austria a BA degree or equivalent is required for academic continuing education.

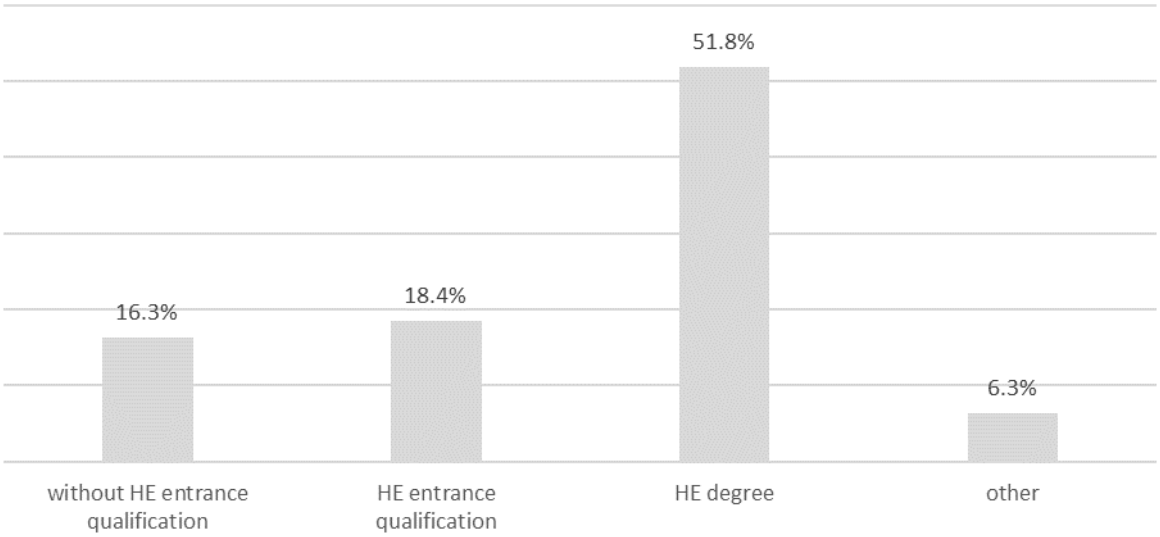


Figure 6 DUK's student population by level of highest educational attainment

Source: DUK student data, summer term 2019, N=7,952

Figure 6 indicates that of all registered students 16.3% is non-traditional students who do not hold any HE entrance qualification. When educational background is examined in line with the age (Table 12), it was observed that higher number of younger students hold an academic degree compared to older students. Group between 40 and 50 has the highest percentage of non-academic background.

	groups of educational attainment			
age	without HE entrance qualification	with HE entrance qualification	HE degree	NA
0-29	9.5	24.8	61.0	4.7
30-39	16.9	18.3	57.4	7.3
40-49	20.3	19.4	53.6	6.7
50+	19.2	20.8	53.3	6.7

Table 12 DUK's student population by age and by groups of highest educational attainment

Source: DUK student data, summer term 2019, N=7,952, missing=558, data in %

[28] Non-traditional students in academic continuing education are defined in this paper as „those who do not have a HE entrance qualification".

The large majority of the pursued studies are Master programmes (Figure 7), and the highest number of pursued studies is in the Faculty of Business and Globalisation (Figure 8). Note: the number of pursued studies differs from the headcount of students, since some students are enrolled in more than one study programme.

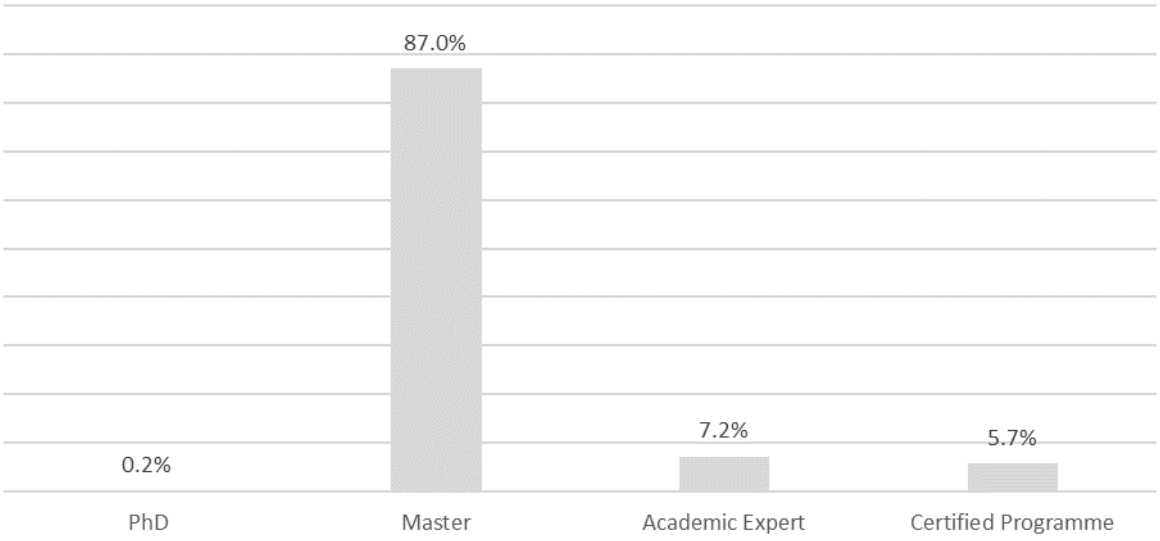


Figure 7 DUK's share of pursued studies by type of study program

Source: DUK student data, summer term 2019, N=8,221

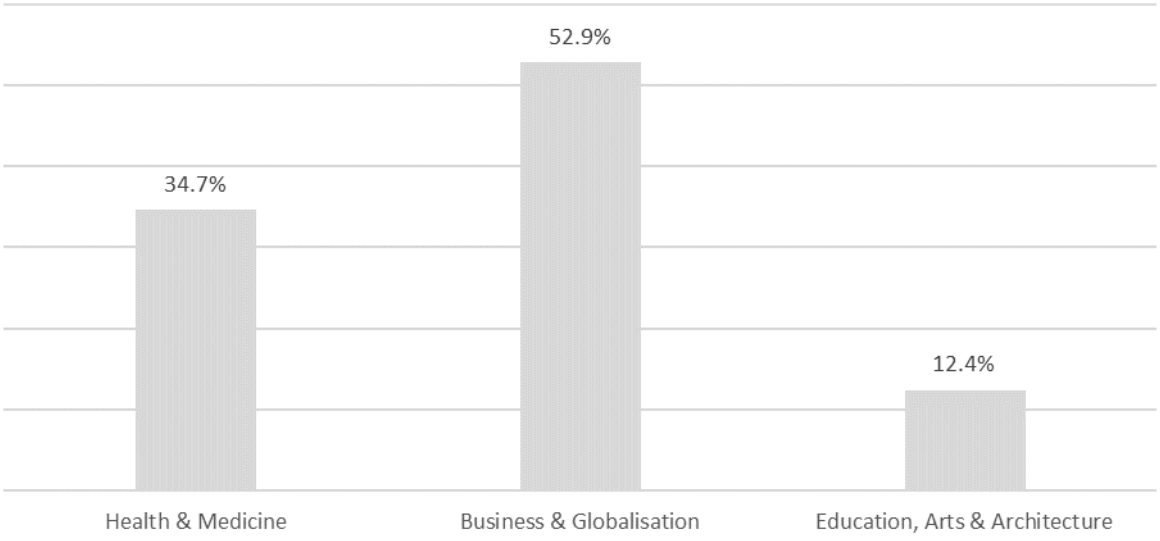


Figure 8 DUK's share of pursued studies by faculty

Source: DUK student data, summer term 2019, N=8,221

Students have an extensive work experience prior to their study at Danube University Krems. Average years of work experience is 13.5, with 8.5% having more than 26 years of work experience. See Figure 9 for the distribution of students according to prior work experience in years.

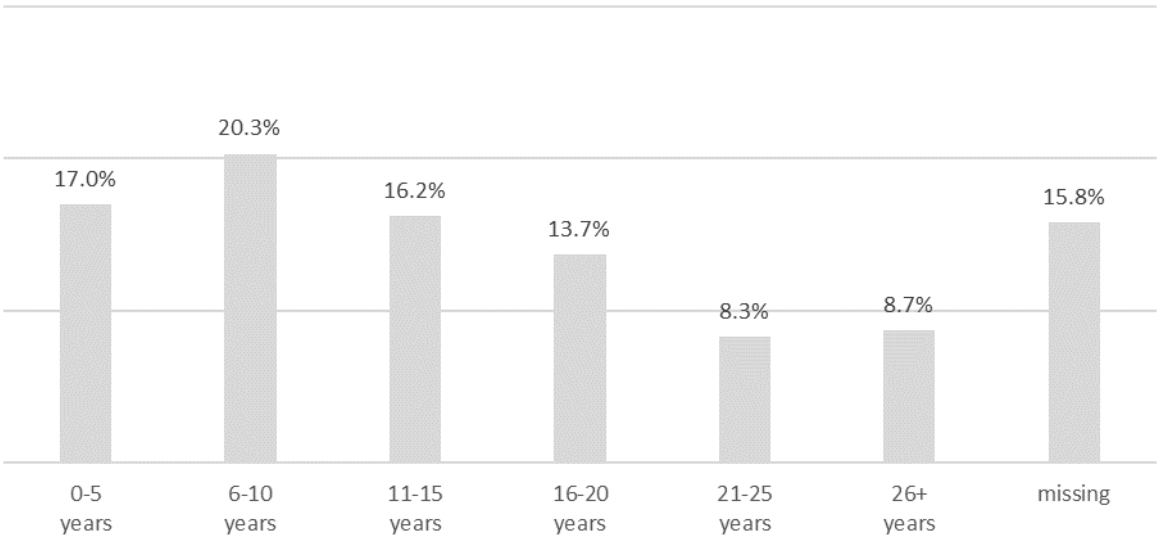


Figure 9 DUK's students' population by prior work experience

Source: DUK student data, summer term 2019, N=7.952

Last information regarding the student characteristics is their reasons for starting the academic continuing education programme at Danube University Krems. A large majority aims for promotion after the completion of their degree. Increase in income is the least selected reason for starting their studies (Figure 10).

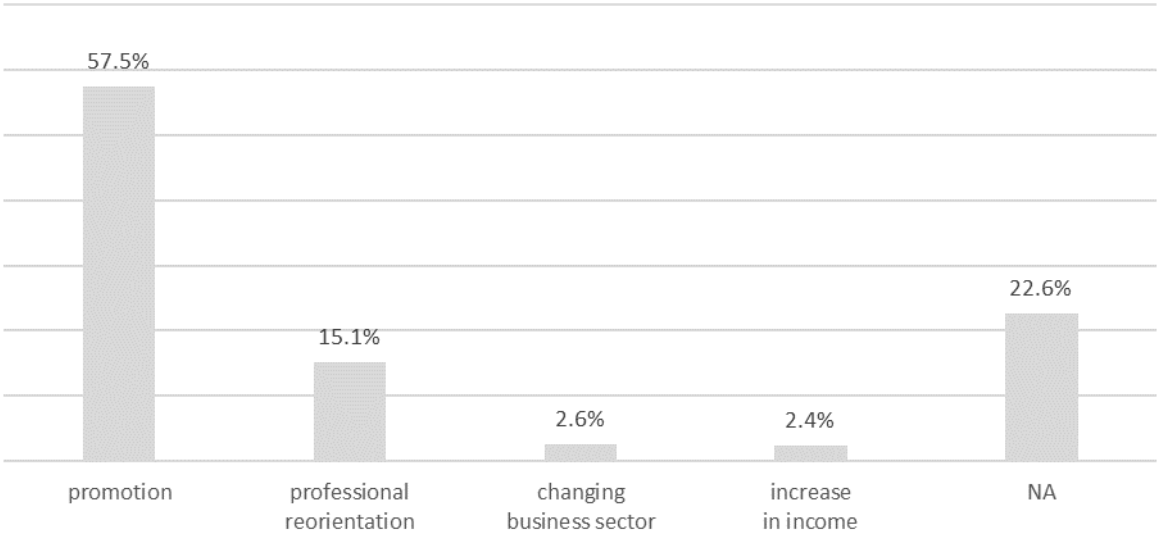


Figure 10 DUK's students' population by reasons for participation in academic continuing education

Source: DUK Marketing Cockpit, summer term 2019, N=7,893

3.2 DUK's students' sample

In this part, we provide a descriptive picture of the sample using students' demographic information, age, gender, educational and professional background and information related to their study programmes. In our sample, gender distribution is not representing the population value (Male: 49.2%; Female: 50.8%). In our sample, 60% of the participants are female while 38% is male, 2% is not specified. Yet, educational level is following a similar trend where the more than half of the students already hold a bachelor degree or above (Table 13).

	Frequency	Percent
without formal HE entrance qualification		
Apprenticeship	6	3.4
VET without HE Entrance Qualification	9	5.2
with formal HE entrance qualification		
Kolleg/Akademie	11	6.3
HE Entrance Qualification (Reifeprüfung)	48	27.6
HE degree		
UoAs/ PHs	19	10.9
University	50	28.7
PhD	13	7.5
Continuing Education	13	7.5
undefined		
Other	3	1.7
Missing	2	1.2
total	174	100

Table 13 DUK's students' sample by highest educational attainment

In our sample, non-traditional students are less than 10%. These students are those who are coming from apprenticeship system or vocational schools without having matriculation exam to be qualified for the university entrance (Table 14). Thus, they do not hold any academic degree.

	Frequency	Percent
without formal HE entrance qualification	15	8.6
with formal HE entrance qualification	59	33.9
HE degree	95	54.6
undefined	5	2.8
total	174	100

Table 14 DUK's students' sample by groups of highest educational attainment

Examining educational level according to age group indicates that in all three categories middle aged students who are 35-55 years old are the majority (see Table 15).

	Age categories in years				
	18-24	25-34	35-44	45-54	55-64
without formal HE entrance qualification	(--)	22	50	28	(--)
with formal HE entrance qualification	2	6	47	38	7
HE degree	(--)	25	32	35	8

Table 15 DUK's students' sample by groups of highest educational attainment and age group

Note. The percentages depict the age group within the highest level of completed education. Percentages that are zero (0%) are not displayed and marked with (--) in the Table.

Figure 11 provides an overview over the shares of students in groups of studies, as they are composed at Danube University Krems. Here, groups of studies are not composed according to academic disciplines, but rather according to professional fields of practice. As one can see, the largest group of correspondents comes from Economics and Management studies, followed by Health & Medicine, and by Psychotherapy & Social Sciences.

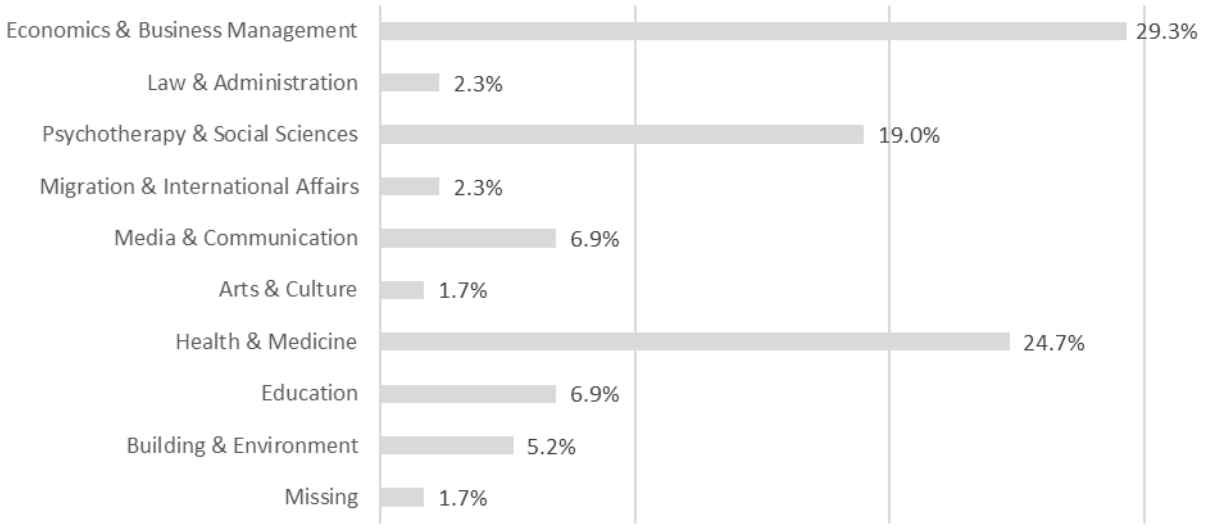


Figure 11 DUK's students' sample by fields of studies

Figure 12 illustrates the distribution of students in the sample according to the type of study program they are enrolled in, or better, according to the qualification they are aiming at. With 92% the vast majority is enrolled in master programs, other types are more or less neglectable in this survey.

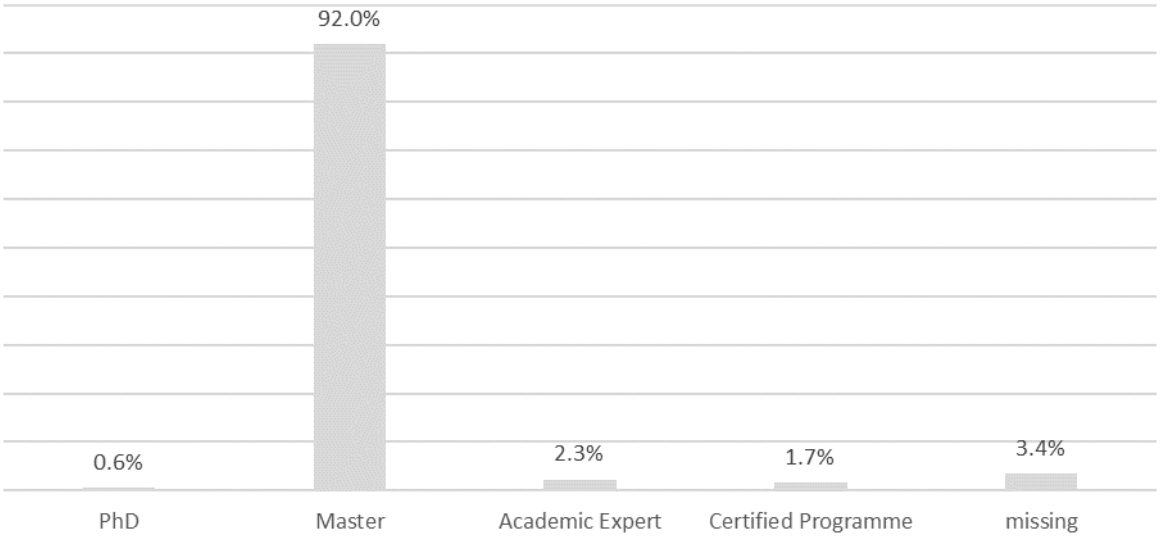


Figure 12 DUK's students' sample by type of study program

Figure 13 illustrates the composition of students in the survey according to the semester in which they are enrolled. The largest group of respondents is those who are enrolled for 7 or more semesters, exceeding the required amount of semester.

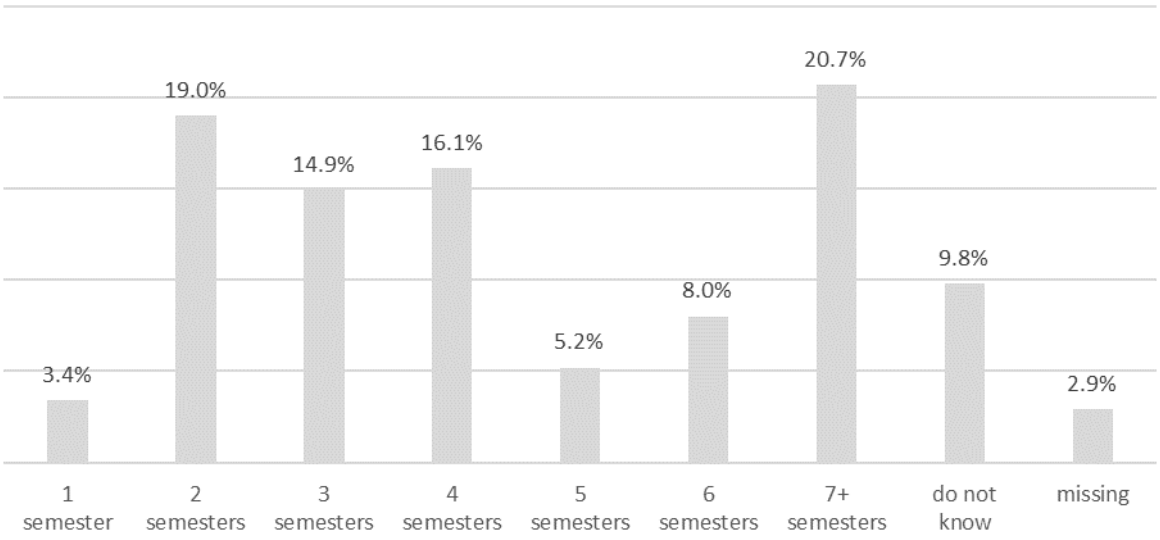


Figure 13 DUK's students' sample by enrolled semester at time of data collection

We also asked students about their experiences in writing different types of texts. 81 students of the surveyed students have already written a master thesis (see Table 16). That is 18% of the number of all answers (n=449). Considering the cases, i.e. all students surveyed (n=174), 47% of them have already written a master thesis.

	n (n=449)	% of all answers (n=449)	% of all cases (n=174)
dissertation	15	3	9
master thesis	81	18	47
bachelor thesis	29	7	17
term paper	135	30	78
blog or article	46	10	27
other text type	89	20	51
book chapter	29	6	17
book	17	4	10
none	8	2	5

Table 16 DUK's students' sample by experiences in writing different types of texts

Note: Multiple answers were possible for this item

3.3 DUK's lecturers' sample

Our second participant group is the lecturers and the head of the study programmes. This part presents the basic demographic information about the lecturers who participated in the survey. Survey was sent to 3,083 lecturers (all that had been teaching at DUK during the last three years), and 247 (8%) of them responded.

Lecturers show significant characteristics. They differ from students in terms of gender. 38% of the participants are female, while 59% of them are male, and 3% was not specified. In terms of age, more than 50% of the lecturers are above 55 with a significant amount over 65 (Table 17).

	frequency	percent
25-34	8	3.2
35-44	30	12.1
45-54	81	32.8
55-64	89	36.0
over 65	36	15.0
missing	2	0.8
total	247	100

Table 17 DUK's lecturers' sample by age groups

According to self-reported data, more than half of the lecturers hold a PhD degree (Table 18). There is also a small group of non-traditional lecturers without university degree. 13 of the participating lecturers started their education in vocational and apprenticeship training and some of them even obtained their PhD later on.

	frequency	percent
without formal HE qualification		
apprenticeship certificate	-	-
vocational school without matriculation exam	1	0.4
with formal HE qualification		
college or academy	-	-
matura or equivalent	5	2.0
HE degree		
Bachelor	3	1.2
Master, DI, Magister	97	39.3
PhD, Dr.	128	51.8
University continuing education	5	2.0
missing	8	3.2
total	247	100

Table 18 DUK's lecturers' sample by highest educational attainment

Danube University hires more external lecturers compared to other universities, which is also reflected in the composition of respondents to our questionnaire: 195 (78.9%) are external lecturers, while 49 are internal ones (see Table 19.

	frequency	percent
external lecturers	195	78.9
internal lecturers	49	19.8
missing	3	1.2
total	247	100

Table 19 DUK's lecturers' sample by employment status

68% of the respondents are teaching or have been teaching at other higher education institutions as well (see Table 20).

	frequency	percent
teaching at other HEI	168	68.0
not teaching at other HEI	75	30.4
missing	4	1.6
total	247	100

Table 20 DUK's lecturers' sample by external teaching activity

Beyond their teaching activities, 53.8 percent of the respondents are active in research as well (see Table 21).

	frequency	percent
active in research	133	53.8
not active in research	109	44.1
missing	5	2.0
total	247	100

Table 21 DUK's lecturers' sample by research activity

Lecturers also have been asked (in a multiple-choice section), in which type of teaching activity they have been involved. As can be seen in Table 22, the majority of lecturers (93.1%) has been involved in lectures. The second most common teaching activity (mentioned by 64.0%) is thesis supervision, while only 47% have been involved in the supervision of seminar papers. Still it is fair to say that the vast majority of lecturers in our sample has experiences in dealing with the written works of students. Conceptual work for the development of courses (40.1%) or of curricula (23.1%) are even less common.

	frequency	percent
lecture	230	93.1
thesis supervision	158	64,0
supervision of seminar papers	116	47.0
development of courses	99	40.1
development of curricula	57	23.1

Table 22 DUK's lecturers' sample by type of teaching activities

Note: Multiple answers were possible for this item.

Concerning the internationality of the lecturers, in our sample almost 80% of the lecturers are from Austria (n=196). Distribution of the rest shows that most of the international faculty is from Germany (Figure 14).

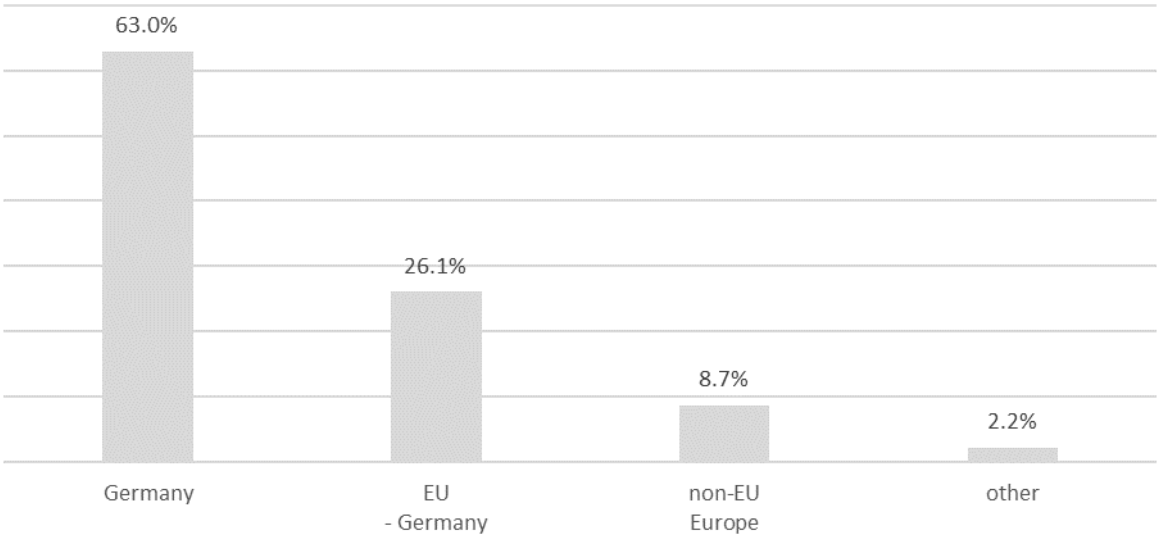


Figure 14 DUK's lecturers' sample by country of residence of international lecturers

Note: n=46

4 Contexts for dealing with texts and information

4.1 Research contexts

Before investigating the needs of students to improve different aspects of their research literacy, the questionnaire established an understanding about the contexts in which research literacy might be important, by asking about different research environments and audiences or addressees for texts and information, and by asking about search platforms and channels for the acquisition of texts.

The first set of questions inquired the importance of different research environments to process, share or publish texts and information for students in the next 2-3 years (see Figure 15). It distinguishes between the university or academic environments (e.g., as part of own studies or when writing a thesis), professional environments (e.g., in the context of gainful employment of in the professional community), private environments (e.g., the family or among friends) and the civil society (e.g., the local community or non-profit organisations).

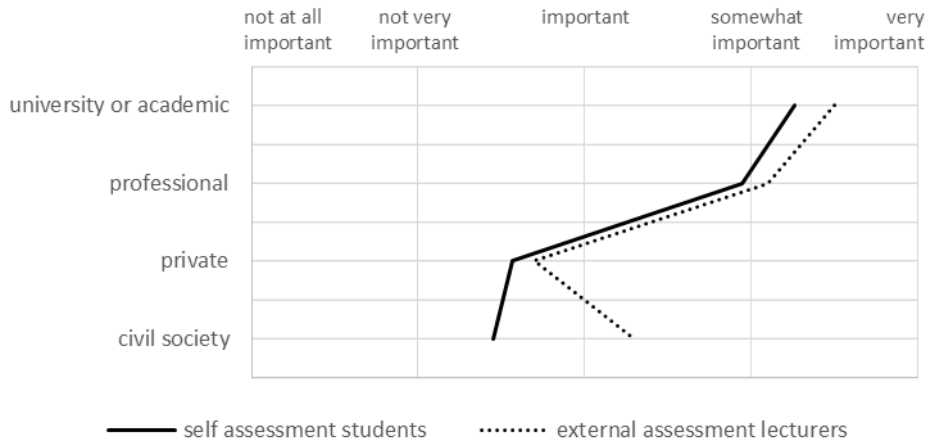


Figure 15 Importance of different research environments for DUK's students in the upcoming 2-3 years

Note: students' n=170-173, lecturers' n=240-244

A vast majority of students (62.4% + 17.3%) and – even more – of lecturers (67.6% + 19.7%) regarded university and academia as very or somewhat important for students. A strong majority of students (39.2% + 32.7%) and of lecturers (38.8% + 32.7%) stated the same importance of the professional environments. Very clearly, research literacy plays an important for the professional life of continuing education students at DUK.

The assessments regarding private or civil society environments differ strongly. A majority of students regarded both private (30.4% + 19.9%) and civil society environments (24.7% + 31.9%) as not very or not at all important for the processing of texts and information. Regarding private environments, the majority of lecturers (29.2% + 14.2%) similarly saw less or no importance. Surprisingly, and in contrast to students themselves, a majority of lecturers (11.7% + 30.4%) assumed some or high importance of the civil society for their students, 34.6% have been neutral in this question. It might be possible, that lecturers overestimated the civil society engagement of their students. At least, one can assume that they consider research literacy as relevant for contributing to civil society.

4.2 Different audiences

The second set of questions asked for the importance of different audiences or addressees for texts and information for continuing education students at DUK in the next 2-3 years (see Figure 16). It distinguished between three types of addressees, namely individual superiors, teachers and clients; limited numbers of known people, as can be found in classroom settings, working groups or organisations; and unlimited numbers of unknown people, as can be found in a wider public.

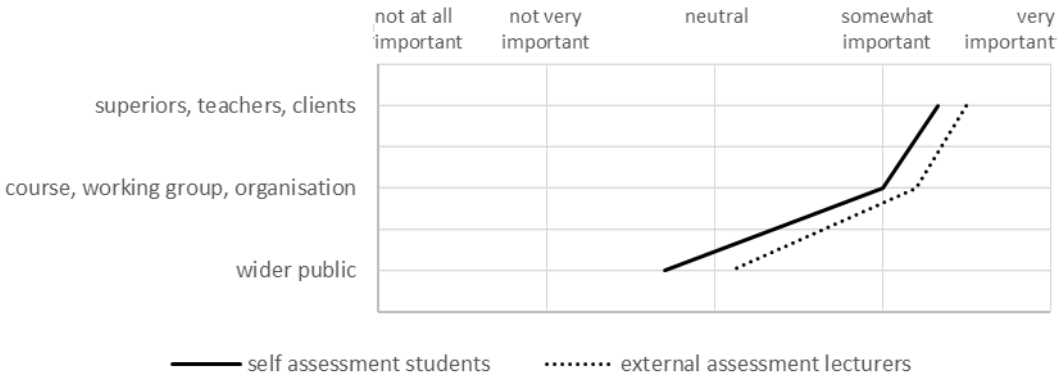


Figure 16 Importance of different audiences of texts for DUK's students in the upcoming 2-3 years

Note: students' n=171-173, lecturers' n=239-243

Overwhelmingly, students themselves (59.0% + 27.2%) and even more lecturers (62.9% + 27.8%) regard superiors, teachers and/or clients as very or somewhat important, and as the main addressees for texts and information generated by students. This target group is closely followed by the group colleagues from courses, working groups or organisations, which is regarded as very or somewhat important by a large majority of students (41.0% + 35.8%) and lecturers (44.4% + 37.2%). Regarding the importance of the wider public as a target audience, students (3.3) are slightly below and lecturers (2.9) are slightly above a neutral mean value. The wider public as potential audience is not in the main focus, but it can still matter much.

4.3 Tools for the search of texts

In the next group of items, we asked to assess the frequency in which selected search tools and document platforms will be used by students in the next 2-3 years, as means to search for scientific or professional texts. In particular, the following tools and platforms have been distinguished: general search engines (e.g., google or google scholar); catalogues of national or international libraries; special databases (e.g., for journals); websites of scientific institutions and/or individual researchers; websites of public institutions or international organisations (e.g., national: Statistik Austria, RIS; international: Eurostat, OECD, UN, etc.); online platforms based on file sharing by authors (e.g., Acadmia.edu, ResearchGate, Kudos, Mendely, ArXiv); or online platforms for pirated copies (e.g., libgen, sci-hub).

For the last two items in this list of tools for the search of text (and also for the acquisition of texts) it is important to mention that they are not commonly known. A large number of respondents indicated, that they do not know any file sharing platforms or any platforms for pirated copies (see Figure 17). These large shares of "don't know's" explain the wide range in the number of respondents in Figure 18 and Figure 19.

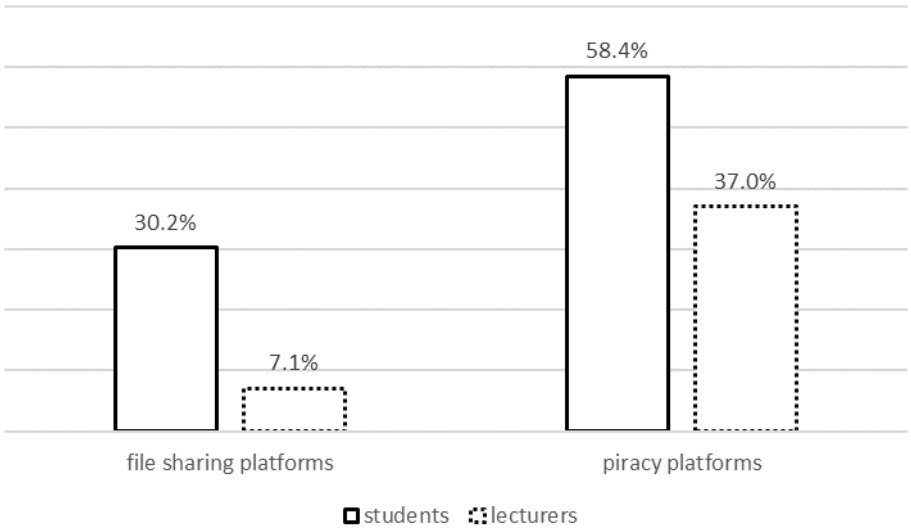


Figure 17 DUK respondents, who do not know academic file sharing or piracy platforms

Note: students' n (file sharing)=50, n (piracy)=101, lecturers' n (file sharing)=17, n (piracy)=88

Following the mean values as exposed in the line chart (Figure 18), one can see close similarities between self-assessments of students and external assessment by lecturers. Only in the cases of library catalogues and special databases, lecturers perceive that students use the library catalogues less than students themselves do, in all other cases they assume higher use. However, students and lecturers set very similar priorities: General search engines are perceived to be the most frequently used tools, followed by library catalogues, special databases, scientific websites and public institutions websites. These first five search environments are all in a range between very frequent and sometimes, which gives them a rather high relevance.

The cases of the two last environments deviate from this picture. In the case of sharing platforms, the means of students and lecturers differ most strongly: while students plan to use file sharing platforms only rarely, lecturers assume students to use them at least sometimes. Platforms for pirated copies are expected to be used even less.

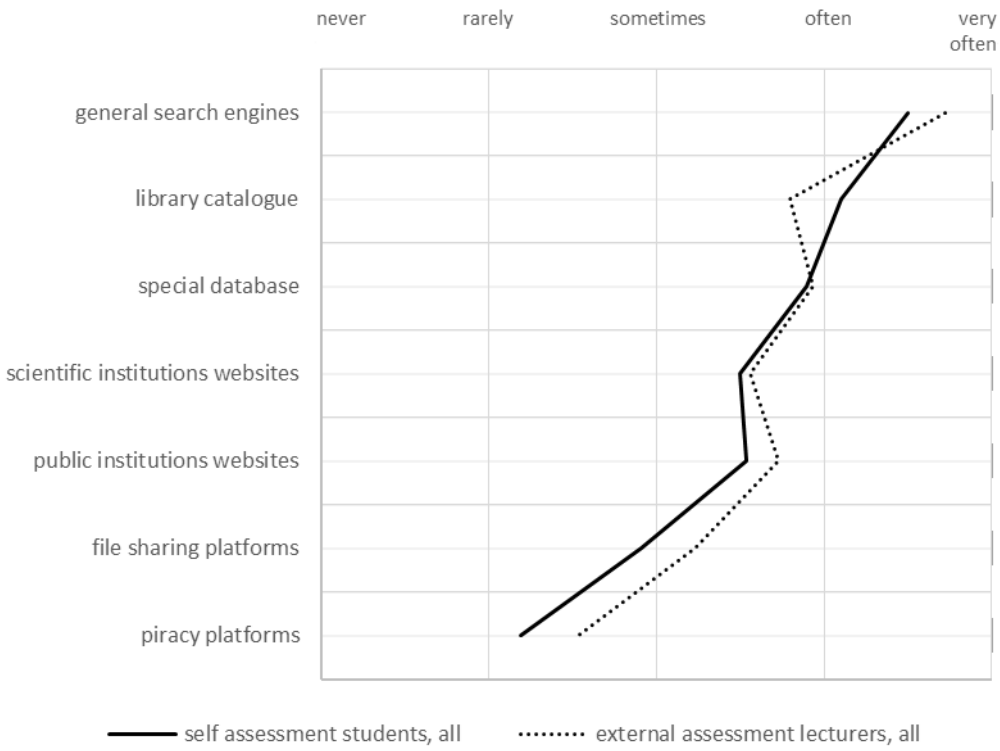


Figure 18 Assumed frequency in selected search tools to be used by DUK's students in the upcoming 2-3 years

Note: students' n=72-173, lecturers' n=150-244

4.4 Channels for the acquisition of texts

The line chart in Figure 19 shows the means regarding the assumed frequency in which selected channels for the acquisition of texts will be used by students in the next 2-3 years. This set of items comprises the requesting/accepting of texts passed on by speakers or colleagues, the borrowing of print holdings from the local university or specialist library, the downloading of full texts via the local library, the use of interlibrary loans or the ordering of articles via the local library, the purchasing of printed texts (e.g., books, magazines, etc.), the purchasing of digital texts (journal articles, e-books, etc.), downloading from websites of scientific institutions or individual researchers, from websites of public institutions or international organisations, from file sharing platforms and from platforms for pirated copies of texts.

Clearly, the dissemination of texts by speakers and the sharing of texts among colleagues or fellow students is a frequent practice, even if students plan to acquire texts in this way less frequently than lecturers expect them to do.

Regarding the acquisition of texts via local libraries, it is interesting to see that the downloading of full texts is regarded the most frequently used service, followed by borrowing from local stocks and by using interlibrary loans.

Even if the purchasing of texts seems to be less frequent, it still is of relevance for students. Interestingly, students seem to have a slight preference for print over digital texts, when they have to pay for it.

Similar to the search for texts, students do not plan to use file sharing platforms or platforms for pirated copies of texts.

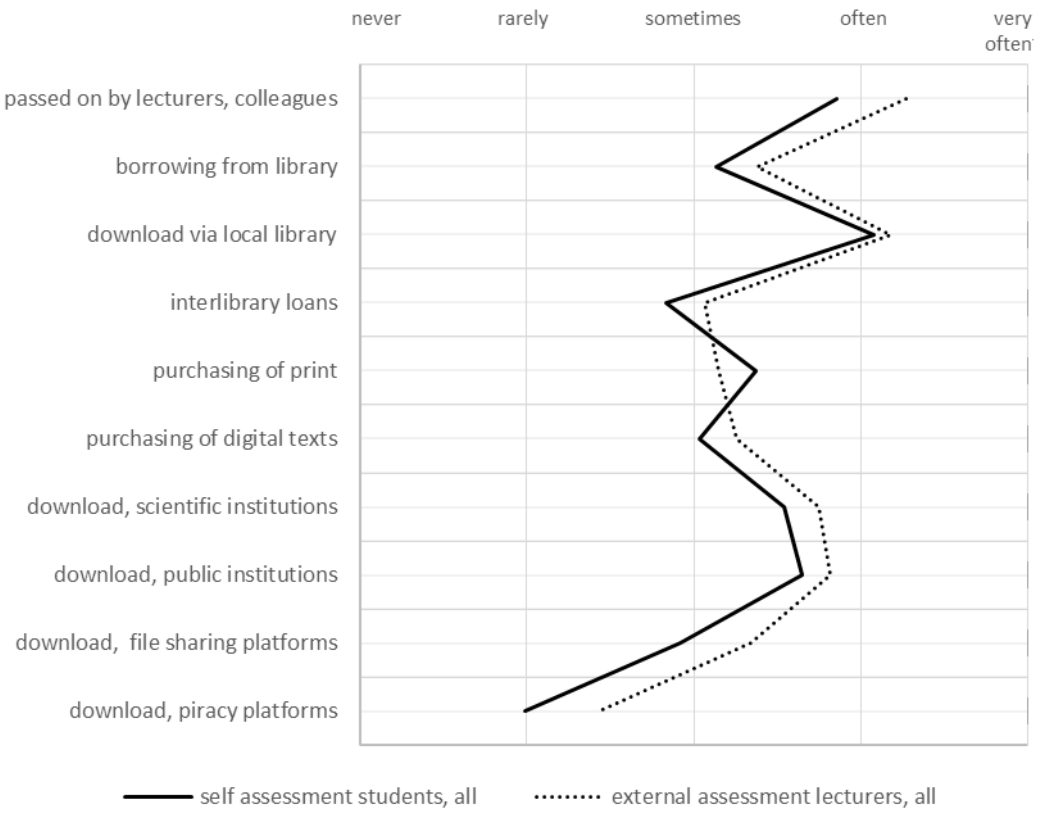


Figure 19 Assumed frequency in selected channels for the acquisition of texts to be used by DUK's students in the upcoming 2-3 years

Note: students' n=74-173, lecturers' n=150-244

5 Research literacy needs

5.1 Five sub-skills of research literacy

The research literacy scale was comprised of five subscales as describe above in the methodology part. Each sub-scale was further operationalised in a range of items. These five sub-scales are *searching skills* (the ability to search, assess and select academic or professional documents), *reading skills* (the ability to read, comprehend, and extract information from academic or professional documents), *writing skills* (the ability to express information, arguments and results in different formats, genres, levels of complexity), *distributing skills* (the ability to present, share and publish information in different contexts), and *collaborating skills* (the ability to collaborate and to co-create texts and information).

Table 23 indicates the descriptive statistics of the sub-scales both for students and lecturers. Mean values show clearly that lecturers evaluate the need for the skills in each competency area higher than the students themselves.

	students			*lecturers*		
	n	*mean*	*SD*	*n*	*mean*	*SD*
searching skills	173	3.51	1.02	243	4.14	.68
reading skills	173	3.34	1.09	245	4.14	.72
writing skills	173	3.24	1.07	245	4.03	.72
disseminating skills	172	3.24	.97	244	3.87	.78
collaborating skills	172	2.92	1.14	244	3.74	.80

Table 23 DUK's students' need for support in improving their research literacy in five sub-skills, descriptive statistics

To visualise the perspectives of the students and lecturers on the needs for research literacy concretely, we formed a line chart (Figure 20). Two general trends can be observed at this level of comparison. On the one hand, the two trend lines (which represent the means of self-assessment and assessment by lecturers) follow a similar pattern and show rather high levels of needs, but slightly decrease in the sequence of sub-skills. On the other hand, self-assessments of students and external assessments by lecturers, different in their extent. Students and lecturers by tendency agree how to rank the different skills sets, but differ in the extent to which they perceive needs for improvement. Lecturers tend to see a significantly higher need for the improvement of students' literacy skills than students themselves do.

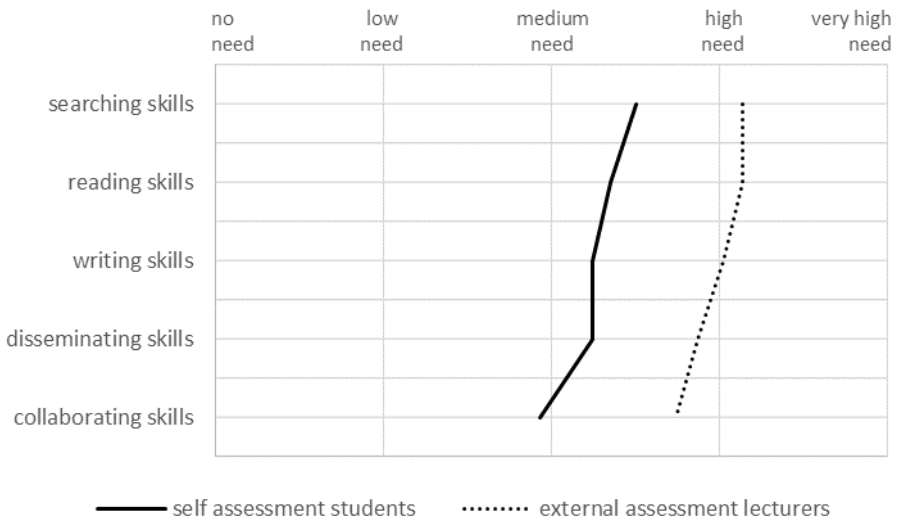


Figure 20 DUK's students' need to improve their research literacy in five sub-skills

Note: students' n=173, lecturers' n=244

5.2 Searching skills

After having established an understanding of the contexts in which research literacy is relevant, the survey investigated the five distinct aspects of research literacy. The first in the list is "searching", comprising all skills necessary for searching and selecting scientific or professional texts.

In this dimension, the questionnaire asked for the level of need students have to improve different skills in searching for literature, namely the ability to identify the most important search platforms for a specific topic from various sources, the ability to distinguish between scientific and non-scientific texts, the ability to select concrete objectives and effective strategies for the search of relevant texts, the ability to narrow down, reduce and condense search results in relation to a specific search objective, the ability to assess the relevance and quality of search results before reading texts, the ability to obtain relevant texts by appropriate means, the ability to organise and store texts in a way that can easily be retrieved, and the ability to use literature management software.

Analysing the means represented in the line chart of Figure 21, both students and lecturers clearly see a need to improve students' skills for literature search. However, lecturers see a much higher need than students themselves do, especially regarding the first five items, which deal with the search and selection of texts. Regarding the last three items, which all deal with the management of already selected texts, the difference between the two groups is less pronounced.

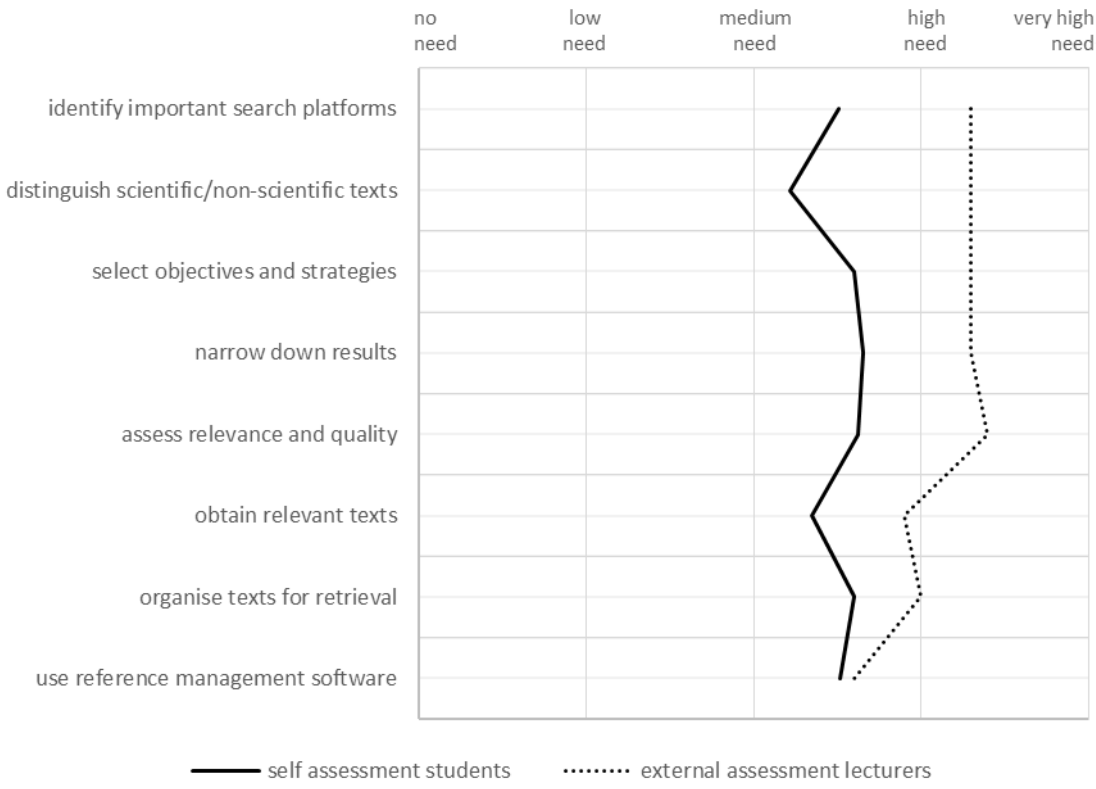


Figure 21 DUK's students' need to improve their searching skills

Note: students' n=171-173, lecturers' n=238-244

5.3 Reading skills

Reading refers to all activities that are necessary for understanding and exploiting scientific or professional texts.

Here, the survey asked for the level of needs of students to improve skills in reading, understanding and exploiting texts. This set of items comprises the ability to set and pursue clear reading objectives and effective strategies for reading individual texts, the ability to find specific information and statements in texts, the ability to identify whole lines of arguments, the ability to assess texts and statements with regard to their relevance to a specific question, the ability to place individual texts in a broader context (e.g., author, discipline, genesis and publication context), the ability to connect the statements and information of different texts, and the ability to document results of the reading process (e.g., paraphrase, quote, excerpt, as well as own comments, ideas, considerations related to the red text).

The general trend is also observed in this sub-scale; lecturers perceive a higher level of need than the students themselves (Figure 22).

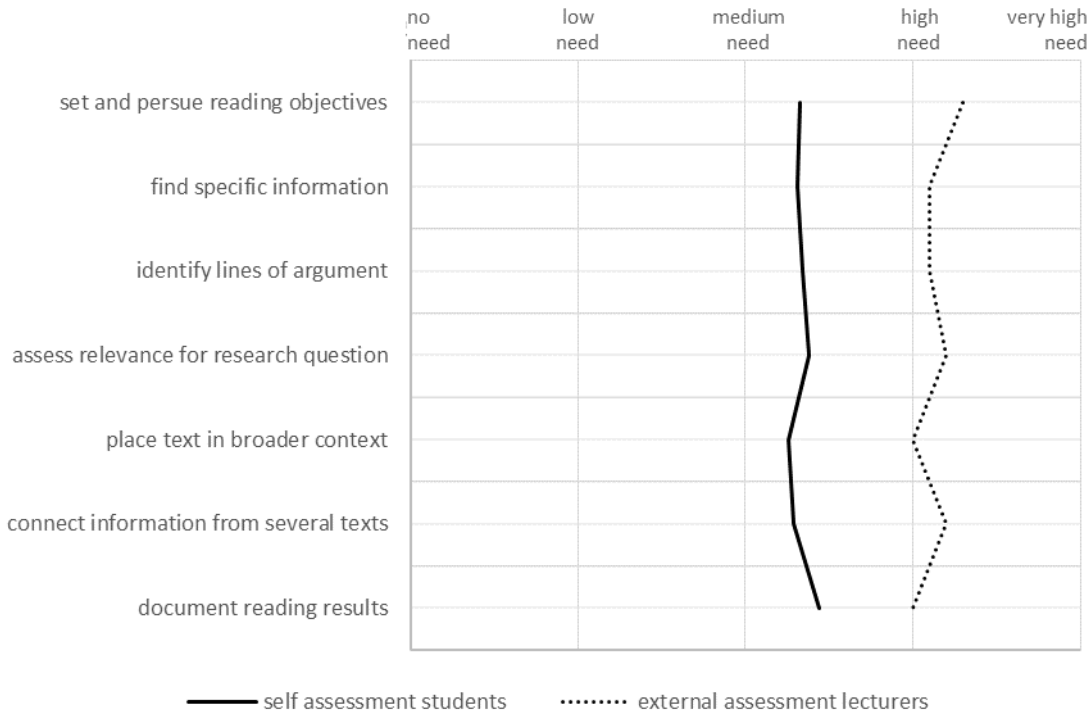


Figure 22 DUK's students' need to improve their reading skills

Note: students' n=170-173, lecturers' n=239-245

5.4 Writing skills

Writing skills comprise all activities belonging to the production of scientific or professional texts. The questionnaire distinguishes between content-related and formal aspects of writing texts. In comparing the two-line charts representing these two sets of items (Figure 23), one can see slightly higher needs regarding content-related aspects of writing.

The set of items regarding content-related aspects of writing comprises the ability to introduce the topic of a text (e.g., by presenting the starting point, problem description and objective of the text), the ability to formulate the main question of the text and to isolate the field of investigation (e.g., spatial, factual, temporal), the ability to name the research objects to be investigated (e.g., cases, objects, actors), the ability to make assumptions and theories explicit and to articulate expectations about possible results, statements, products, the ability to describe the methodological approach to answering a question, the ability to present results at the end of a text (e.g., main findings, conclusions and possible recommendations), and the ability to put the main elements of the text (objectives, research question, theory, methods, results) into a concise context to develop a thread of argumentation.

In all of these items, students' self-assessment is above medium need, in most of them lecturers' assessment is above high need.

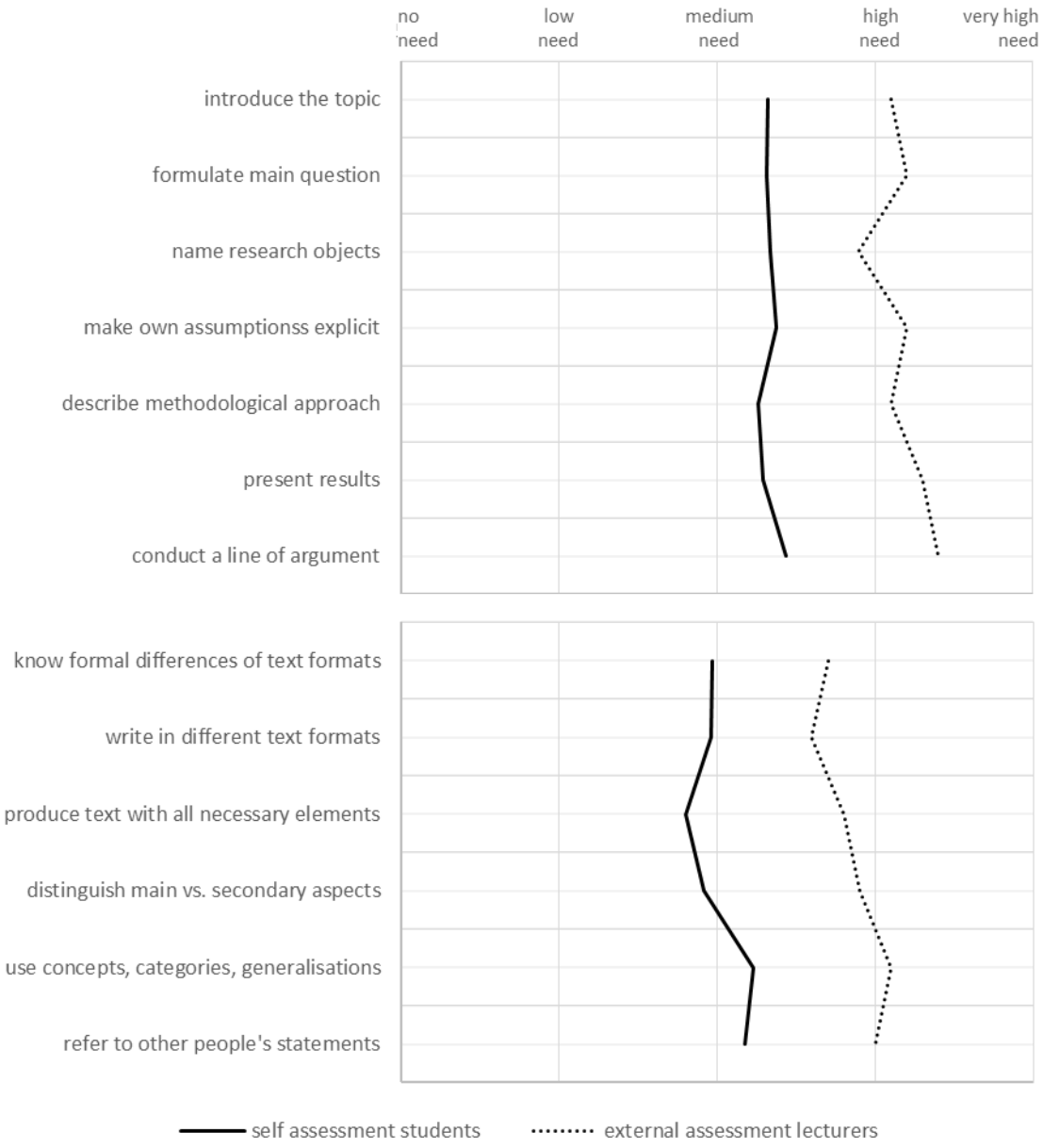


Figure 23 DUK's students' need to improve their writing skills

Note: students' n=169-173, lecturers' n=239-245

The set of items regarding formal aspects of writing comprise the knowledge about formal requirements of different types of texts (e.g., seminar paper, thesis, presentation slides), the ability to produce the same content in different text formats and lengths, the ability to distinguish between main and secondary aspects of a text, the ability to use clear-cut concepts, categories and generalisations, and the ability to refer to other people's statements.

Among the formal aspects of writing, the use of concepts and the reference to other people's statements have been assessed to be the most important ones.

5.5 Disseminating skills

Since digital media create much more opportunities for sharing and publishing information and texts, the dissemination of information and texts has become an important task.

The survey comprised the following items, which try to capture the dissemination of texts and information: the ability to distinguish between private sharing and public distribution of texts and information, the ability to avoid the infringement of third party rights (e.g., copyrights, data protection, trade secrets), the ability to protect one's own rights when passing on texts or information, the ability to distinguish between Open Access and proprietary forms of publication, the ability to assess publishing opportunities with regard to the desired effects, and the ability to assess publishing opportunities with regard to their trustworthiness, quality of service and business conditions.

Students report the ability to protect their own rights, the ability to distinguish between Open Access and other forms of publication, and the ability to assess the quality of publishing opportunities as equally important and their most important needs (Figure 24). Lecturers give most importance to the ability to avoid the infringement of third-party rights and (slightly less) to the ability to protect own rights and to assess the quality of publishing opportunities. Both groups regard the ability to distinguish between private and public context of dissemination as least important in this set of items.

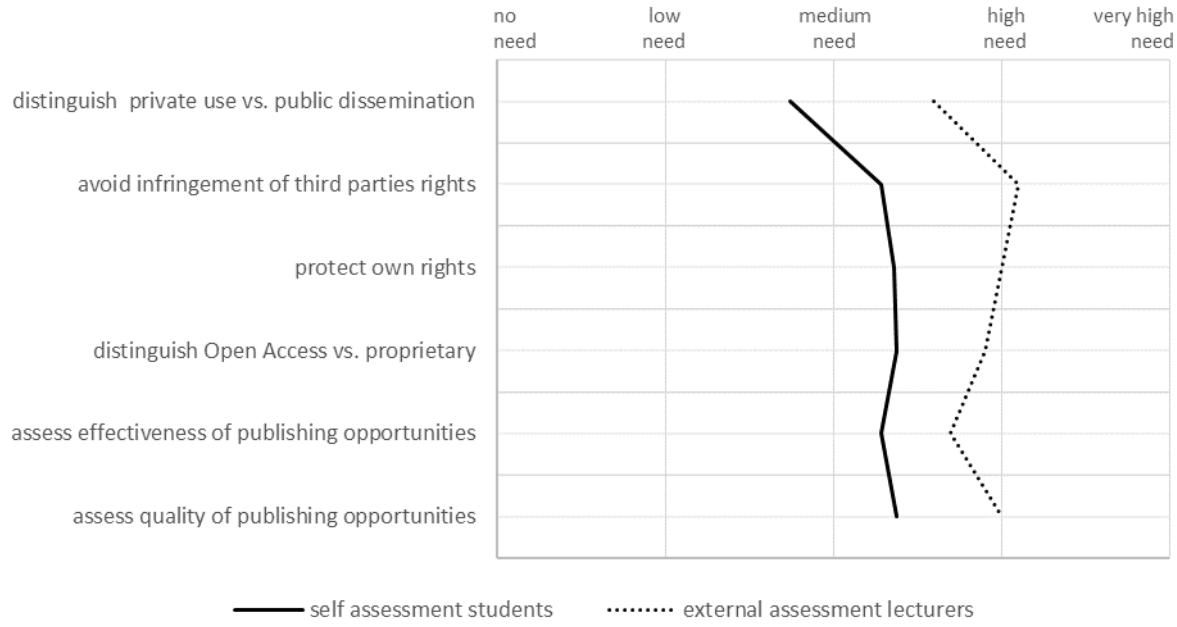


Figure 24 DUK's students' need to improve their disseminating skills

Note: students' n=172, lecturers' n=242-244

5.6 Collaborating skills

In the development of scientific or professional texts and information, cooperation with other people is becoming more and more important.

The respective set of items comprises the ability to take the perspective of other people, the ability to collaborate with people from other disciplines or fields of practice, the ability to set objectives and organise tasks in a group, the ability to deal spontaneously with unexpected problems, the ability to spontaneously use unforeseen opportunities in a collaboration, and the ability to improvise creatively in the collaboration with other people.

In all items the assessment by students is slightly below (or matching) the level of medium need, the assessment by lecturers is slightly below high need (see Figure 25). Both groups see the highest need in the abilities to collaborate across disciplines/fields and in organising groups.

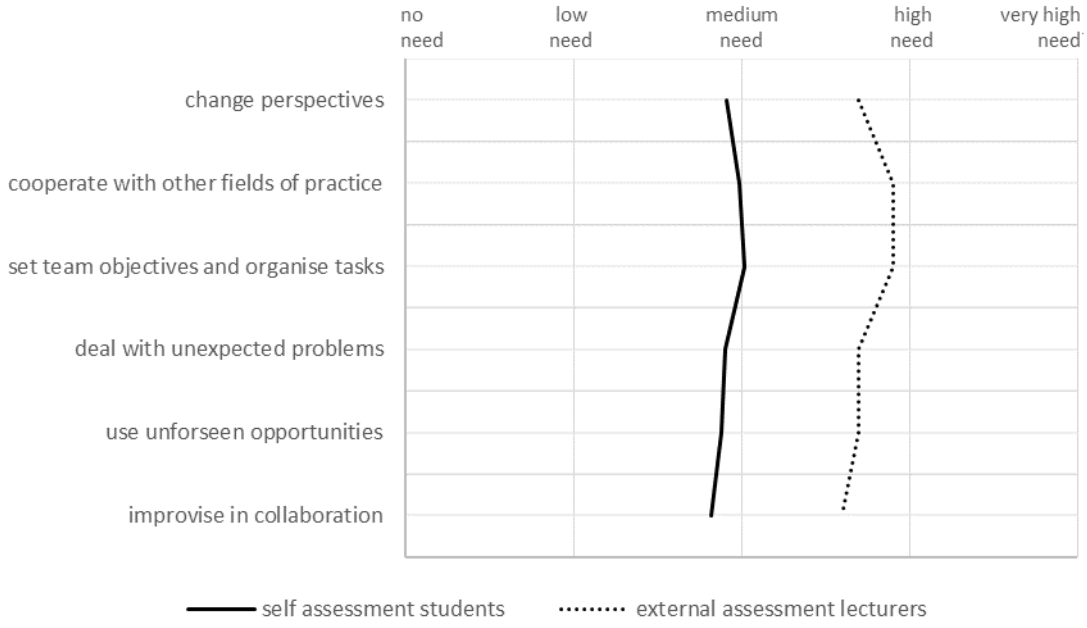


Figure 25 DUK's students' need to improve their collaborating skills

Note: students' n=170-172, lecturers' n=242-244

5.7 Comparison by educational background

To assess, if students differ in their needs for support in research literacy according to their educational, we directly asked lecturers, if they see differences between three groups: students with higher education degrees (bachelor and above), students without formal higher education degrees, and students without formal higher education entrance qualification (e.g., Matura or similar). With respect to students' self-assessment, we grouped the answers along demographic data (reported prior educational qualification), which allowed us to distinguish between these three groups.

As expected, lecturers made a clear difference between these three groups, assuming that the lower the prior educational attainment of students is the group with the higher need for support in research literacy (see Figure 26). In any case, lecturers see more than just a medium need for HE graduates, high need for students with higher education entrance qualification and more than high need for those without formal higher education entrance qualification.

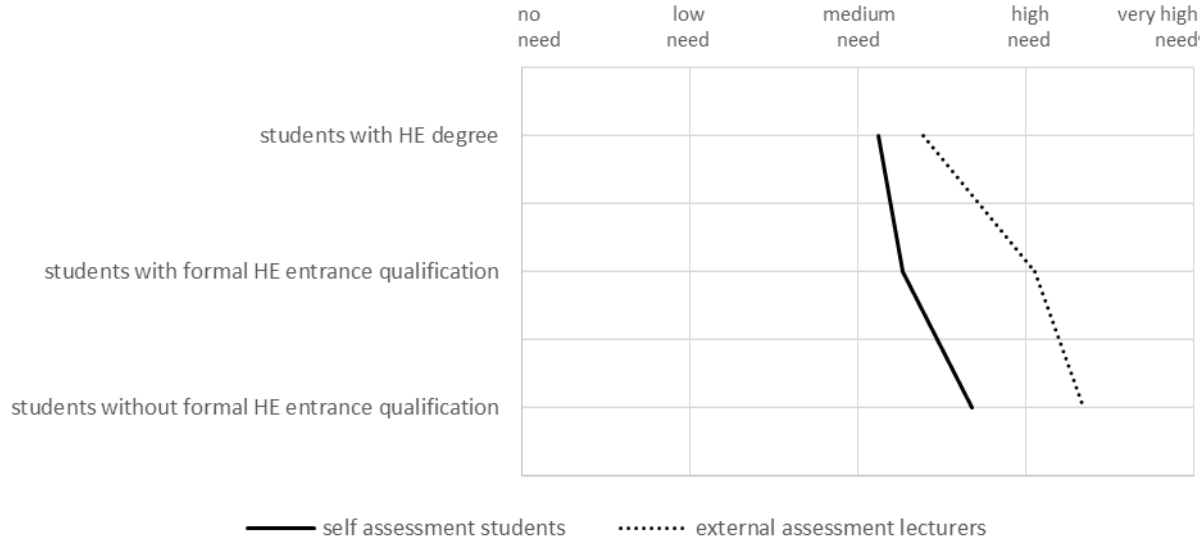


Figure 26 DUK's students' need to improve their research literacy by prior educational attainment

Note: students' n=168, lecturers' n=238-241

While students in all three groups see the need for improvement (even if their self-assessment is more optimistic than the assessment by lecturers), it is surprising to note that there is only a small difference between the groups, their self-assessment regarding their need for improvement in research literacy is very similar.

In order to conduct a comparison between the groups according to educational level, one-way ANOVA was conducted. Table 24 indicates the descriptive statistics of the sub-skills by the education level. Here is it is visible that there are some slight differences between the groups. In all of the sub-scales, students without higher education entrance qualification indicated the highest value for need. Yet, ANOVA did not yield any statistically significant difference between the groups.

	n	*mean*	*SD*	*95%-CI for means*	
				lower	*upper*
searching skills (M=3.51; SD=1.03)					
without formal HE entrance qualification	18	3.53	.64	3.21	3.85
with formal HE entrance qualification	55	3.47	1.05	3.19	3.76
HE degree	95	3.52	1.08	3.30	3.74
reading skills (M=3.35; SD=1.10)					
without formal HE entrance qualification	18	3.49	.90	3.05	3.94
with formal HE entrance qualification	55	3.27	1.14	2.96	3.57
HE degree	95	3.38	1.12	3.15	3.61
writing skills (M=3.24; SD=1.07)					
without formal HE entrance qualification	18	3.40	.76	3.02	3.78
with formal HE entrance qualification	55	3.11	1.10	2.81	3.40
HE degree	95	3.29	1.10	3.07	3.52
disseminating skills (M=3.24; SD=.98)	167	3.24	.98	3.09	3.39
without formal HE entrance qualification	18	3.43	.80	3.03	3.82
with formal HE entrance qualification	55	3.10	1.05	2.82	3.39
HE degree	94	3.29	.98	3.09	3.49
collaborating skills (M=2.93; SD=1.15)					
without formal HE entrance qualification	18	3.23	1.01	2.73	3.73
with formal HE entrance qualification	55	3.00	1.08	2.71	3.29
HE degree	94	2.83	1.21	2.58	3.08

Table 24 Scales of students' need to improve their research literacy by level of highest educational attainment

Table 25 shows the results of the ANOVA conducted on the different sub-scales of the research literacy.

	df	*SS*	*MS*	*F*	*p*
searching skills					
between groups	2	.09	.05	.04	.96
within groups	165	176.43	1.07		
total	167	176.52			
reading skills					
between groups	2	.84	.42	.34	.71
within groups	165	202.44	1.23		
total	167	203.29			
writing skills					
between groups	2	1.71	.85	.74	.48
within groups	165	189.74	1.15		
total	167	191.44			
disseminating skills					
between groups	2	1.85	.92	.96	.39
within groups	164	158.46	.97		
total	166	160.31			
collaborating skills					
between groups	2	2.87	1.43	1.09	.34
within groups	164	215.71	1.32		
total	166	218.57			

Table 25 One-way analysis of variances (ANOVA) of students' need to improve their research literacy by levels of educational attainment

In addition to education level, we also conducted analysis to compare groups according to gender and age, but the analysis did not yield any significance difference between the groups.

5.8 Transmission of research literacy

In an additional part of the survey, lectures were asked to assess their own needs for and their assessment of different means for the transmission of research literacy to students.

Since the project distinguishes five sub-sets or groups of skills, which contribute to research literacy, lecturers were asked to assess their own need for support in their task of transmitting research literacy to their students. On average, lecturers see about medium need for support in transmitting different aspects of research literacy to their students (see Figure 27).

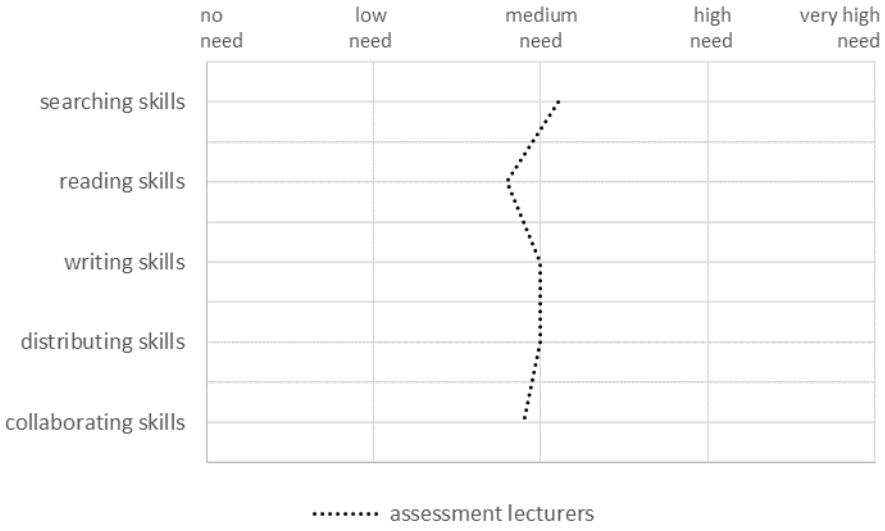


Figure 27 DUK's lecturers' need for support in transmitting research literacy

Note: n=243-246

The survey offered a range of different measures for transmitting research literacy, which was assessed by lecturers, namely the establishment of research literacy as an explicit educational goal of the curriculum (and part of the qualification profile), the continuous and coordinated transmission of research literacy throughout the entire course of studies, the transmission in specialised courses, the transmission in content related courses, the transmission in extra-curricular offerings (without ECTS), and the involvement of central support units (e.g., library, learning services) in the transmission of research literacy.

As can be seen in the following line chart (Figure 27), the highest level of importance was given to measures like establishing research literacy as an explicit goal of the curriculum, to continuous transmission through the entire course of studies and to the involvement of central support units. When comparing course formats, specialised courses are favoured over the transmission in regular, content-based courses and over extra-curricular courses, which received the comparatively least appreciation.

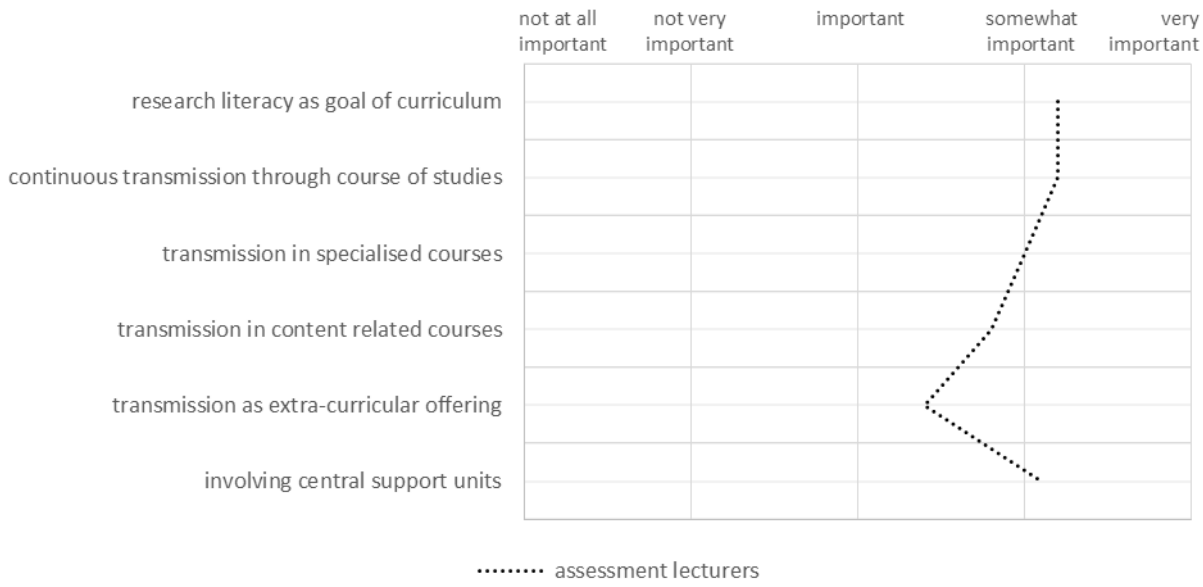


Figure 28 Importance of different measures for transmitting research literacy

Note: n=243-245

6 Results of focus groups and survey on long term students

6.1 Focus group: Needs of students

The workshop started with a discussion on 1) whether there are differences between traditional and non-traditional students, i.e., perceived differences in research literacy between students holding a higher education degree (Bachelor or above), students without formal higher education degree and students without formal higher education entrance qualification. Furthermore, we addressed the question of what are the needs of DUK students in terms of 2) their literature research, 3) reading comprehension, 4) scientific writing skills, 5) their opportunities for dissemination and 5) the importance of collaboration in scientific writing; and which measures could support students in improving these research literacy skills.

Our conceptual and semantic analysis yielded the following findings:

6.1.1 Perceived differences between students from different educational groups (non-traditional and traditional students)

The lecturers did not perceive any major differences between non-traditional and traditional students regarding their research literacy skills. They emphasised that the willingness to learn and the curiosity to learn new things have more considerable influence on the quality of scientific work than the degree of the completed education before beginning university.

6.1.2 Searching skills

With regard to literature search, the lecturers identified three major issues associated with the students' ability to literature research, i.e., searching and selecting relevant publications:

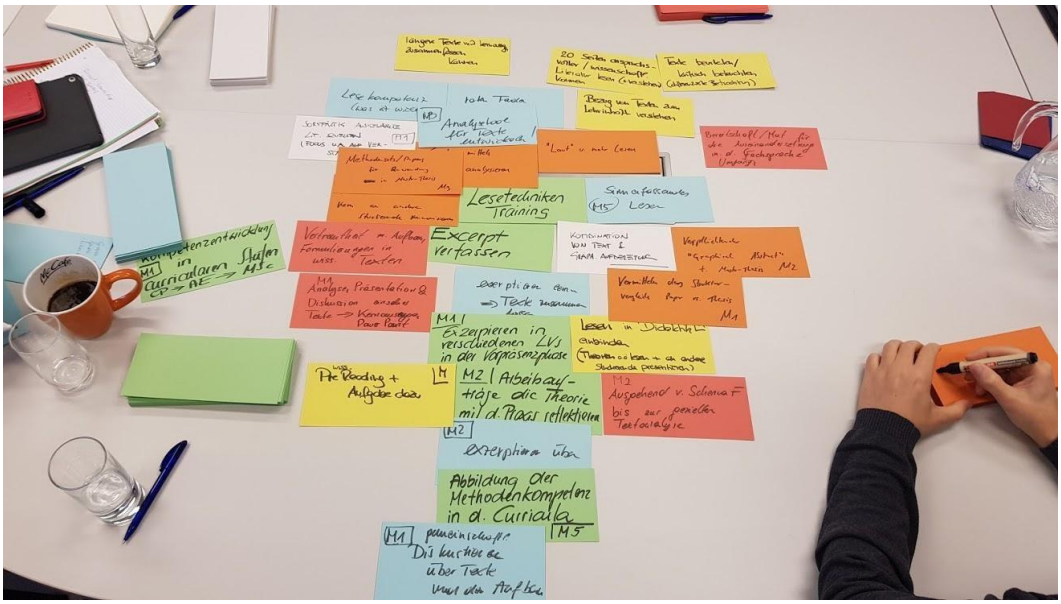
- *Search for relevant publications*
  The use of online journals, textbooks and databases by students' needs to be increased and therefore specific support should be provided. A corresponding task should be implemented in the curriculum of all study programs. In addition, clear guidelines or handbooks would be helpful as a support, as well as training on how to find suitable sources. Furthermore, the difference between literature search and literature analysis should be made more evident to students.
- *Selecting relevant literature*
  This topic received particular attention. All lecturers emphasised that students have difficulties in distinguishing scientific from popular science articles, regardless of whether they have previous experience in writing academic texts. They consider that students must develop standards that enable them to recognise and evaluate the quality of literature, i.e., the assessment of the citation worthiness of a source.
- *Managing the literature*
  Although the use of e.g., Zotero is suggested in courses on techniques of scientific work, only few students use literature management tools. This must therefore be further encouraged.

Picture 1 Collected postings on literature search

Source: participants of focus group, photo: Lukas Zenk

6.1.3 Reading skills

The lecturers identified a students' need for analytical reading and critical reading strategies. It is therefore essential to provide students with the knowledge necessary for a thorough analysis of the functioning of a scientific text. To support this process of reading comprehension, courses should therefore be offered in which texts are discussed according to the principle of closed reading. The need for better understanding of infographics was also discussed. In addition, the lecturers perceive that students have difficulties in reading English texts and assume that this is the reason why students do not read scientific texts, which are mostly written in the technical language English. For this reason, it was also suggested that a student's knowledge of English should be considered as a prerequisite for admission to studies.

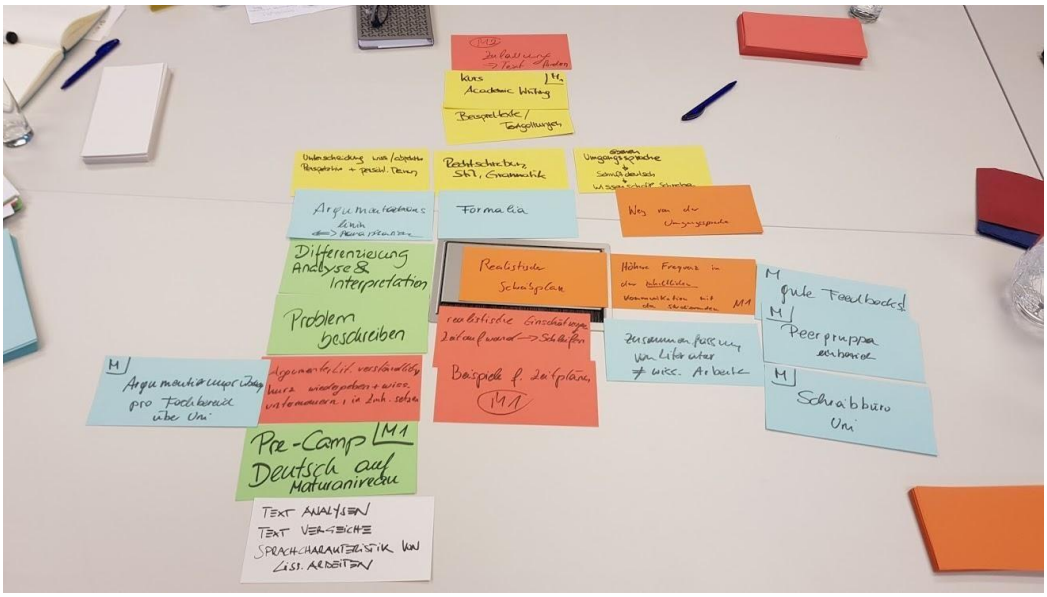


Picture 2 Collected postings on reading

Source: participants of focus group, photo: Lukas Zenk

6.1.4 Writing skills

In the context of academic writing, the basic skills required of students were discussed. In particular, the lecturers identified shortcomings of the students with regard to their ability to distinguish between personal opinions and objective analyses, as well as to comply with the formal criteria of scientific writing and the structure of scientific texts. Furthermore, students also have difficulties in breaking away from their colloquial language. One way to counteract these problems of students in academic writing is, for example, to set up writing workshops offering good example practices or peer group work. Within the framework of these measures, they should practice writing, receive feedback, train argumentation and learn different text genres. The lecturers all agreed that especially the writing of excerpts should be trained.

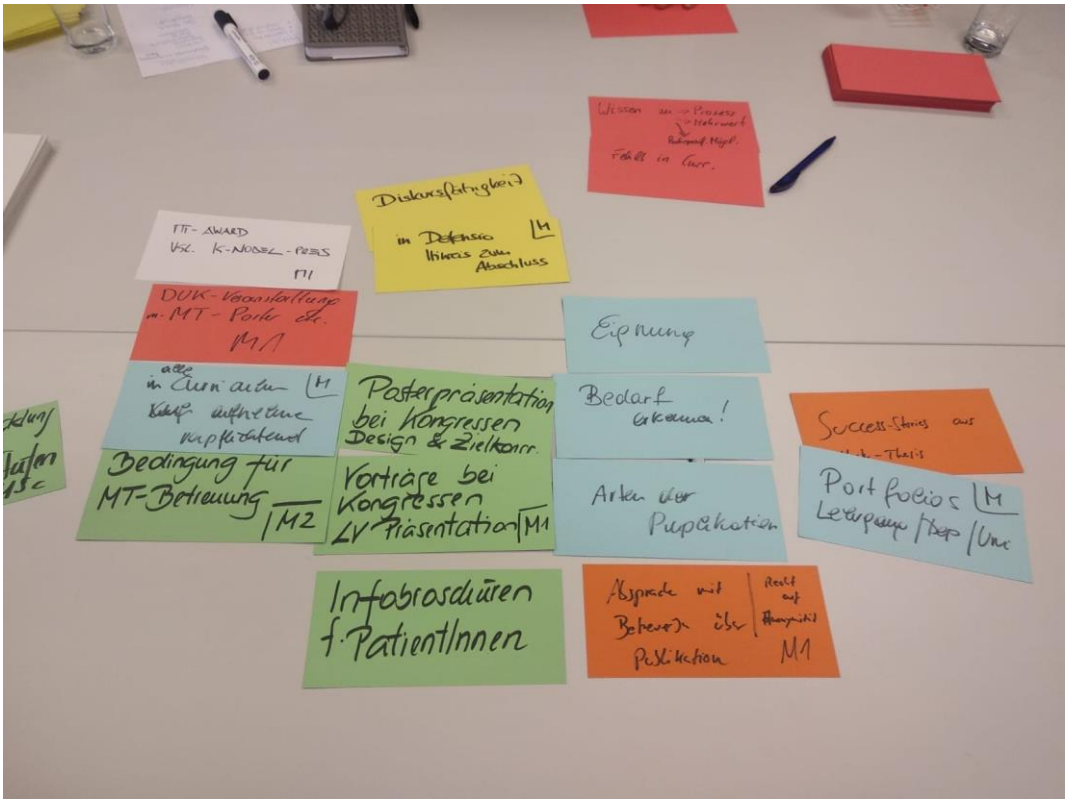


Picture 3 Collected postings on writing

Source: participants of focus group, photo: Lukas Zenk

6.1.5 Disseminating skills

For the dissemination of scientific findings, students' need an overview of the different types and media of dissemination, including lectures, poster presentations, proceedings, scientific papers, information brochures, etc. As support, activities during teaching were recommended, such as presentations of their ideas, obligatory publications within their studies, and recommendations from supervisors on how they could scientifically exploit their Master's thesis, for example.

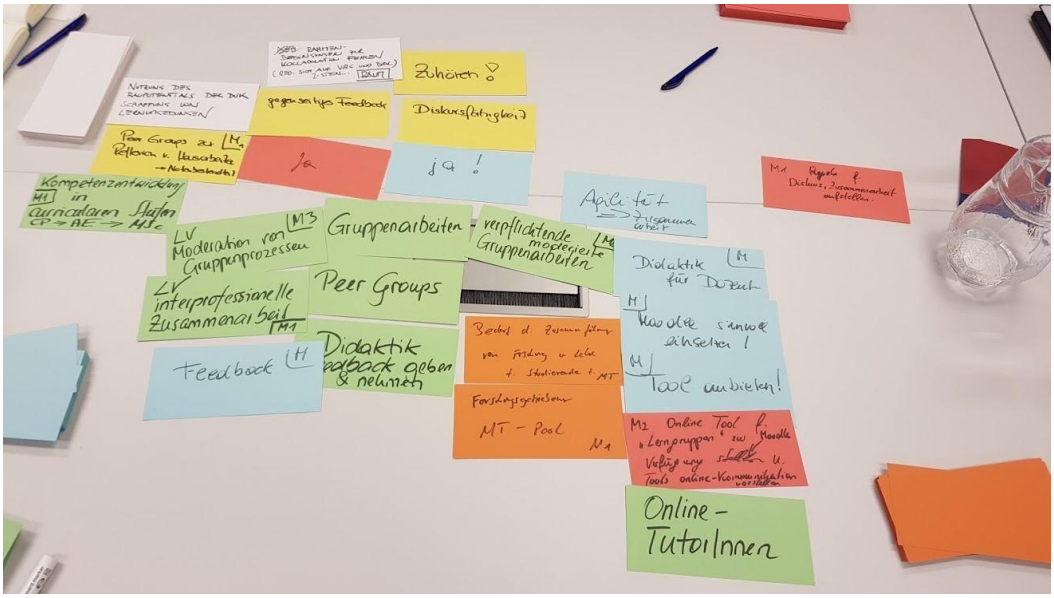


Picture 4 Collected postings on disseminating

Source: participants of focus group, photo: Lukas Zenk

6.1.6 Collaborating skills

According to the participants, students still have the idea that they are individual fighters in science. Instead, group work should be encouraged, feedback should be given on their ideas and new research gaps identified. For better collaboration, obligatory group work in which they also use common electronic tools (e.g., Moodle, Google Docs) and learn rules for discourse would be useful.



Picture 5 Collected postings on collaborating

Source: participants of focus group, photo: Lukas Zenk

6.2 Collaborative workshop: Collaboration in scientific writing

The focus of this workshop was on how to ensure collaboration in scientific writing. Thus, we addressed 1) the question of what skills seem necessary when people work together in scientific work and 2) the need for online and offline collaboration in academic writing. Another focus of the workshop was 3) the definition of useful tools that can support students in working together on term papers or research projects.

Our analyses yielded interesting results. One interesting finding was that as the need to collaborate increases, so does the need for digital and online tools. This showed that not only social competencies are relevant for collaboration, but also tools that enable interaction over distances. There is a high need for flexibility and the opportunity and ability to develop output together in a short period. Findings are organised under three themes.

6.2.1 Skills

The necessary skills for collaboration in science were discussed in-depth and several discussion topics were raised. One essential skill was people and social skills. Collaboration requires a high degree of flexibility to react to unplanned events and to empathise with other people. The ability to find compromises was also emphasised, for example to write joint scientific proposals or papers in one piece and developing common leading questions instead of producing individual blocks of text and different research questions. Social skills are essential, to recognise hierarchies in group processes and to have the right timing to handle or avoid conflicts.

Project relevant work experience is also an essential competency in scientific collaboration. Thus, work processes are relevant for joint activities in order to avoid time bottlenecks and to meet hard deadlines. At the same time, an understanding of roles adapted to the situation is essential in order to know the formal planning and to fulfil corresponding formal criteria, as well as to set situation-specific interventions.

According to the participants, the allocation of work and roles is of great importance in order to agree on who, for example, writes which parts, via which media the communication takes place and how decisions are made in the group. For this purpose, knowledge of different tools is important in order to plan individual work (e.g., Endnote) or collaborative work (e.g., Google Docs).

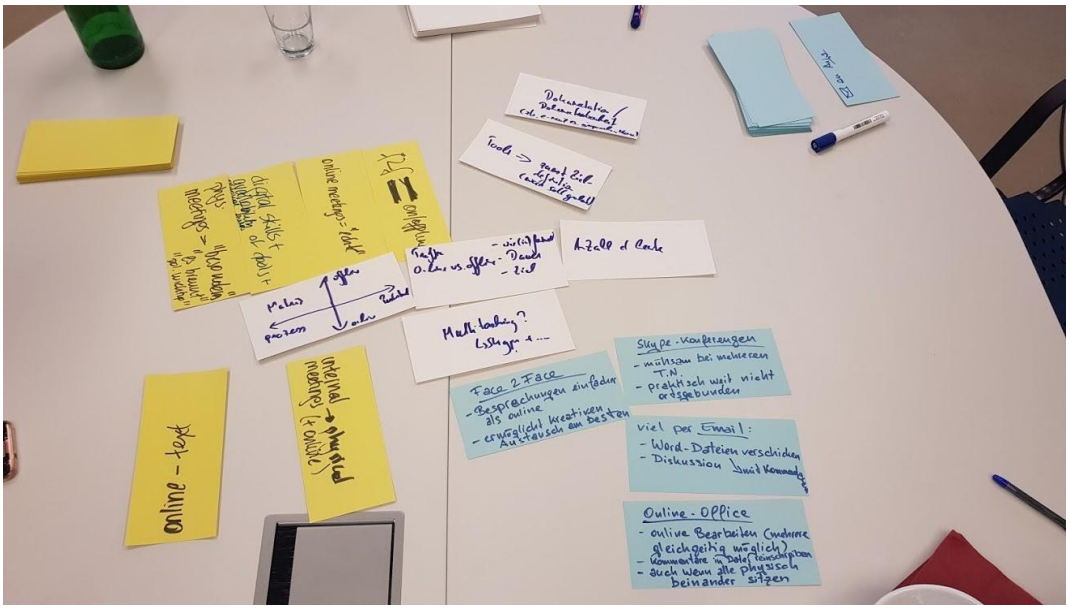
Picture 6 Collected postings on skills

Source: participants of workshop, photo: Lukas Zenk

6.2.2 Online and offline collaboration

For the collaboration, online and offline collaborations were discussed from different perspectives. The physical presence of face2face meetings was mentioned as an advantage for more creative processes, as well as the effect for team building, for example to get to know each other personally at the beginning of a project. In face2face meetings electronic tools are used e.g., through a beamer projection, essential sentences can be formulated jointly and minutes can be written together even in larger groups.

Online meetings, on the other hand, were mentioned for regular meetings in which people from different locations can communicate with each other. The increased efficiency of work processes was highlighted. At the same time, the disadvantages were also mentioned, such as losing track of who is attending the meeting in larger groups, the quality of the transmission is often poor, some participants are "forgotten" and online meetings are not suitable for larger groups. In addition, participants feel unobserved and are often less concentrated in meetings because they are answering emails on the side. Appropriate technical equipment is also required.



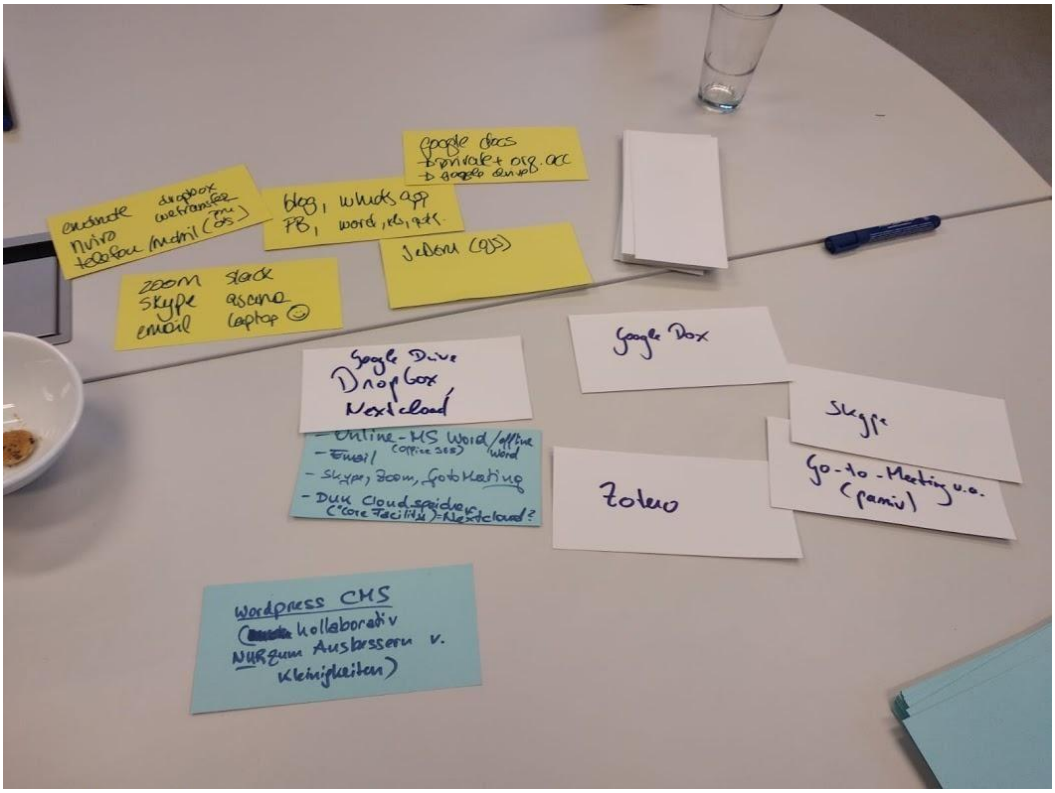
Picture 7 Collected postings on online and offline collaboration

Source: participants of workshop, photo: Lukas Zenk

6.2.3 Tools

The use of tools for collaborative processes was rated as substantial, especially the use of cloud solutions. In addition to dropbox, google drive and WeTransfer, university internal cloud solutions were also mentioned, which were considered as important storage devices in terms of data protection. In some projects, the webbased tool Asana was used, or Slack and WhatsApp for internal communication.

For meetings, the participants mentioned in particular Skype, Zoom, GoToMeeting and Adobe Connect, whereby Skype was considered as the best-known tool and the one most used. For scientific writing, tools for references as well as for research were listed. For reference management, the participants mentioned Endnote and Zotero in particular. For literature research, different databases were used depending on the scientific discipline. Besides general research services like Google Scholar, Scopus or Pubmed, these were Biber, Cochrane, RNet etc. With regard to dissemination, ResearchGate was highlighted, but also Facebook communities and WordPress blogs were named.



Picture 8 Collected postings on tools

Source: participants of workshop, photo: Lukas Zenk

Finally, essential skills for the students were discussed. At the beginning came social skills to organise projects and to divide roles and work packages. The technical expertise is relevant for the correct selection and use of the appropriate tools. During the writing process, the use of track changes should be learned in order to be able to write together efficiently

6.3 Survey on long term students

Student statistics at Danube University Krems (DUK) show a significant number of students (about 35%), who are enrolled far beyond the standard period of study. The ReaLiCE project therefore decided to conduct a small survey among all students in master programs at DUK, who were enrolled for seven or more semesters. (The standard period of study in most master programs at DUK is four to five semesters.) Between July and September 2020, the survey was sent to 2,857 long-term students at DUK

6.3.1 Population characteristics

As the population characteristics of all long-term students in Table 26 show, the majority of this group is male (54.7%), without any academic degree (53.0%).

	f	*%*
gender		
male	1,564	54.7
female	1,293	45.3
education background		
academic	1,342	47.0
non-academic	1,515	53.0
age (at the time of registration)		
18-25	195	6.8
26-35	1,284	44.9
36-45	996	34.9
46-55	346	12.1
56+	36	1.3
nationality		
Austria	2,176	76.2
Germany	485	17.0
Other EU	77	2.7
Non-EU Europe	51	1.8
Other countries	68	2.4
department		
Faculty for Education, Arts and Architecture	292	10.2
Faculty for Health and Medicine	1,309	45.8
Faculty for Business and Globalisation	1,256	44.0
semester (registered at the time of data collection)		
7-10	1,148	40.2
11-15	997	34.9
16-20	436	15.3
21-25	177	6.2
26+	99	3.5

Table 26 DUK's long term students, population characteristics

Note: N=2,857

The average mean for the responding students (at the time of registration) is 36. There is a large variation in the group regarding the age (standard deviation is 7.86), the youngest student was 21 and the oldest was 72 when they registered to their study program. Number of semester that students are

registered in July 2020 also shows a variety with the average of 13, minimum 7 and maximum 46 semester. But as it can be seen from Table 26 (above) majority of the students are in their 7-10 semester which means they extended their studies by 2-3 semesters.

6.3.2 Sample characteristics

Having addressed 2,857 long-term students, we received 300 responses, which gives us a return rate of 10.5%. The average age in this sample is 44.5 years, the minimum age 28 and the maximum age 70 years. 61.0% of the respondents were male, 37.0% female.

We also asked how many semesters students are beyond the standard period of study in their program. Results show that halve of the students (50.7%) have extended their studies for six or more semesters. Remarkably, a considerably group of students (14.0%) indicated that they do not exactly know, how many semesters they are beyond the standard period of study.

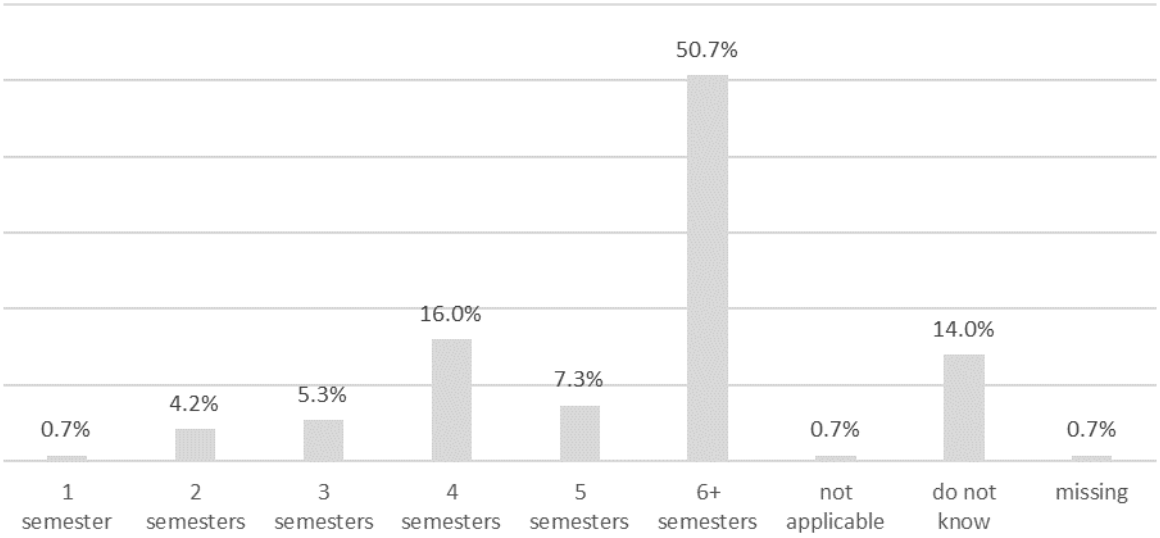


Figure 29 DUK's long term students' sample, number of semesters respondents are beyond their standard period of study

Note: n=300

6.3.3 Reasons for extending studies

Based on the literature review, 13 reasons for dropout/extending study programs for higher education and adult education students, especially for non-traditional students were delineated. We asked our students to choose the most important reasons for their extended enrolment at DUK study programs, and they could choose several reasons.

Analysis of the data indicated that the most important three reasons are work obligations, family responsibilities and academic problems to complete the master thesis. These reasons were followed by lack of motivation to complete the study and health issues.

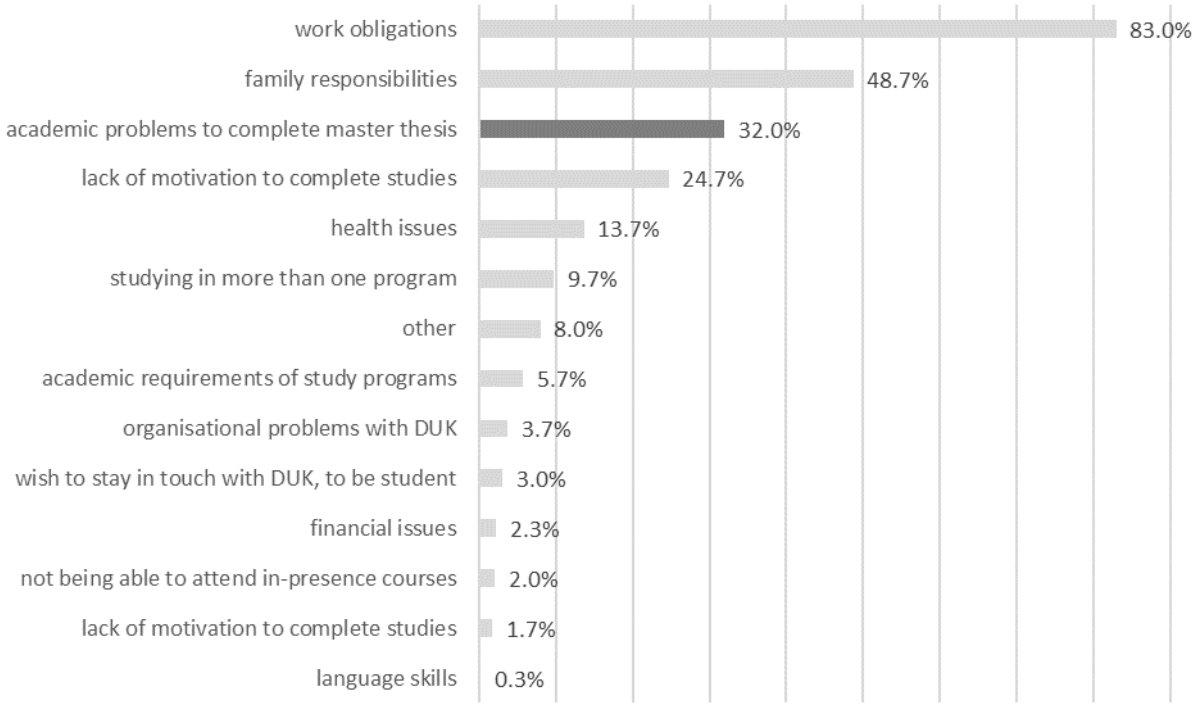


Figure 30 DUK's long term students' sample, reasons for extending the duration of studies

Note: n=300, multiple answers were possible

About one third (32.0%) of the responding long-term students report to have academic problems to complete their master thesis. Even if not every academic problem can be equated with problems of research literacy, there is good reason to belief that a lack of research literacy skills contributes much to the academic problems to complete a master thesis. These students need sufficient support to develop the necessary skills.

7 Summary and conclusions

Based on systematic review of the research literature and the policy documents of stakeholders from within and outside higher education, the ReaLiCE project has developed a concept of research literacy that goes beyond traditional concepts of information literacy, study skills or academic writing. Rather than following one of these simplistic approaches, the ReaLiCE concept of research literacy offers tools to address the competencies required for academic or professional communication in a holistic way, by connecting its complementary aspects, namely reading and writing, or searching with disseminating. Additionally, the concept offers tools to address social aspects of academic or professional communication, namely by identifying the specific research environments and by dealing with the need to collaborate for the production of texts and information.

For a quantitative survey among all students and lecturers at Danube University Krems, which was performed in 2019, this concept was operationalised by developing distinct sets of items for the research environments, skills for literature search, reading skills, writing skills, disseminating skills and collaborating skills. For the lecturers' questionnaire, a particular set of items addressed questions regarding the transmission of research literacy skills. Additionally, both questionnaires gathered some demographic details about the respondents.

The quantitative survey was complemented by two focus group workshops with lecturers from different faculties of the university. The following paragraphs connect and compile the main findings from both the quantitative and the qualitative inquiries. For the analysis of the data, descriptive and simple inferential statistical analysis were conducted.

Research environments

Having been asked about the relevance of different environments of research for DUK's students in the upcoming 2-3 years, the self-assessments of students and the external assessments of lecturers have been very much alike in all four sets of questions, very close in their means:

Both students and lecturers regard the university or and academic contexts as the most important for sharing texts and information, closely followed by professional contexts, while they give much less importance to private or civil society environments. The closeness between academic and professional contexts seems to be very relevant, since it indicates that sharing texts and information is not just an academic affair, but also of high professional relevance.

Similarly, the most important addressees for texts and information have been superiors, teachers and clients, closely followed by colleagues in courses, working groups and organisations. These results confirm reporting to superiors as the most important form or written communication, closely followed by the need to communicate in written form with colleagues and peers. In comparison to that, a wider public is of lesser importance, but still in a middle position, which seems to be a remarkably strong value. Addressing a wider public is of importance for academic or professional communication.

Among the platforms most frequently used for searching academic or professional literature, general search engines are in the sole lead, followed by library catalogues and special databases in second place, and websites form scientific of public institutions on third. While normally only the use of library catalogues and special databases is taught in higher education, literature search practices used for other platforms might be relevant as well.

The different channels for the acquisition of texts is another structural element of the research environment of students, scholars and professionals. A distinct and frequently use for is the sharing of texts

by lecturers and among colleagues. In a group of three library services, downloading via local libraries by far outnumbers the borrowing of physical copies and interlibrary loans. This is a clear sign of the growing importance of digital library services. Both the self-assessment by students and the assessment by lecturers confirm that students sometimes purchase print or digital texts, but slightly more frequently download materials from scientific or other public institutions. One can conclude that these last results highlight the importance of reliable texts and materials, which are in the public domain as open access materials. Universities are among these institutions, which are responsible to provide this kind of materials.

Students' need to improve their research literacy, in general perspective

The comprehensive concept of research literacy has been split up in the sub-dimensions searching skills, reading skills writing skills, disseminating skills and collaborating skills, which have been further operationalised detailed sets of items per item. Comparing the aggregated means from students and lecturers' assessments at the level of the sub-dimensions was used to gain an overview.

Two general trends were observed at this level of comparison. First, the two trend lines from students' and from lecturers' survey follow very similar patterns and in general are parallel to each other. Both groups see the highest need for students' improvement in searching skills, consecutively followed by reading, writing, disseminating and collaborating skills. In both cases, there is only a slight decline in importance across these five sub-skills. Second, however, the assessments of students and of lecturers differ more strongly in their extent, than they had in the prior section on research environments. Both groups see a need for students to improve their research literacy skill, but lecturers see a stronger need than students themselves do.

At this point, it is very interesting to analyse, in how far these assessments of students' needs differ, when students are distinguished according to their prior educational qualifications. This is particularly important for Danube University Krems, since the university specialises on academic continuing education and therefore dealing with a highly heterogeneous population of students. For the purpose of analysis, three groups of students were formed: students with prior higher education degree, students with formal higher education entrance qualification (Matura or equivalent) and students without formal higher education (HE) entrance qualification. As expected, lecturers participated in the survey made a clear difference between these three groups, assuming that the lower the prior educational qualification of students, the higher is their need for support in research literacy. Surprisingly, however, self-assessments of students from these three groups show no statistically significant difference. All groups of students report similar needs for improvement.

Results from the focus groups with lecturers confirm this. A formal qualification is no guarantee for adequate research literacy skills, in particular in continuing education, when students tend to come with older qualifications and from diverse professional backgrounds. Since formal qualifications are no guarantee, the level of skills largely depends on the individual. E.g. some students can speak very convincingly and argue in a sophistic way, while being limited in their written expression.

Searching skills

The results from the quantitative surveys mainly indicate the differences between students and lecturers in the extent to which they see a need of students to improve their skills in this particular subdomain of research literacy. The focus group could go more into detail and raise additional topics, e.g., the difficulty to switch between different searching contexts (e.g., different search platforms or data-

bases), between different text formats (e.g., from digital to analogue texts) or text genres (e.g., practical vs. theoretical, popular vs. academic). Other problems can be related to the ability to assess the quality of a text in its context and relevance of texts for a purpose, to analyse, select and condense search findings. Lack of proficiency in English can be another issue, since in many disciplines or fields much of the relevant literature is available in English only. To a certain extent, it can be a challenge to raise the interests of students, to make them curious enough to go beyond their comfort zone.

Reading skills

In the surveys, students recognised the need and lecturers recognised the high need for students to improve their reading skills. This was confirmed by the focus group, which reflected on different approaches to foster these skills.

Writing skills

The questionnaire distinguished between content-related and formal aspects of writing. In comparison, both students and lecturers assessed a higher need of students to improve their content-related rather than formal writing skills. However, the focus group discussed more of the formal aspects, e.g., the ability to distinguish between personal opinion and objective analysis, the use of appropriate language style, or other criteria for scientific writing and the structuration of texts. Content wise, the ability to develop arguments, to critically discuss and to feedback in written form were mentioned. Lecturers confirmed these challenges, but also critically discussed, in how far it is their job to act as language teachers, especially when simple language errors (grammar, orthography) become an issue.

Disseminating skills

While the survey mainly raised questions about legal issues and publishing opportunities, the focus groups also discussed the forms and extent of disseminating texts and information. While one colleague argued that students at Danube University are trained to be able to participate in academic and professional communication, but not conduct high-level research, another pointed out that dissemination does not necessarily have to be limited to scholarly journals. Other dissemination formats can be poster presentations, contributions to public events, the production of information materials for clients, the production of CV's or portfolios for self-marketing purposes, or even the public defence of a master thesis have been mentioned as potential forms of dissemination. These competencies need to be developed.

Collaborating skills

Among all five sub-skills, collaborating skills have been regarded as the least important, even if their importance has been acknowledged both by students and by lecturers. In the focus groups, this set of skills was discussed ambiguously. Some colleagues pointed at the generally increasing demand for collaboration in professional settings, others reported their difficulties to assess the real demand of students or raised concerns about practical problems in teaching and assessing this kind of skills.

Lecturers' opinions about the transmission of research literacy to their students

Having been asked about their own needs regarding the transmission of research literacy to their students, lecturers on average reported a medium need for support. There only have been slightly higher needs with respect to searching skills, and slightly lower needs with respect to reading skills and collaborating skills. One can assume that lecturers regard themselves as reasonably competent. On the other hand, these results may also indicate that the task of transmitting research literacy is not just a

question of individual competencies of lecturers, but rather an organisational question as well. This view is supported by the next set of questions.

Here, lecturers have been asked to assess the importance of a range of different measures, which all have organisational implications. For example, in the means of their responses, lecturers assessed two measures, namely the establishment of research literacy as an explicit goal of curricula and the coordinated transmission of research literacy throughout the entire course of studies, as more than rather important, which set these two items at the top of their priority list. One could argue that this result might justify a new priority for the development of new and for the revision of existing curricula.

Lecturers also strongly voted for involving central support units (e.g., the library or learning services) into the transmission of research literacy. Combined with the results above (on lecturer's individual needs for support), one could argue that this might be a vote for a division of labour and responsibility, rather than for individual coaching, which would leave the responsibility with the individual lecturer.

It is also interesting to see the assessment of different course formats: specialised course for research literacy (e.g., on literature search or academic writing) are regarded as rather important, which is the highest vote among courses. Lecturers' votes for the transmission in content related courses were slightly lower, and even lower for extra-curricular offerings. However, even this lowest rank among the measures is above the middle value. In other words: all three course formats have their justification for the transmission of research literacy. It is again a relevant organisational question, how to create a good mixture of formats.

Part 3:
Research literacy at four higher education institutions in Austria

1 Introduction

The aim of this chapter is to compare the empirical findings at Danube University Krems (DUK) with cases of other offerings in university continuing education and to broaden the empirical basis and increase the legitimacy of the ReaLiCE project. Thus, this chapter aims to provide data from comparable cases in continuing education and to have a larger data set to increase the applicability of the results of the project. Goals of this work package are:

1. To collect data from similar cases for comparison
2. To create synergy between continuing education institutions
3. To provide partner institutions with information about the assessments of their students and lecturers
4. To test our research instruments, which have been developed at DUK, at other universities as well
5. To disseminate our concept of research literacy

It is noteworthy to say that this comparison does not have any normative goals. It therefore does not aim for any competition between institutions. There are no standards to reach; there are no good or bad results to achieve. Thus, we mainly adopt a descriptive approach in our analysis. We are very grateful to our partner institutions for their willingness to participate and for their kind support throughout the process.

2 Methodology

2.1 Selection of cases

In the first half of 2020, several higher education institutions (HEI) in Austria and Germany have been invited to participate as partner institutions in the ReaLiCE project. Instead of addressing a large number of higher education institutions with one generic mass-mail, we chose a more individual and incremental strategy to address institutions individually. Since higher education institutions differ considerably with regard to their offerings of continuing education, we started with that institutions provide a wider range of continuing education programs.

Probably due to turbulent times during the Covid-19 pandemic, but also due to other priorities and activities[29], several of the addressed higher education institutions rejected our offer. However, some of them have been so kind to refer to potential partners, mostly to individuals with responsibility for the management or administration of continuing education, who are known in the field for being particularly active and willing to cooperate. These individuals in each institution coordinated internal procedures for permission and/or for consent to execute the survey.

Three universities agreed to participate in our study: Alpen-Adria Universität Klagenfurt (AAU), Universität Innsbruck (UIBK) and Fachhochschule Oberösterreich (University of Applied Sciences in Upper Austria – FHOÖ). In the case of UIBK (and similar to DUK), it has been a rather central decision to send the survey questionnaire to all students and lecturers in their continuing education programs. In the cases of AAU and FHOÖ, not all, but selected continuing education programs were involved in the survey.

2.2 Data collection procedure

Quantitative data were collected through an online survey. This survey aimed to identify perceived skills and investigate needs for special measures in different aspects of research literacy. Two complementary forms of the survey questionnaire were developed, one for students and for lecturers, which allow for comparing the self-assessment of students with the external assessment of students by lecturers. The instrument measures students' need for five sub-skills of research literacy which were identified as: *searching skills* (ability to search, assess and select academic or vocational documents); *reading skills* (ability to read, comprehend and extract information from academic or vocational documents); *writing skills* (ability to express information, arguments and results in different formats, genres, levels of complexity); *distributing skills* (ability to present, share and publish information in different contexts); and *collaborating skills* (ability to collaborate and to co-create text and publications). All sub-scales used 5-point Likert-type scales ranging from 1 (*no need*) to 5 (*very high need*).

The same survey, which had been used to collect data from Danube University Krems in summer 2019 already, was used with small adjustments for each university. We did not make any changes in the items measuring the research literacy skills. Only in the demographic questions, we added the names of specific continuing education programs for AAU and FHOÖ (to allow for internal analysis) and changed the university name in each survey. Data from AAU, UIBK and FHOÖ were collected between

[29] E.g. one institution reported a recently executed survey on another topic, which might have reduced the willingness of students and lecturers to participate in yet another study.

	students			lecturers		
	addressed	responded	return rate	addressed	responded	return rate
DUK	7,739	174	2.2%	3,086	247	8.0%
AAU	392	37	9.4%	178	9	5.1%
UIBK	844	25	3.0%	250	12	4.8%
FHOÖ	156	15	9.6%	43	1	2.3%
All	9,131	251	2.7%	3,557	269	7.6%

Table 27 Distribution of responding students and lecturers, by HEI

May and July 2020. Table 27 shows the number of respondents and return rate, as well as total number of the students and lecturers that survey was sent to. In general, lecturers' participation in the survey is much higher than students' participation.

2.3 Internal consistency of the Survey

We calculated Cronbach's α for all scales developed in this survey to check the internal consistency with the final data set including three other universities. Cronbach's α describes how well the internal consistency of a survey made up of several Likert-type scales and items was achieved. The resulting α coefficient of reliability ranges from 0 to 1. If all scale items are completely independent of each other, i.e. are not correlated or share no covariance, then α=0. The minimum acceptable value for Cronbach's alpha is about .70; below this value, the internal consistency of the common range is low. The maximum expected value is 1; however, this value indicates redundancy or doubling, so alpha values between .80 and around .95 are usually preferred. It should be noted that Cronbach's α is neither a measure of dimensionality nor a measure of validity.

In our analysis of the survey´s internal consistency, the Cronbach's α result of scale 1, *searching skills* was .94, without any exclusion.

In scale 2, *reading skills*, a Cronbach's α of .95 was obtained, without any exclusion.

For scale 3, *writing skills*, the Cronbach's α was quite high; a Cronbach's α of .97 was obtained, without any exclusion. However, the Cronbach's α after exclusion was similar for all items; it was between .968 and .969, indicating that we could/should shorten the scale.

The Cronbach's α for scale 4, *disseminating skills* proved to be optimal. We achieved a Cronbach's α of .90, without any exclusion.

The Cronbach's α was also quite high for the fifth scale, *cooperating skills*, but still within acceptable limits. It reached a Cronbach's α of .95.

Based on the Cronbach's α values, it is possible to state that the scale has a sufficient internal consistency.

3 Sample Demographics

3.1 Students' Sample

In this part, we provide a descriptive picture of the sample using students' demographic information, age, gender, educational and professional background and information related to their study programmes. In the final sample (n=246), as well as individual universities, the majority of the students (64.2%) was female (Figure 31).

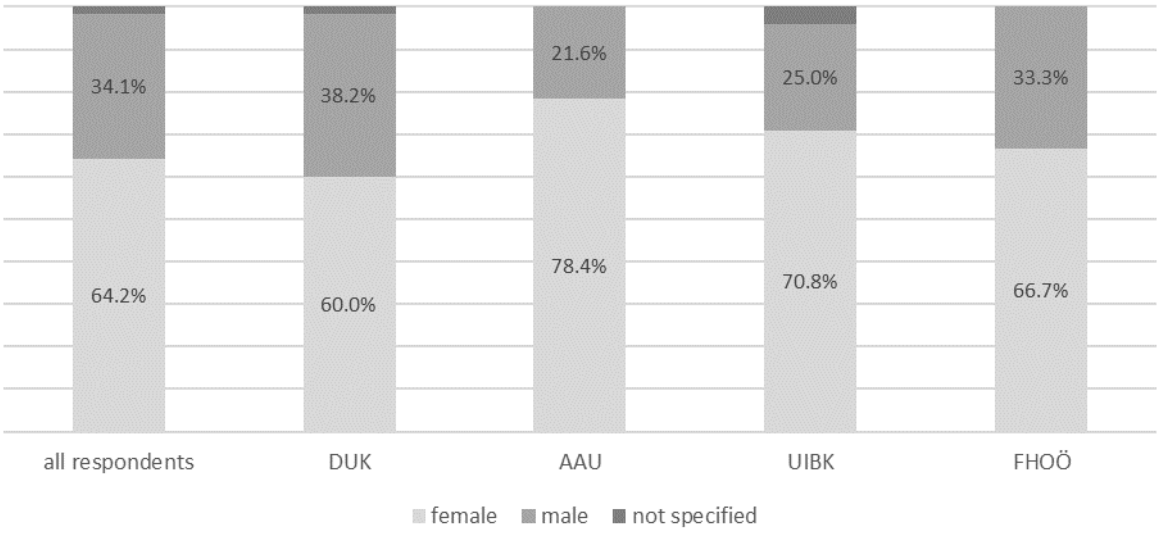


Figure 31 Students' sample by gender and by HEI

Note: All n=246, DUK n=170, AAU n=37, UIBK n=24, FHOÖ N=15

In contrast to gender, age shows variations between the universities. In our large sample, majority of the students are between 25 and 45 (see Figure 32).

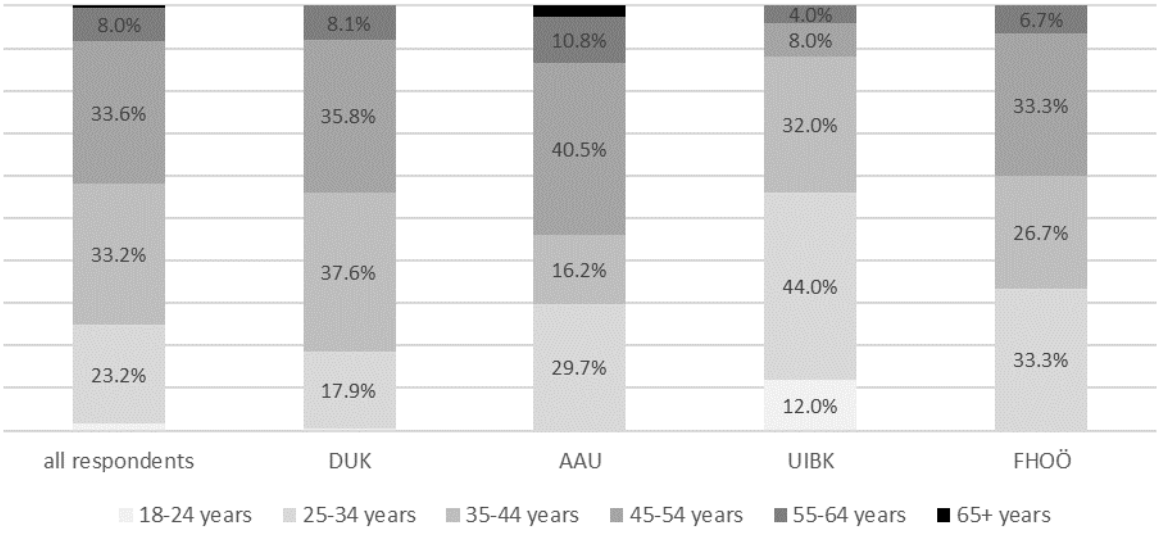


Figure 32 Students' sample by age group and by HEI

Note: All n=250, DUK n=173, AAU n=37, UIBK n=25, FHOÖ n=15

Frequencies indicated that academic continuing education participants are quite homogenous in terms of internationality. The majority (82.3%) of the responding students are Austrian, followed by students from Germany. In our sample University of Innsbruck hosts the largest group of international students (Figure 33).

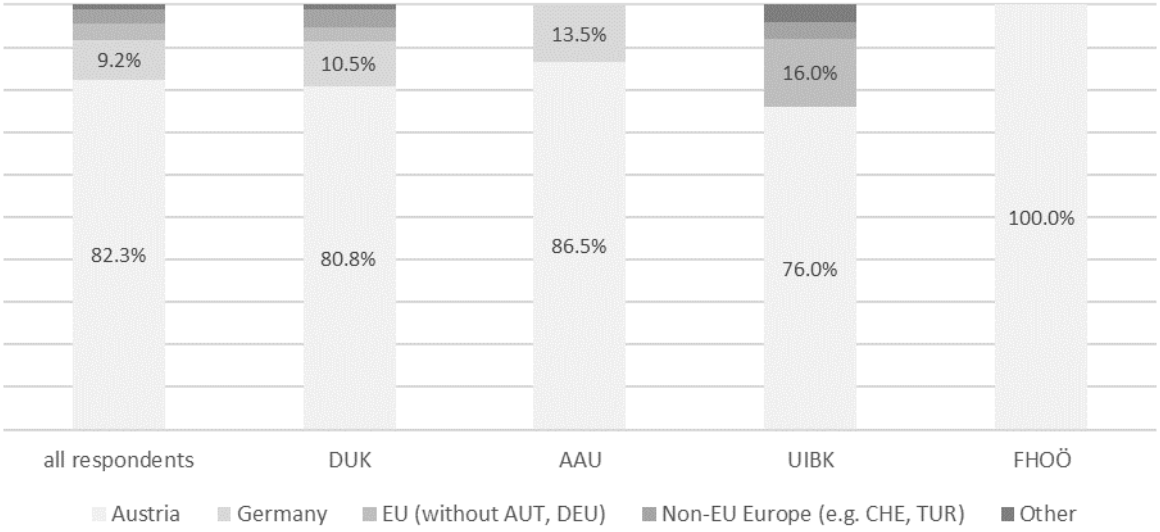


Figure 33 Students' sample by country of residence and by HEI

Note: All n=249, DUK n=172, AAU n=37, UIBK n=25, FHOÖ n=15

In our sample, the proportion of non-traditional students is only about 9%. These students are those who are coming from apprenticeship system or vocational schools without having matriculation exam to be qualified for the university entrance. Thus, they do not hold any academic degree. More than half of the students (57.4%) hold a higher education degree, while almost 30% have matriculation exam (Matura/Abitur) or vocational higher education qualification exam (see Figure 34). Looking at the individual universities, composition of the respondents differs in FHOÖ, in terms of educational level with a higher rate of non-traditional students.

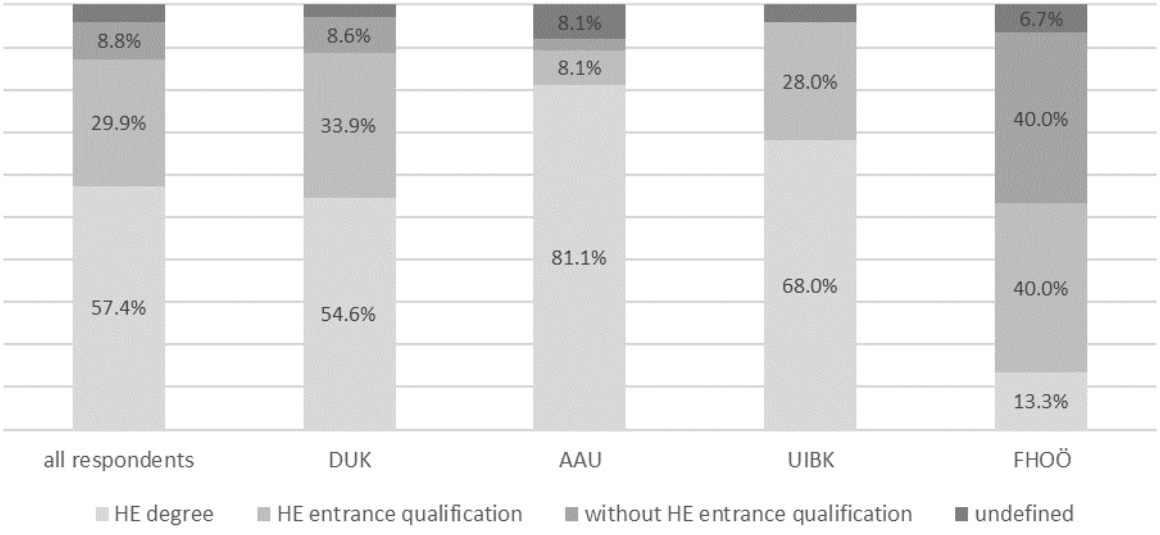


Figure 34 Students' sample by highest educational attainment and by HEI

Note: All n=251, DUK n=174, AAU n=37, UIBK n=25, FHOÖ n=15

Figure 35 illustrates the distribution of students in the sample according to the type of study program they are enrolled in, or better, according to the qualification they are aiming at. With 85.8%, the vast majority is enrolled in master programs, 7.1% for certificate and 7.1% other types. At the university level, data yields that while majority of the students in DUK and AAU study for a master's degree, the student composition is less homogeneous at UIBK and FHOÖ

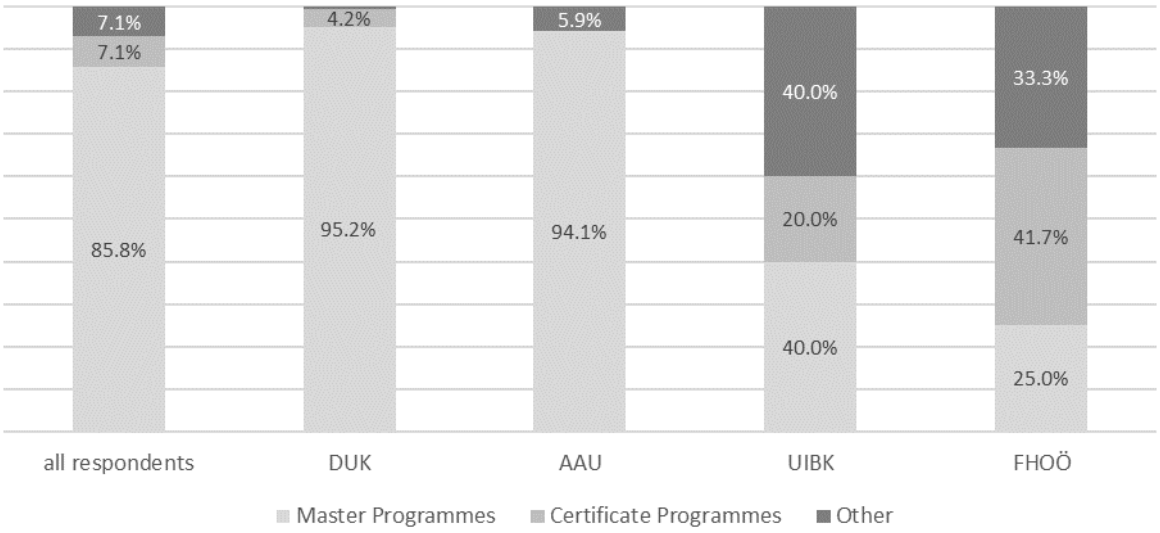


Figure 35 Students' sample by type of study program and by HEI

Note: All n=239, DUK n=168, AAU n=34, UIBK n=25, FHOÖ n=12

Figure 36 illustrates the composition of students in the sample according to the semester in which they are enrolled. In DUK, the group of students who are enrolled for 7 or more semesters, exceeding the required number of semesters, is particularly large (21.3%). This also explains the large share of this group (15.6%) among all respondents. It is important to examine the reasons for extending the study time in academic continuing education, since they may have to do with research literacy.[30] At three institutions, the shares of newly enrolled students (1-2 semesters) has been more (AAU: 74.3%, FHOÖ 53.3%) or close to (UIBK: 45.8%) to half of all responding students, while in the case of DUK (23.1%) this group was less than a quarter.

[30] In order to investigate this challenge, we conducted a small-scale study at DUK on long term students, who enrolled for seven or more semesters. Results of this additional study on long term students can be found in Part 2, chapter 6.3 of this report.

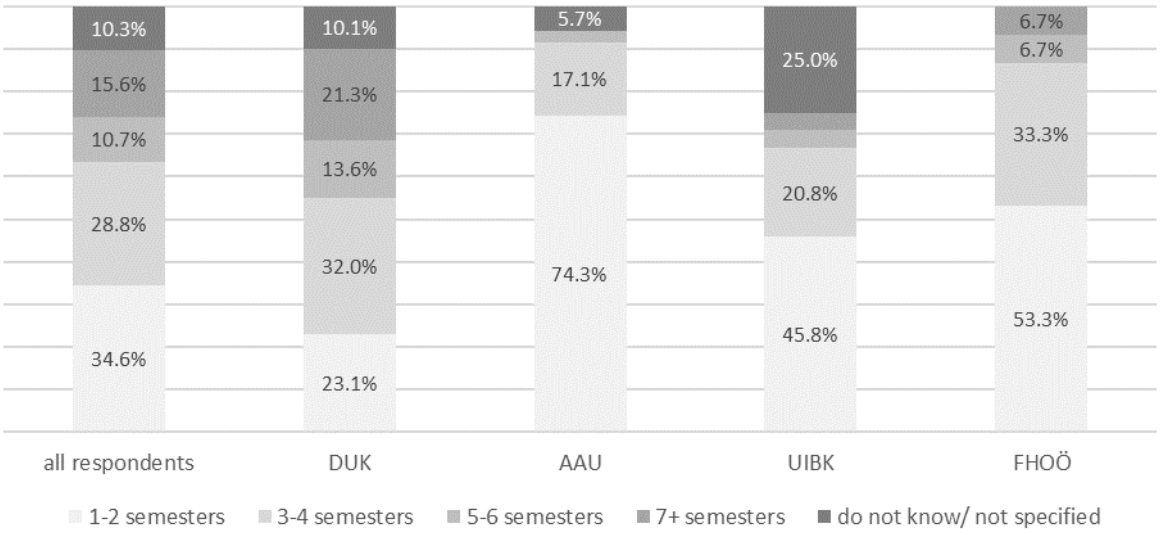


Figure 36 Students' sample by enrolled semester at the time of data collection and by HEI

Note: All n=239, DUK n=168, AAU n=34, UIBK n=25, FHOÖ n=12

We also asked students about their experience in writing in different forms and settings. 81 students of the surveyed students have already written a master thesis. That is 18% of the number of all answers (n=449). Considering the cases, i.e. all students surveyed (n=251), 122 of them have already written a master thesis, while only 12 of them did not produce any academic text before (see Table 28).

	DUK	AAU	UIBK	FHOÖ	Total
dissertation	15	2	1	1	19
master thesis	81	25	11	5	122
bachelor thesis	29	18	9	0	56
term paper	135	28	17	12	192
blog or article	46	14	7	0	67
other text type	89	22	13	4	128
book chapter	29	15	5	1	50
book	17	3	3	0	23
none	8	1	2	1	12

Table 28 Students' sample by experiences in writing different types of texts and by HEI

Note: Multiple answers were possible for this item.

3.2 Lecturers' sample

Our second participant group is the lecturers and the heads of the study programmes. This part presents the basic demographic information about the lecturers who participated in the survey from four universities. Together with DUK, the survey was sent to 3557 lecturers, 272 (7.6%) of them responded (247 from DUK). From FHOÖ, we have only one respondent.

Contrary to students, the majority of lecturers (almost 60%) are male while 37% are female (Figure 37).

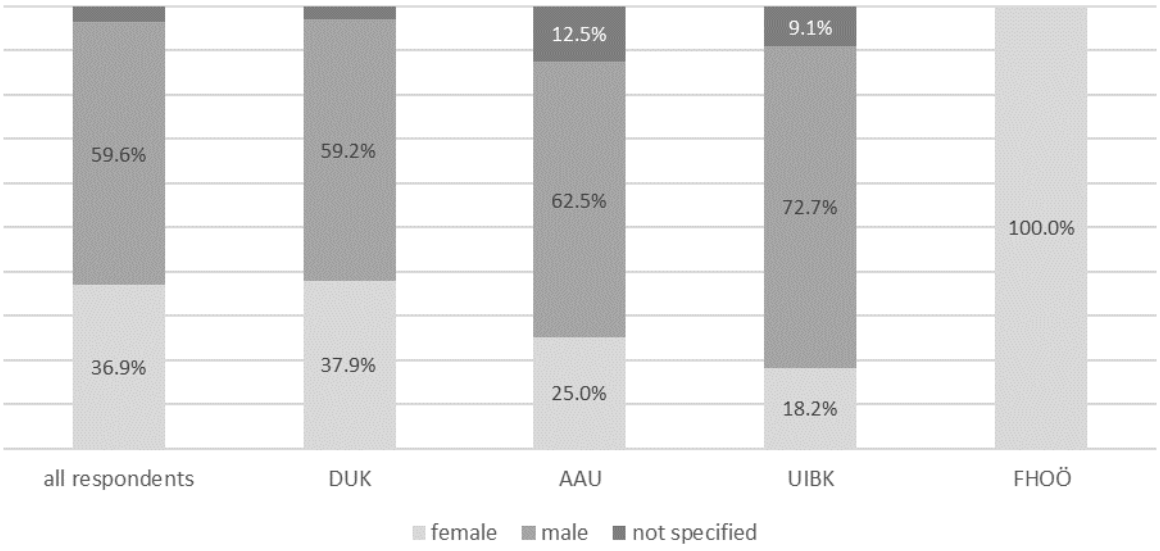


Figure 37 Lecturers' sample by gender and by HEI

Note: All n=267, DUK n=245, AAU n=9, UIBK n=12, FHOÖ n=1

Figure 38 indicates the division of the sample into age groups. The majority of our respondent lecturers are between 55 and 64, and 15% of them are above 65.

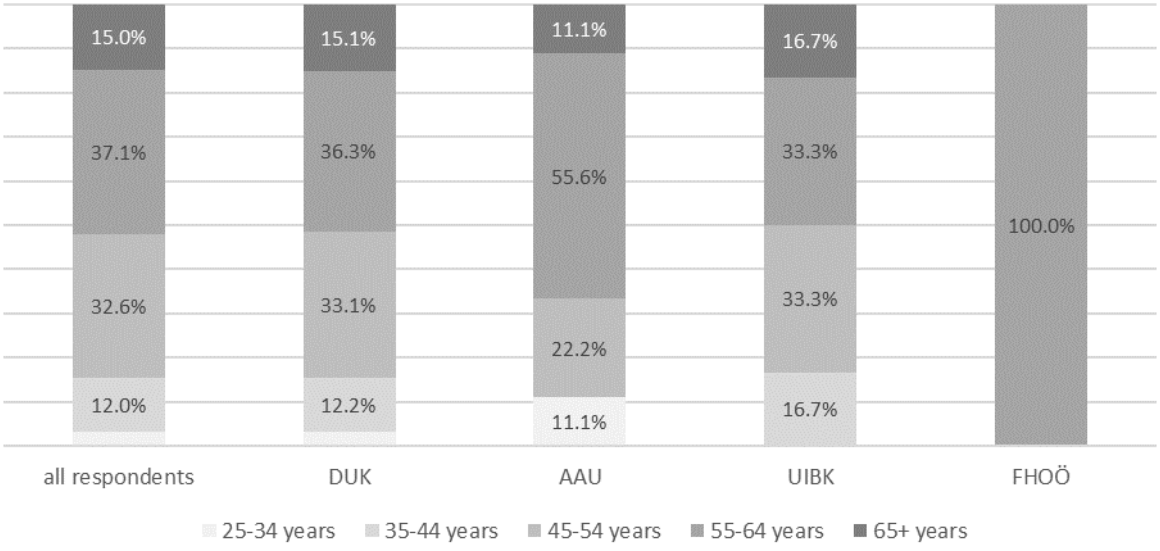


Figure 38 Lecturers' sample by age group and by HEI

Note: All n=267, DUK n=245, AAU n=9, UIBK n=12, FHOÖ n=1

According to self-reported data, more than half of the lecturers hold a PhD degree (Table 29). Danube University Krems has the largest variation in lecturer's academic background, while almost all of the lecturers in other universities hold postgraduate degrees (Master and PhD/Doctorate).

	DUK		AAU		UIBK		FHOÖ		total	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
without formal HE entrance qualification										
vocational school without matriculation exam	1	0.4	-	-	-	-	-	-	1	0.4
with formal HE entrance qualification										
College or Academy	5	2.1	-	-	-	-	-	-	5	1.9
HE degree										
Bachelor	3	1.3	-	-	2	16.7	-	-	5	1.9
University Continuing Education	6	2.5	-	-	-	-	-	-	6	2.3
Master, DI, Magister	97	40.4	2	22.2	2	16.7	1	100.0	102	38.9
PhD, DR	128	53.3	7	77.8	7	58.3	-	-	142	54.2
other	-	-	-	-	1	8.3	-	-	1	0.4
missing	5									
Total	245	100.0	9	100.0	12	100.0	1	100.0	267	100.0

Table 29 Lecturers' sample by highest educational attainment and by HEI

We also investigated the lecturers' employment conditions, being external/internal, leadership positions, and responsibilities and tasks they are involved in (Figure 39 and Table 30 shows the results). Danube University Krems hires more external lecturers compared to other universities, which is also reflected in the composition of respondents to our questionnaire: 79.9% of the lecturers are external, while 20.1% are internal ones. In AAU and UIBK it is more equal (Figure 39).

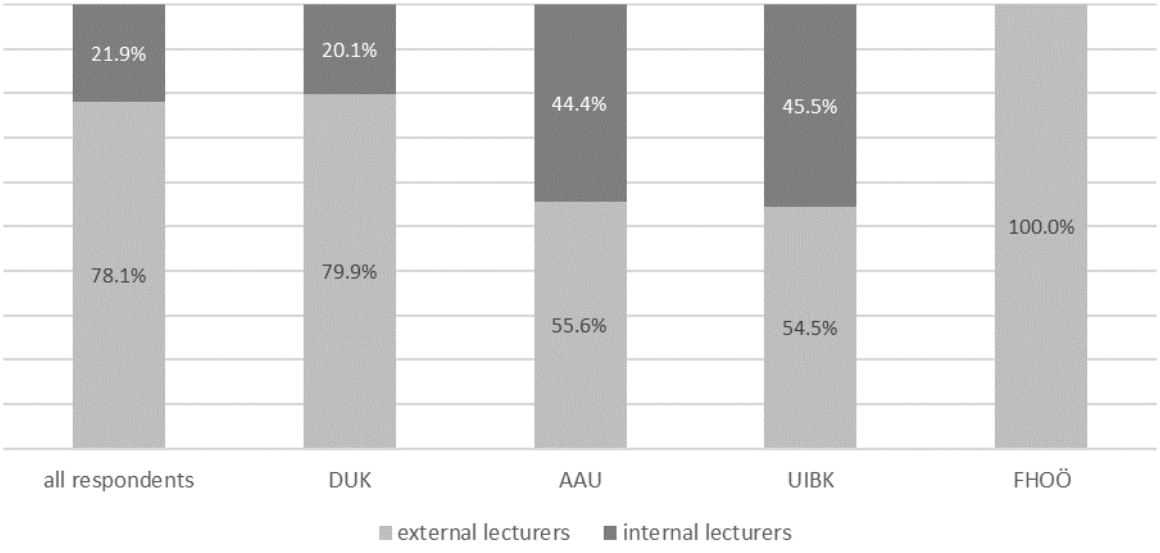


Figure 39 Lecturers sample by employment status and by HEI

Note: All n=267, DUK n=245, AAU n=9, UIBK n=12, FHOÖ n=1

Regarding other conditions, 20% of our sample have managerial responsibilities for study programs or modules. In AUU majority of the lecturers had leadership responsibilities (7 out of 9 lecturers), while 50% of the lecturers in UIBK hold a leadership position.

In our large sample, 69.1% of the respondents are teaching or have been teaching at other higher education institutions as well.

Beyond their teaching activities, 54.9% of the respondents are active in research as well. In UIBK, two thirds of the lecturers are active in research.

	DUK		AAU		UIBK		FHOÖ		Total	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
leadership position										
in a leadership position	41	16.6	7	77.8	6	50.0	-	-	54	20.1
not in a leadership position	206	83.4	2	22.2	6	50.0	1	100.0	215	79.9
research activity										
active in research	133	55.0	4	44.4	8	66.7	-	-	145	54.9
not active in research	109	45.0	5	55.6	4	33.3	1	100.0	119	45.1
teaching at other HE institutions										
teaching at other HEI	168	69.1	7	77.8	8	66.7	-	-	183	69.1
not teaching at other HEI	75	30.9	2	22.2	4	33.3	1	100.0	82	30.9

Table 30 Lecturers' sample by other employment conditions and by HEI

Lecturers also were asked which type of teaching activity they have been involved (They could choose multiple answers). As can be seen in Table 30 and Table 31, the majority of lecturers (92.9%) has been involved in lectures. The second most common teaching activity (mentioned by 65.4%) is thesis supervision, while 49.4% were involved in the supervision of seminar papers. Still it is fair to say that the vast majority of lecturers in our sample has experiences in dealing with the written works of students. Conceptual work for the development of courses (42.0%) or of curricula (25.7%) are even less common.

	DUK		AAU		UIBK		FHOÖ		Total	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
lecture	230	93.1	9	100.0	10	83.3	1	100.0	250	92.9
supervision of seminar papers	116	47.0	7	77.8	9	75.0	1	100.0	133	49.4
thesis supervision	158	64.0	9	100.0	8	66.7	1	100.0	176	65.4
development of courses	99	40.1	7	77.8	6	50.0	1	100.0	113	42.0
development of curricula	57	23.1	6	66.7	5	41.7	1	100.0	69	25.7

Table 31 Lecturers' sample by teaching activities and by HEI

Note: Multiple answers were possible for this item.

Concerning the internationality of the lecturers, in our sample 82.3% of the responding lecturers live in Austria. Distribution of the rest shows that most of the international faculty is from Germany (Figure 40). UIBK has the highest number of lecturers with international background, coming from other EU countries (33.3%).

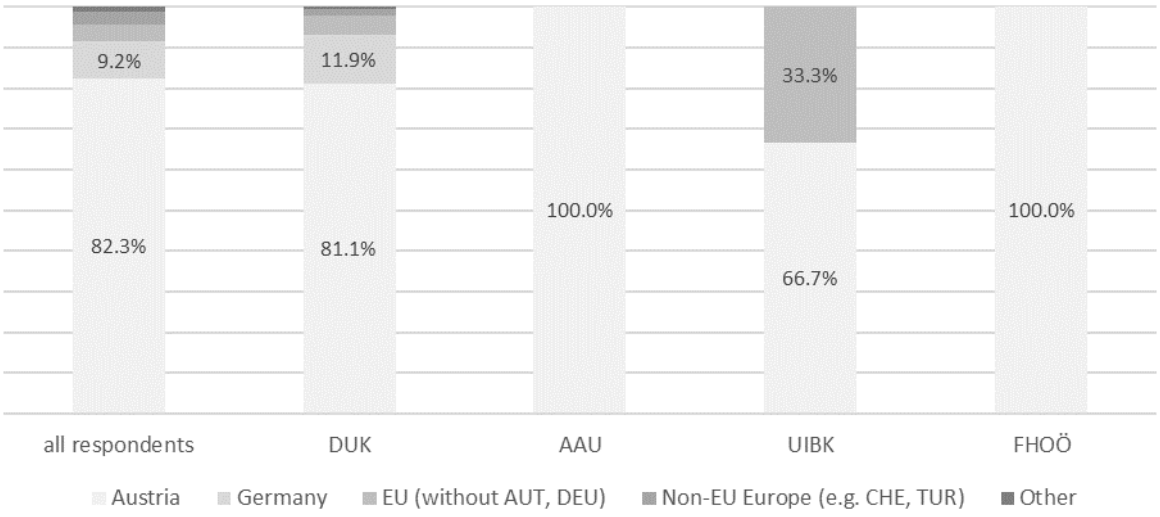


Figure 40 Lecturers' sample by country of residence and by HEI

Note: All n=267, DUK n=245, AAU n=9, UIBK n=12, FHOÖ n=1

4 Contexts for dealing with texts and information

Literacy in general – and research literacy in particular – is the ability to deal with text and information in different contexts. With four distinct sets of questions, the survey started to establish an understanding, which context and addressees might be relevant for students of continuing education programs, and which tools are the most commonly used for the search and the acquisition of academic and/or professional texts.

These first sets of questions may also serve as examples for general approach of the survey and the way of its analysis. Two complementary questionnaires have been sent out, one asking for the self-assessments of students, and the other for the external assessments on the same issues by lecturers. The responses to both questionnaires were calculated in 5-point Likert scales (rating from 1-5). The following figures combine the ratings from both sources to allow for comparisons, the continuous lines representing student's self-assessments, the dotted lines representing the external assessment by lecturers.

Some of the following figures additionally compare the rates of different HEIs, either from students or from lecturers.

4.1 Research context

The first set of questions inquired the importance of different research environments for students in the next 2-3 years, for processing, sharing or publishing texts and information (see Figure 41). It distinguished between the university or other academic environments (e.g., as part of own studies or when writing a thesis), professional environments (e.g., in the context of employment or in a professional community), private environments (e.g., family or friends) and civil society (e.g., the local community or non-profit organisations).

The vast majority of students and of lecturers regard academic environments as very or rather important for students in the next few years. Similar importance was given to professional environments by students and by lecturers. Very clearly, the ability to deal with text is highly relevant both for the academic and for the professional lives of continuing education students.

Compared to that, the small majority of students rate private environments and civil society environments as not very or not at all important. While the external assessment of lecturers for private environments is close to this self-assessment of students, they give considerably higher importance to civil society environments. Maybe, lecturers overestimate the civil society engagement of their students. At least, one can assume, literacy is regarded as relevant for effectively dealing in civil society environments.

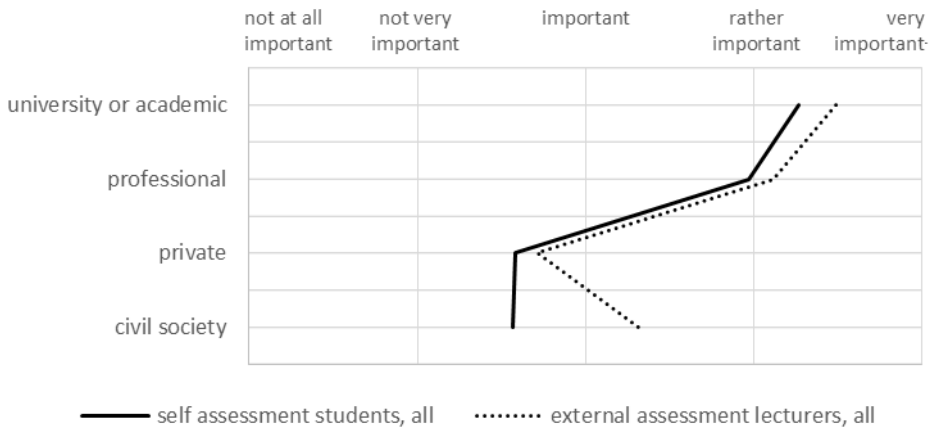


Figure 41 Importance of different research contexts for students in the upcoming 2-3 years, all HEI

Note: students' n=246-250, lecturers' n=261-265

Comparing the self-assessments of responding students between the four higher education institutions (Figure 42), the lines look very similar. They come closest in rating professional environments as rather important for students. Three universities (DUK, AUU and UIBK) rate academic environments between rather and very important, while the mean of students from FHOÖ rate them as important.

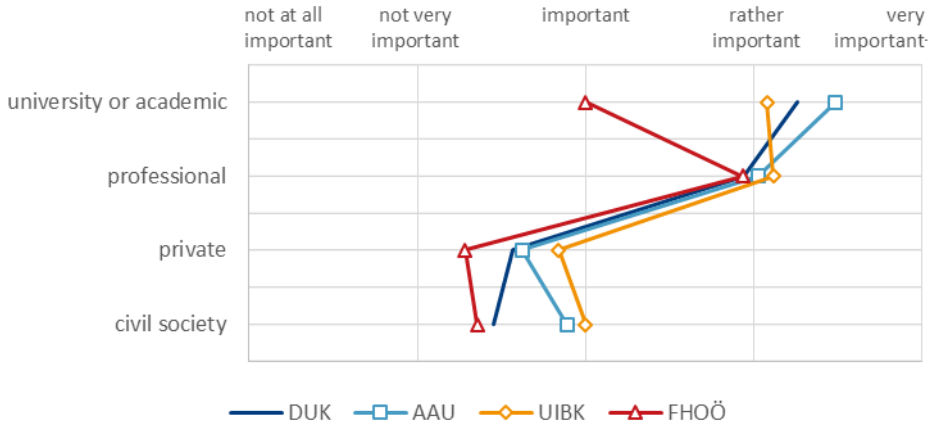


Figure 42 Importance of different research contexts for students in the upcoming 2-3 years, responding students per HEI

Note: DUK n=170-173, AAU n=37, UIBK n=25, FHOÖ n=14-15

Comparing the external assessment by lecturers (Figure 43), respondents from DUK and AAU come to nearly the same ratings. Respondents from UIBK match this pattern, but come to higher ratings, while the one responding lecturer from FHOÖ rates all contexts as very important.

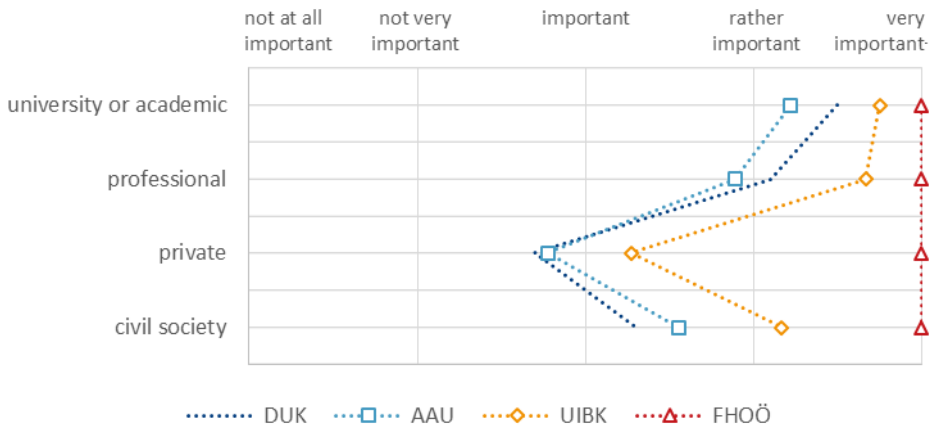


Figure 43 Importance of different research contexts for students in the upcoming 2-3 years, responding lecturers per HEI

Note: DUK n=240-246, AAU n=9, UIBK n=11-12, FHOÖ n=1

4.2 Different audiences

In the second set of questions, the survey asked to assess the importance of different audiences or addressees of continuing education students in the next 2-3 years. It distinguished between individual superiors (or teachers or clients), limited numbers of known people (peers in classrooms or colleagues in working groups or organisations) and unclear numbers of unknown people in a wider public.

Both students themselves and – even more so – lecturers regard individual others and groups as the main addressees for texts and information generated by students. Both groups of respondents put lesser emphasis on a wider public, but still regard it as important (Figure 44). One can assume that text-based communication with superiors and peers is daily business for professionals or other graduates from continuing education. Addressing a wider public is less common, but still important for students in the next 2-3 years.

Compared to these average assessments by all responding students and lecturers, the assessments grouped by individual HEI (Figure 45, Figure 46) do not differ much.

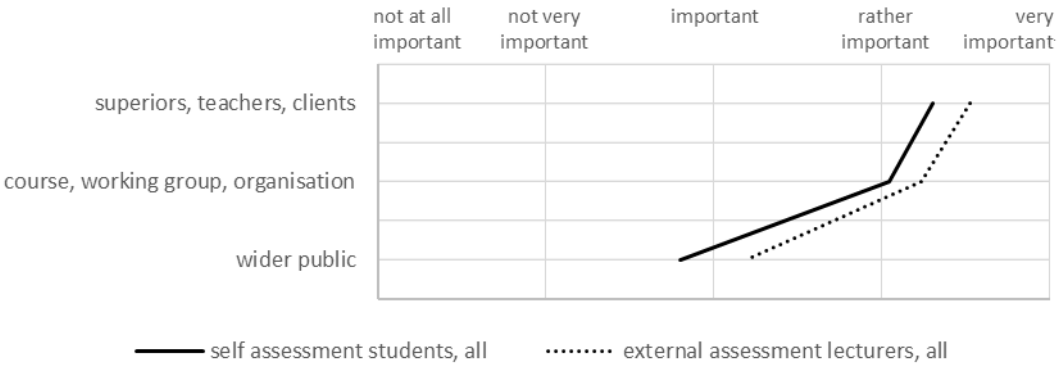


Figure 44 Importance of different audiences of texts for students in the upcoming 2-3 years, all HEIs

Note: students' n=248-250, lecturers' n: 260-266

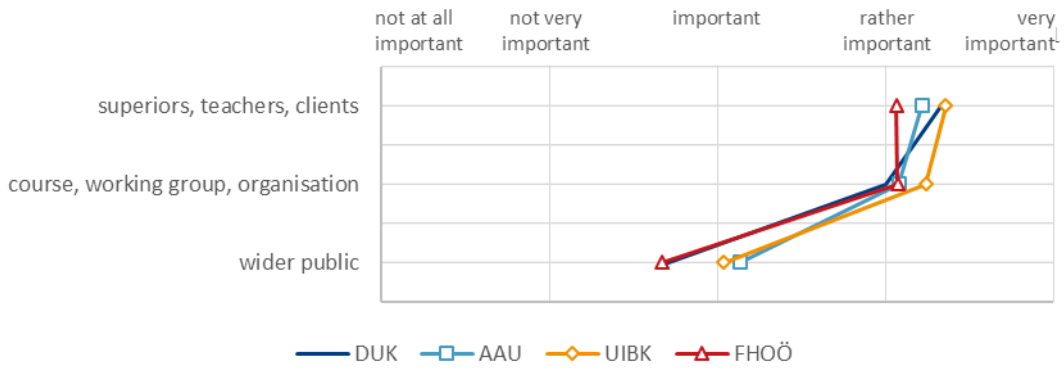


Figure 45 Importance of different audiences of texts for students in the upcoming 2-3 years, responding students per HEI

Note: DUK n=171-173, AAU n=37, UIBK n=25, FHOÖ n=15

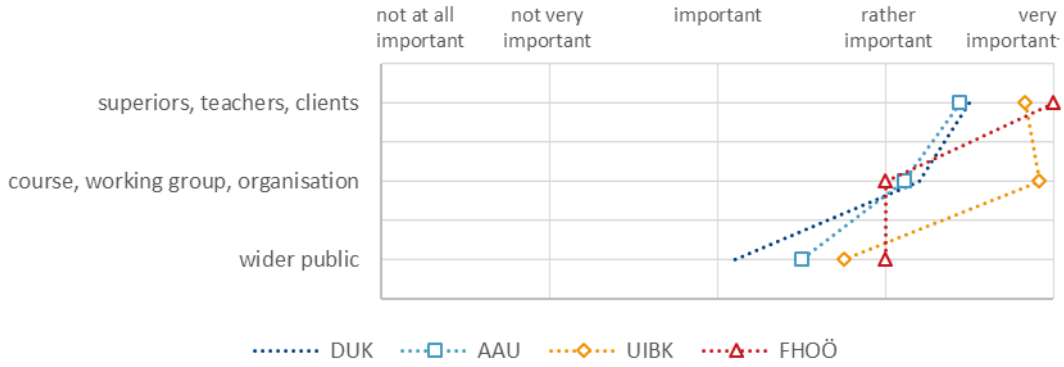


Figure 46 Importance of different audiences of texts for students in the upcoming 2-3 years, responding lecturers per HEI

Note: DUK n=239-245, AAU n=8-9, UIBK n=12, FHOÖ n=1

4.3 Tools for the search of texts

As a result of the digitalisation of the last three decades, academic and/or expert knowledge has become organised in new ways, which also has increased the variety of tools that can be used for the search for relevant texts. We therefore asked our respondents to assess the frequency in which they expect students of continuing education to use selected tools and document platforms in the next 2-3 years. In particular, the following tools and platforms were distinguished: general search engines (e.g., google or google scholar); catalogues of local or national libraries; special databases (e.g., for journals); websites of scientific institutions and/or individual researchers; websites of public institutions or international organisations (e.g., national: Statistik Austria, RIS; international: Eurostat, OECD, UN, etc.); online platforms based on file sharing by authors (e.g., Academia.edu, ResearchGate, ArXiv); our online platforms for pirated copies of scholarly publications.

However, while the first five tools for the search of texts in this list are commonly known, the situation is different for file sharing and pirate platforms. 29.3% of the students and 6.5% of the lecturers do not know file sharing platforms, 60.2% of student and 36.2% of lecturers have never heard about pirate platforms (see Figure 47). These numbers show that lecturers are considerably more aware of these two types of platforms. The large shares of "don't knows" explains the wide range in the numbers of respondents in the following figures.

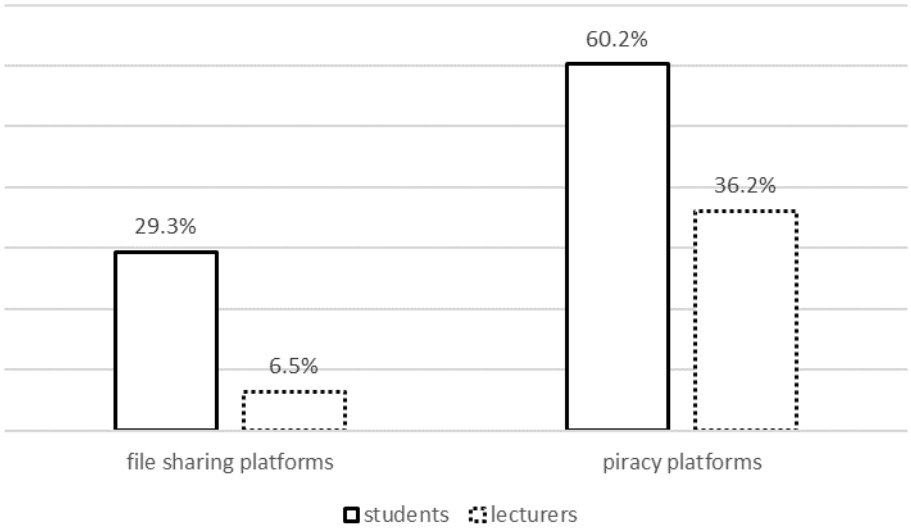


Figure 47 Respondents, who do not know academic file sharing or piracy platforms

Note: students' n=73/150, lecturers' n=17/94

By comparing the mean differences of the ratings by all responding students and lecturers (as exposed in the line chart in Figure 48) in graphical form, one can see that lecturers are slightly pessimistic about students use of library catalogues, and have stronger expectations than students themselves about students use of public institutions websites, file sharing and piracy platforms. However, these are only small differences between the expectations of students and lecturers. Apart from that, the two lines look surprisingly similar: General search engines are expected to be the most commonly used search tools, followed by library catalogues and special databases, closely followed by scientific or public institutions websites. Platforms for file sharing or pirated copies are the least frequently used in this list.

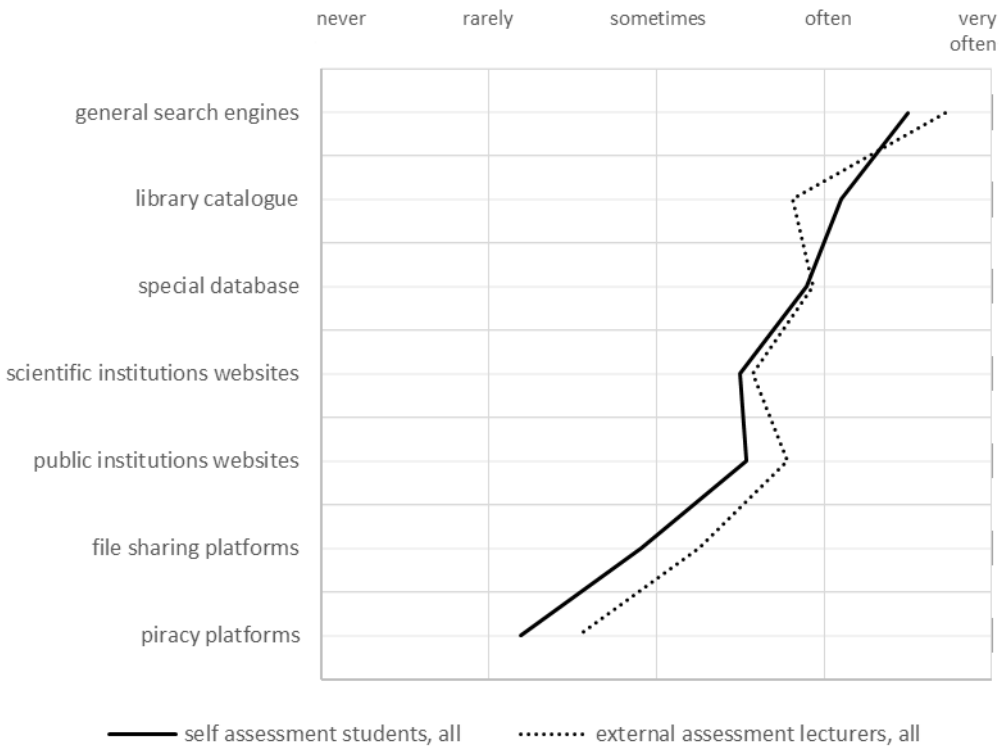


Figure 48 Assumed frequency in selected search tools to be used by students in the upcoming 2-3 years, all HEIs

Note: students' n=99-250, lecturers' n=166-266

Comparing the responses from different HEIs visually, the means of student's responses are very close (Figure 49), while those of lecturers show larger mean differences (Figure 50), even if tendencies look similar.

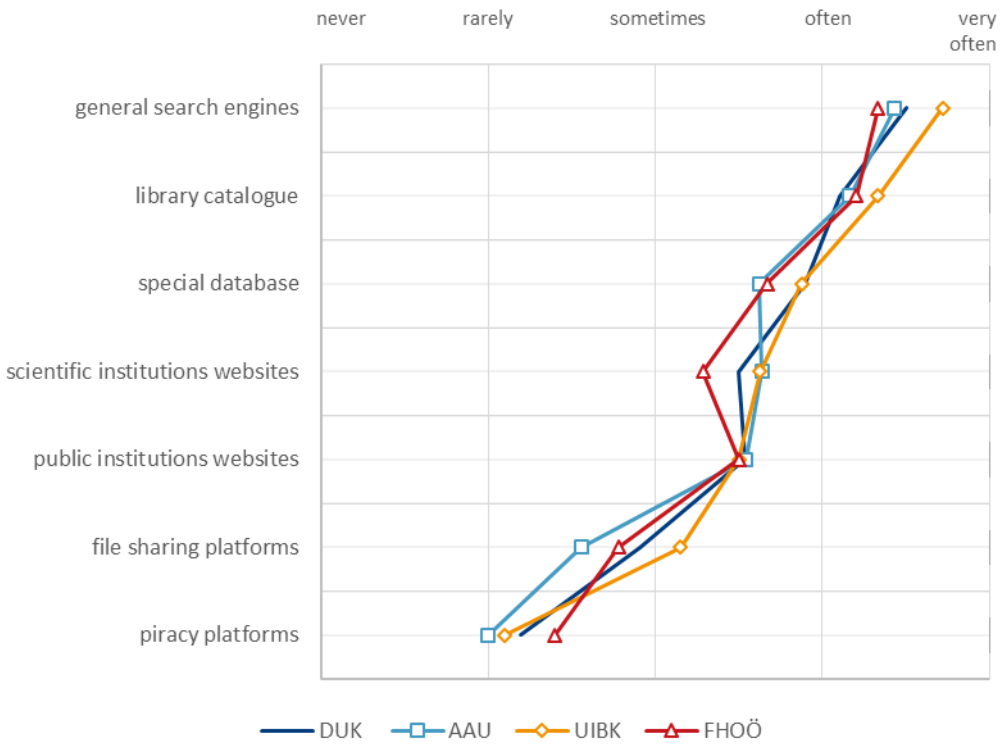


Figure 49 Assumed frequency in selected search tools to be used by students in the upcoming 2-3 years, responding students per HEI

Note: DUK n=72-173, AAU n=12-37, UIBK n=10-25, FHOÖ n=5-15

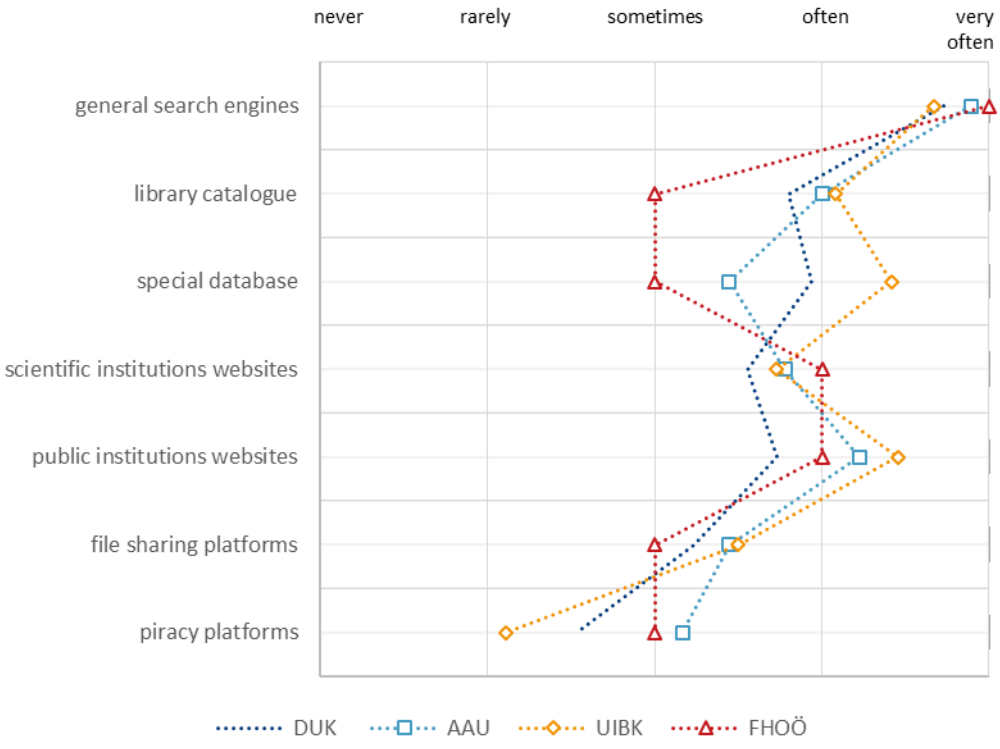


Figure 50 Assumed frequency in selected search tools to be used by students in the next 2-3 years, responding lecturers per HEI

Note: DUK n=150-244, AAU n=6-9, UIBK n=9-12, FHOÖ n=1

4.4 Channels for the acquisition of texts

The next set of items distinguishes different channels for the acquisition of texts. It comprises the requesting/accepting of texts passed on by speakers or colleagues, the borrowing of print holdings from a local library, the download of texts via a local library, the use of interlibrary loans for books or articles via the local library, the purchasing of printed texts (e.g., books, journals), the purchasing of digital texts (e.g., journal articles, e-books), downloading from scientific websites, from public and/or international institutions, from file sharing and from piracy platforms for scholarly texts.

The lines representing the ratings of all responding students and lecturers show the same tendencies (see Figure 51). However, lecturers expected higher frequencies in students' use of almost all channels for the acquisition of texts. Interestingly, lecturers seem to expect that students rely more on (free) downloads via the local library, or from scientific and public institutions, and to invest less in interlibrary loans or purchases. Students' self-assessments make less difference between these channels.

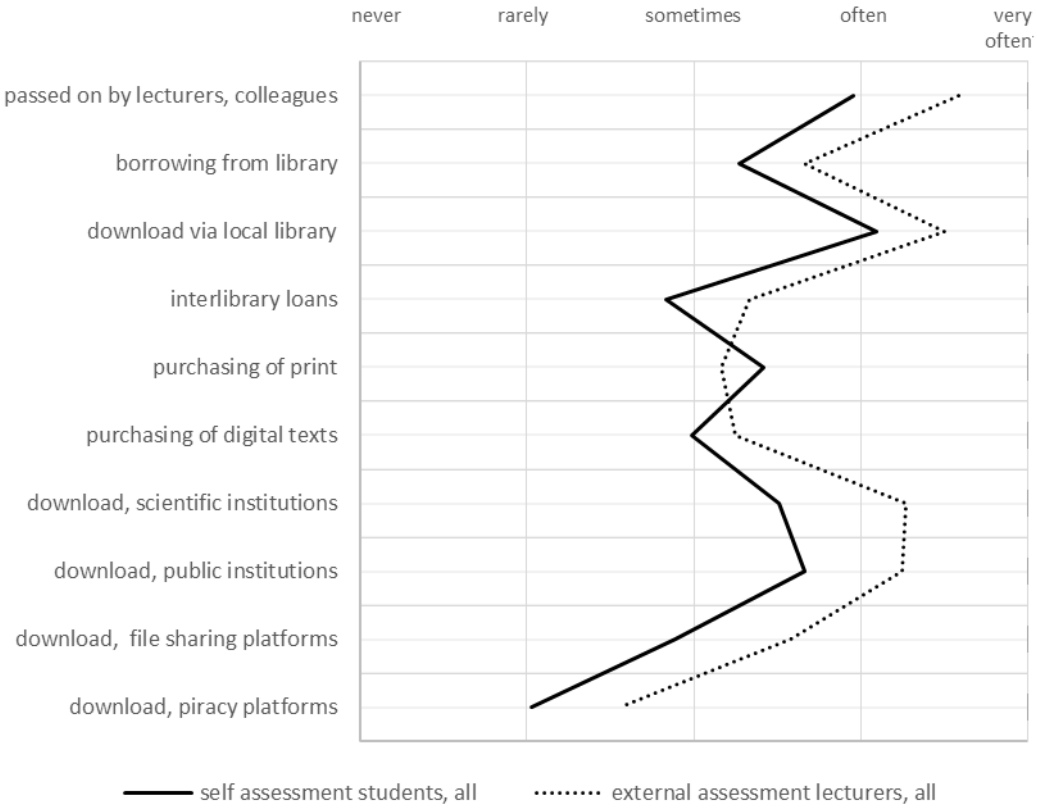


Figure 51 Assumed frequency in selected channels for the acquisition of texts to be used by students in the upcoming 2-3 years, all responding students and lecturers

Note: students' n=104-250, lecturers' n=166-265

The line charts representing the ratings of students (Figure 52) and of lecturers (Figure 53) from the participating HEI are again very close to each other and follow the general tendencies (Figure 51).

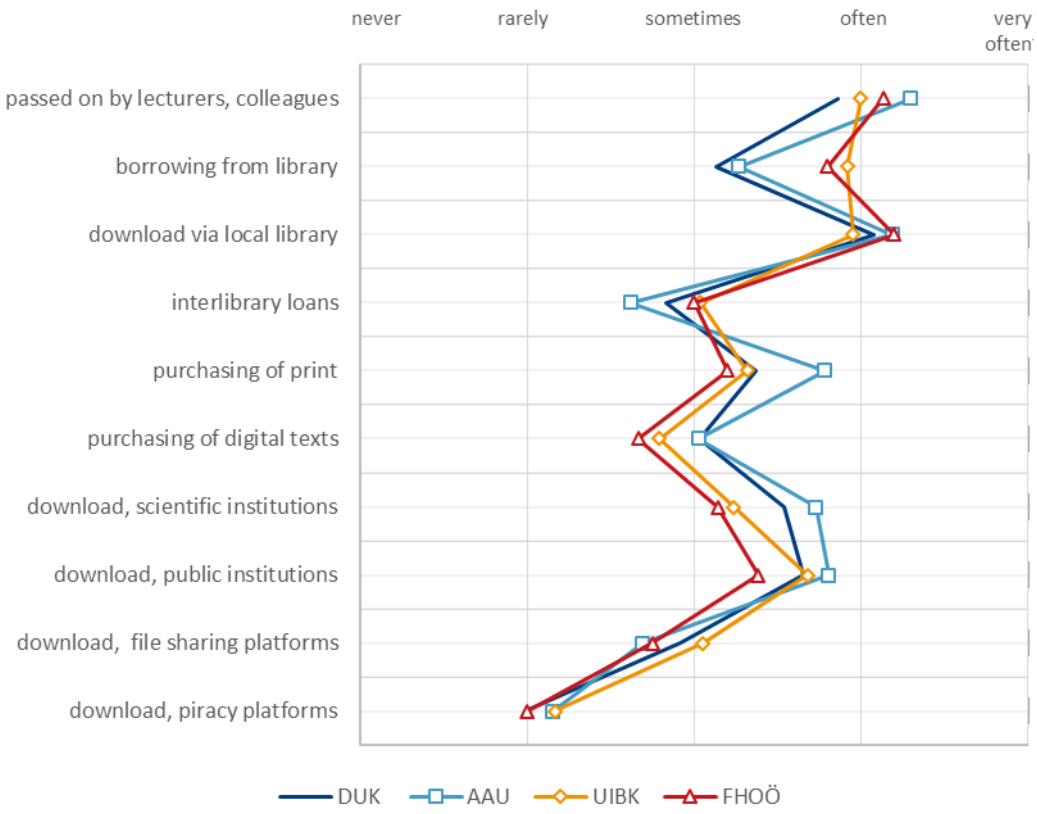


Figure 52 Assumed frequency in selected channels for the acquisition of texts to be used by students in the upcoming 2-3 years, responding students per HEI

Note: DUK n=74-173, AAU n=13-37, UIBK n=12-25, FHOÖ n=5-15

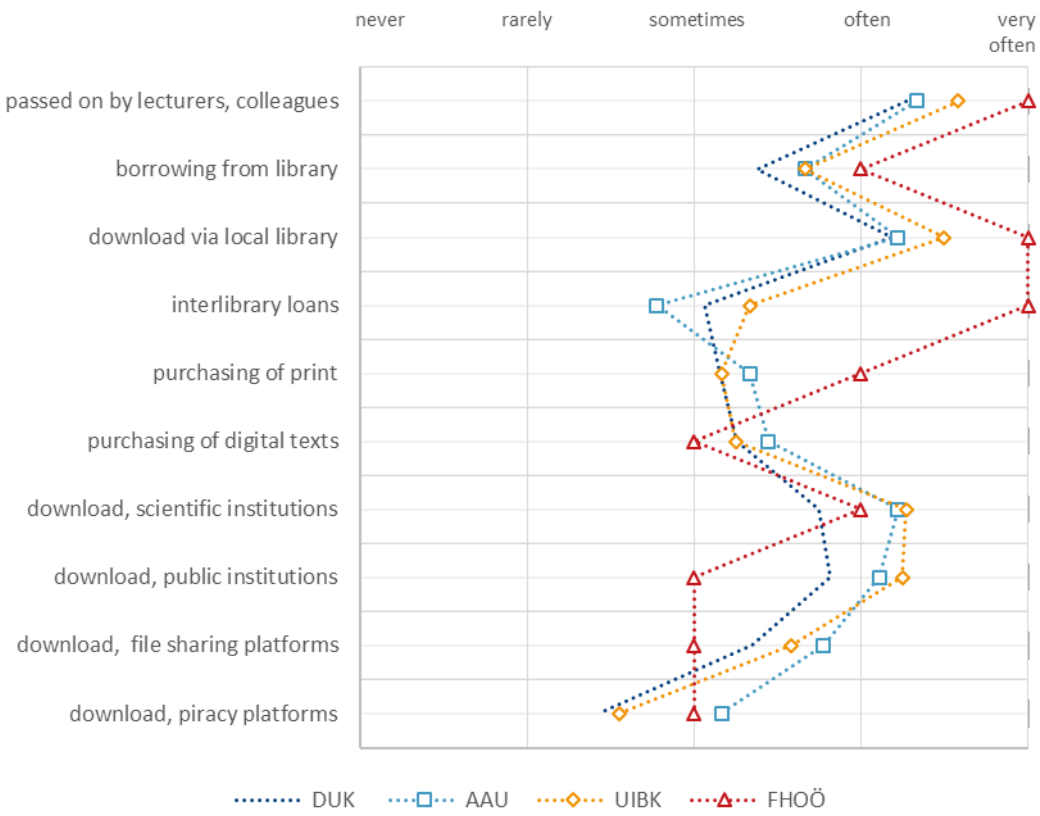


Figure 53 Assumed frequency in selected channels for the acquisition of texts to be used by students in the upcoming 2-3 years, responding lecturers per HEI

Note: DUK n=150-244, AAU n=6-9, UIBK n=9-12, FHOÖ n=1

5 Research literacy needs

Having established an understanding of the contexts in which research literacy is relevant, and the tools that students might use in the next 2-3 years, the survey investigated student's needs for support in five sub-dimensions of research literacy. These five sub-dimensions are searching skills (the ability to search, assess and select academic or professional documents), reading skills (the ability to read, comprehend, and extract information from academic or professional documents), writing skills (the ability to express information, arguments and results in different formats, genres, levels of complexity), distributing skills (the ability to present, share and publish information in different contexts), and collaborating skills (the ability to collaborate and to co-create texts and information). To rate the needs of students in the sets of items per sub-skill, again students have been asked for their self-assessment and lecturers for an external assessment.

5.1 Searching skills

The first of the five sub-skills are searching skills, comprising all skills necessary for searching and selecting academic or professional texts.

In this dimension, the questionnaire asked for the level of need students have to improve different skills in searching for literature, namely the ability to identify the most important search platforms in their field, the ability to distinguish scientific from non-scientific texts, the ability to select concrete objectives and effective strategies for the search of relevant texts, the ability to obtain relevant texts by appropriate means, the ability to organise and store collected texts in a way that can easily be retrieved, and the ability to use literature management software.

All students and lecturers see a clear need to improve students' skills for literature search. (Figure 54) However, lecturers see a much higher need than students themselves do, especially in the first five items, which deal with the search and selection of texts. The difference is less pronounced in the last three items, which deal with the management of selected texts.

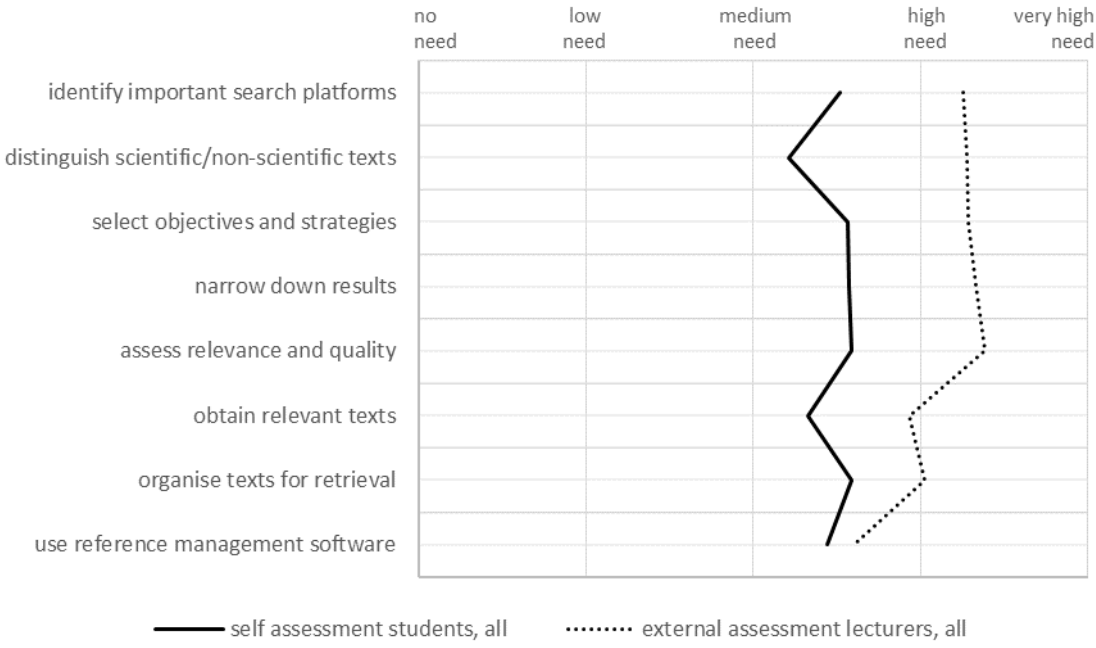


Figure 54 Students' need to improve their searching skills, all students and lecturers

Note: students' n=247-250, lecturers' n=260-266

The means across all institutions are obviously dominated by DUK, which contribute the largest share to this sample. Students from AAU and UIBK see slightly lesser need for improvement, while those from FHOÖ see higher need. (Figure 55) Comparing the responses of lecturers from different HEIs, DUK and AAU are very close to each other, while lecturers from UIBK see slightly lesser need for improvement (Figure 56).

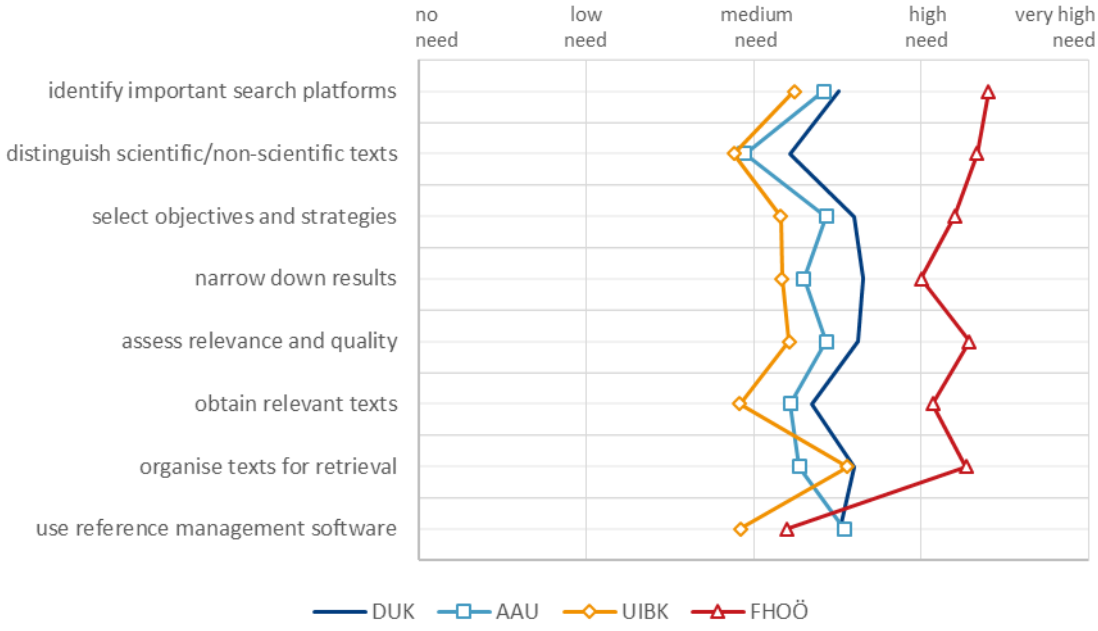


Figure 55 Students' need to improve their searching skills, responding students per HEI

Note: DUK n=171-173, AAU n=37, UIBK n=25, FHOÖ n=15

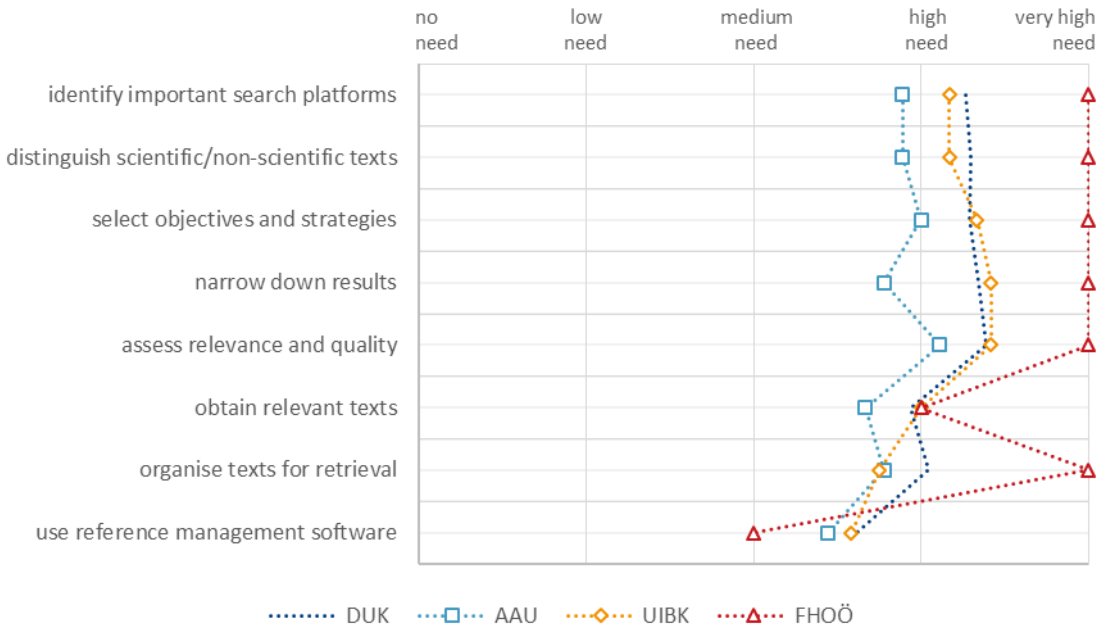


Figure 56 Students' need to improve their searching skills, responding lecturers per HEI

Note: DUK n=238-244, AAU n=9, UIBK n=12, FHOÖ n=1

5.2 Reading skills

Reading skills cover all activities that are necessary for understanding and exploiting academic or professional texts. In this set of questions, the survey asked for the ability to set and pursue clear objectives and strategies for reading individual texts, the ability to find specific information in texts, the ability to identify whole lines of arguments, the ability to assess texts and statements with regard to their relevance to specific questions, the ability to place in a broader context (e.g., author, discipline, genesis, and publication context), the ability to connect the statements and information from different texts, and the ability to document results of the reading process (e.g., paraphrase, quote, excerpt, as well as own comments, ideas, considerations related to the red text).

Again, the mean of all lecturers indicates that lecturers see a much higher need than students themselves do. (Figure 57) The means of responding students (Figure 58) and of responding lecturers (Figure 59) from DUK, AAU and UIBK are very close to each other, while respondents from FHOÖ see a higher need in both cases.

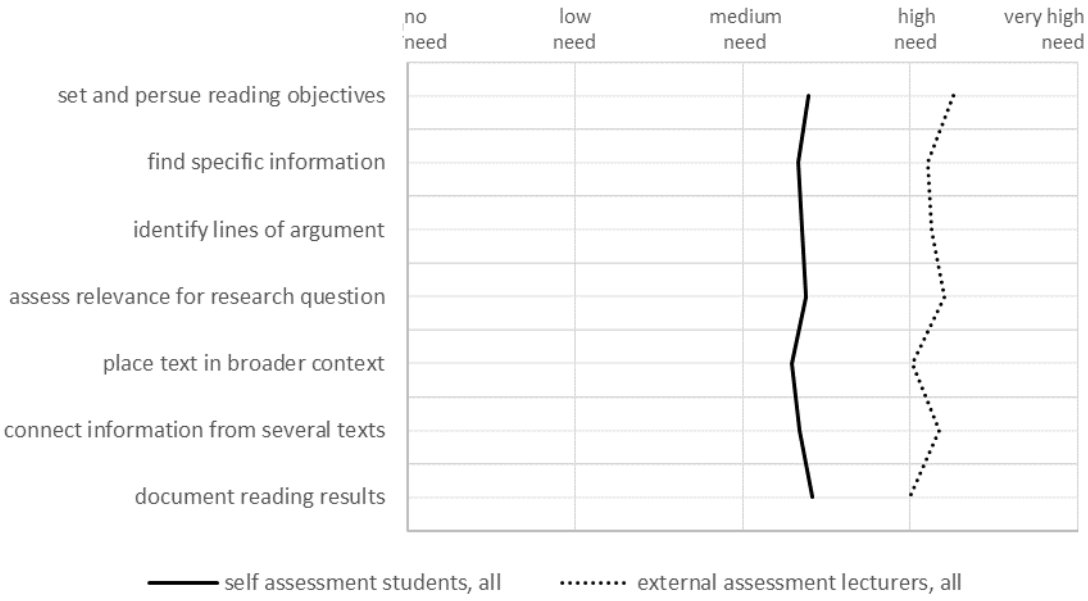


Figure 57 Students' need to improve their reading skills, all students and lecturers

Note: students' n=247-250, lecturers' n=261-267

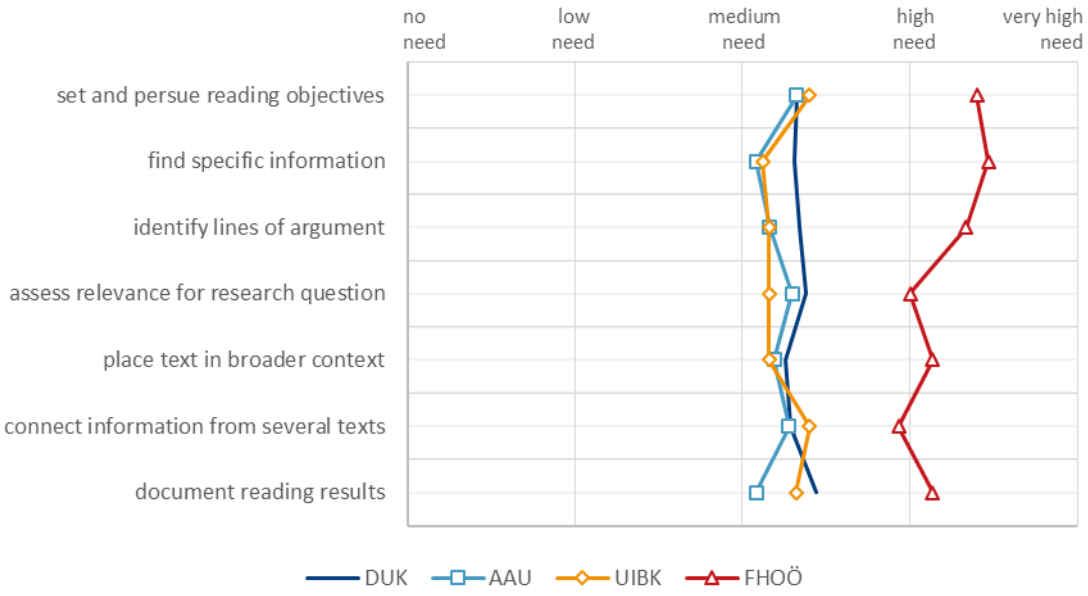


Figure 58 Students' need to improve their reading skills, responding students per HEI

Note: DUK n=170-173, AAU n=37, UIBK n=25, FHOÖ n=15

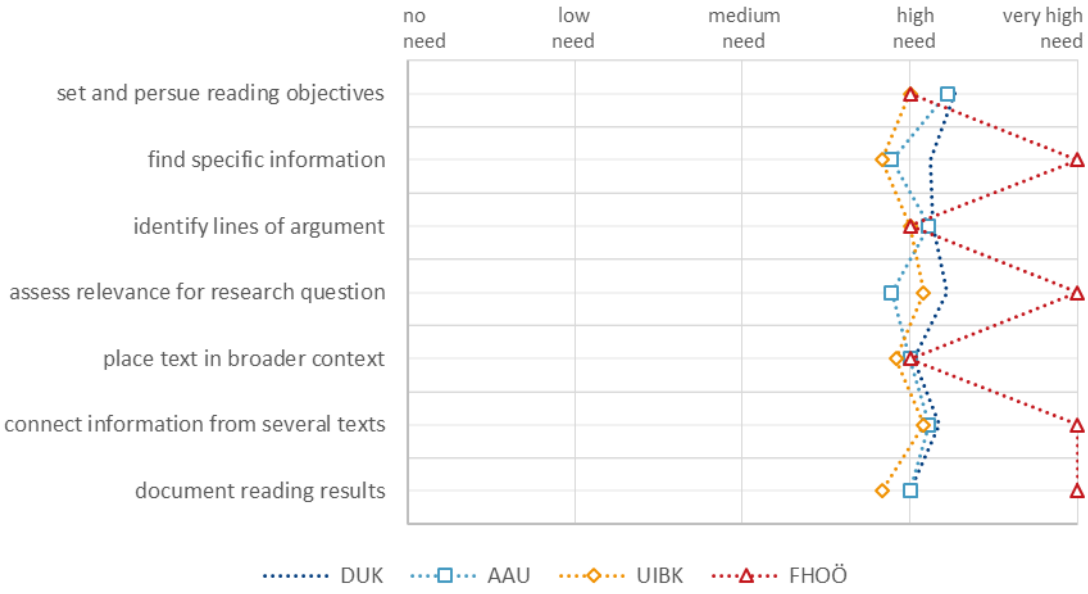


Figure 59 Students' need to improve their reading skills, responding lecturers per HEI

Note: DUK n=239-245, AAU n=9, UIBK n=12, FHOÖ n=1

5.3 Writing skills

Writing skills comprise all activities belonging to the production of academic or professional texts. The questionnaire distinguished between content-related and formal aspects of text production.

The set of items regarding content-related aspects comprises the ability to introduce the topic of a text (e.g., by presenting the starting point, problem description and objective of the text); the ability to formulate the main questions of the text and to isolate the field of investigation (e.g., cases, objects, actors); the ability to make assumptions and theories explicit or to articulate expectations about possible results, statements, products; the ability to describe the methodological approach to answering a question; the ability to present results at the end of a text (e.g., main findings, conclusions, and possible recommendations); and the ability to bring the main elements of the text (objectives, leading assumptions, research questions, methods, results) into a concise form to develop a thread of arguments.

The set of items regarding formal aspects of writing comprise the knowledge about formal requirements of particular texts (e.g., seminar paper, thesis, presentation slides); the ability to produce the articulate the same content in different text formats and lengths; the ability to distinguish between main and secondary aspects of texts; the ability to use clear-cut concepts, categories and generalisations.

The ratings of all responding students and all lecturers show slightly higher needs regarding the content-related abilities than formal aspects of writing (Figure 60). This general tendency also reflects in the comparison of ratings from students and lecturers from different HEIs (Figure 61, Figure 62). Among students, the group of respondents from FHOÖ differ strongly from those of other HEIs, since they state a higher need for writing skills, in particular regarding formal aspects. Among lecturers, the differences are much smaller.

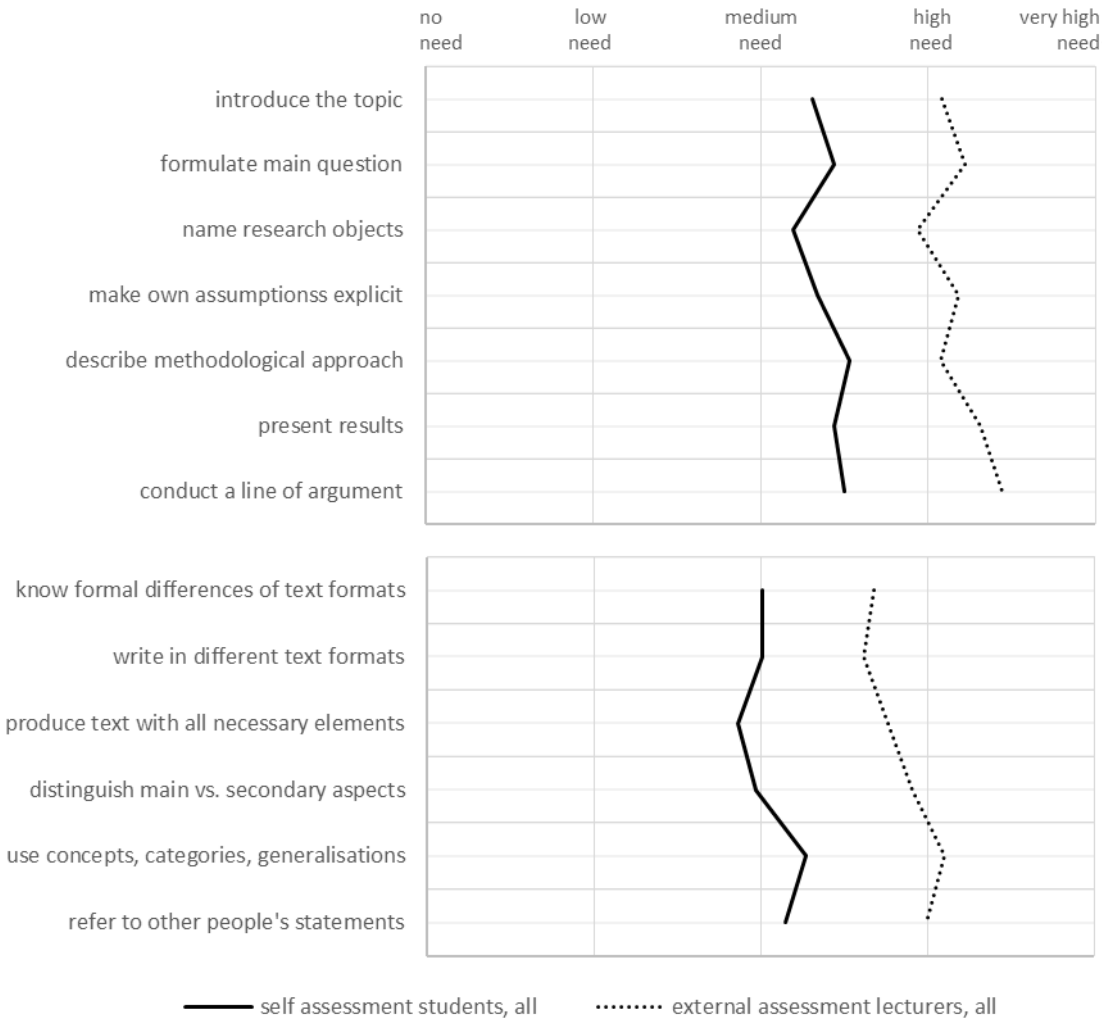


Figure 60 Students' need to improve their writing skills, all students and lecturers

Note: students' n=246-250, lecturers' n=261-267

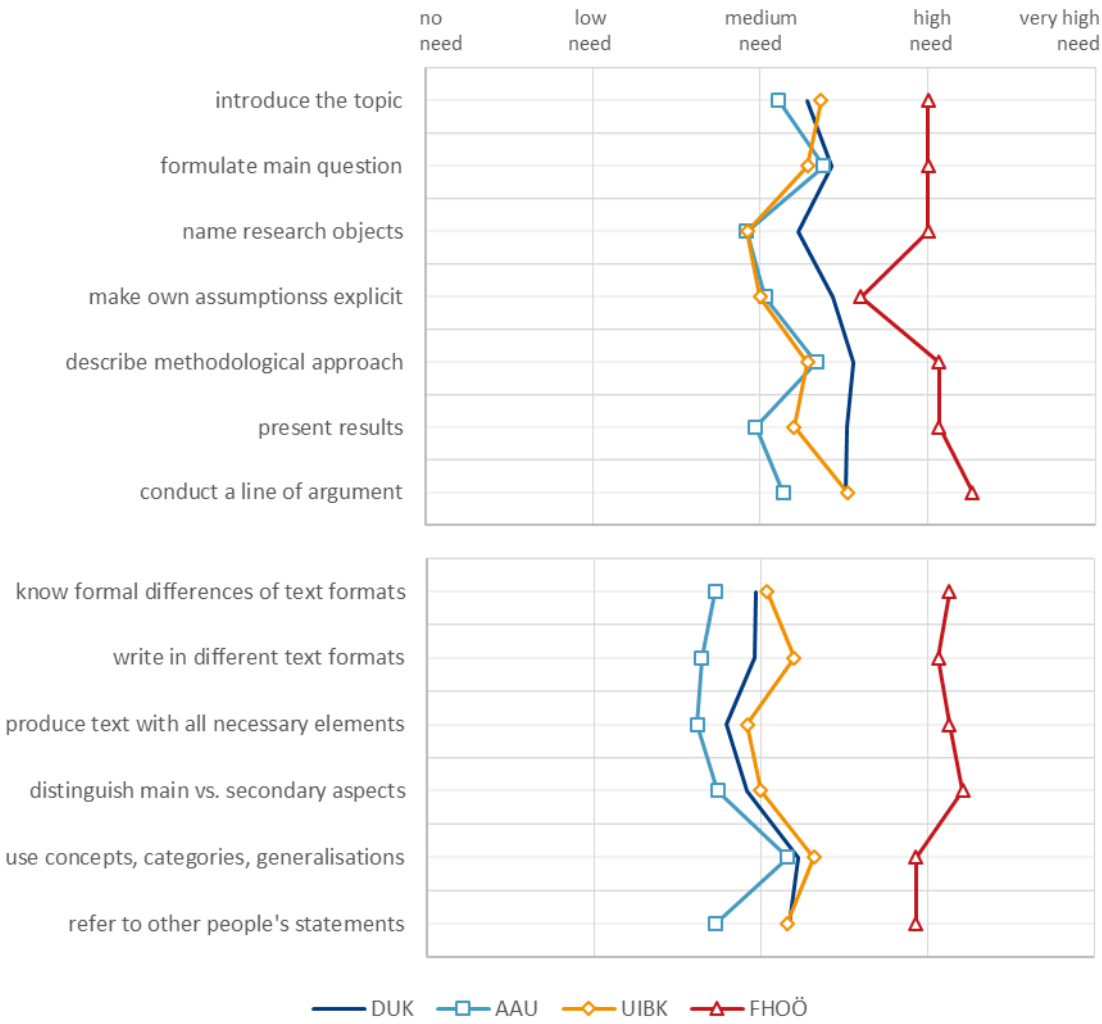


Figure 61 Students' need to improve their writing skills, responding students per HEI

Note: DUK n=169-173, AAU n=37, UIBK n=25, FHOÖ n=15

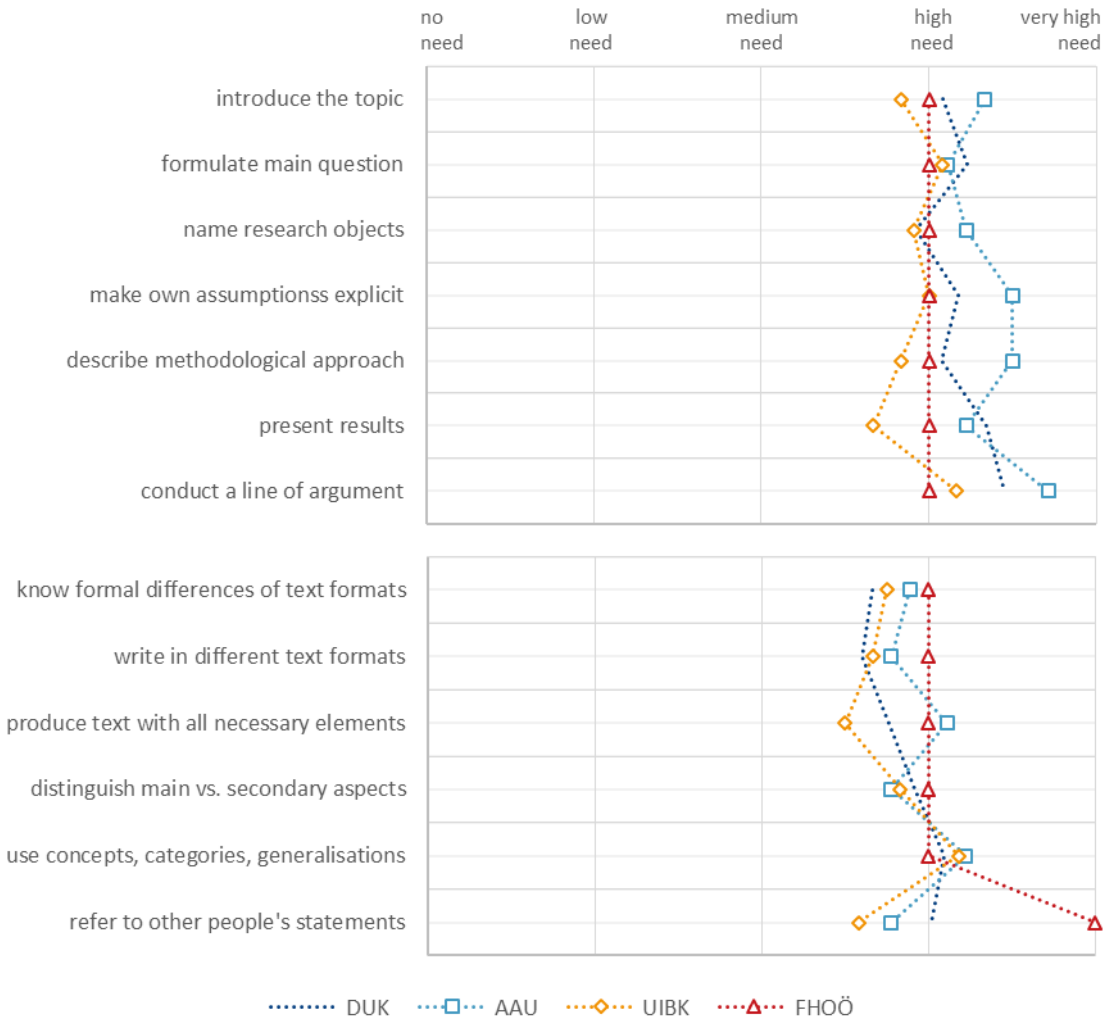


Figure 62 Students' need to improve their writing skills, responding lecturers per HEI

Note: DUK n=239-245, AAU n=9, UIBK n=12, FHOÖ n=1

5.4 Disseminating skills

Digital media have created a wide range of new opportunities to share and publish texts and information. Disseminating therefore has become an important sub-skill of research literacy.

Trying to capture relevant aspects of disseminating skills, the survey questionnaire distinguished the following items: the ability to distinguish between the private sharing and the public distribution of texts and information; the ability to avoid the infringement of third party rights (e.g., copyrights, data protection, trade secrets); the ability to protect one' own rights when passing on texts or information; the ability to assess publishing opportunities with regard to the desired effects; and the ability to assess publishing opportunities with regard to their trustworthiness, quality of service and business conditions.

Students report most of these abilities as equally important. Only in the case of the ability to distinguish between private use and public dissemination, the see less need for improvement. Lecturers have a very similar tendency in their ratings, seeing a higher overall need. They give most importance to the question of infringement of third parties rights. (Figure 63)

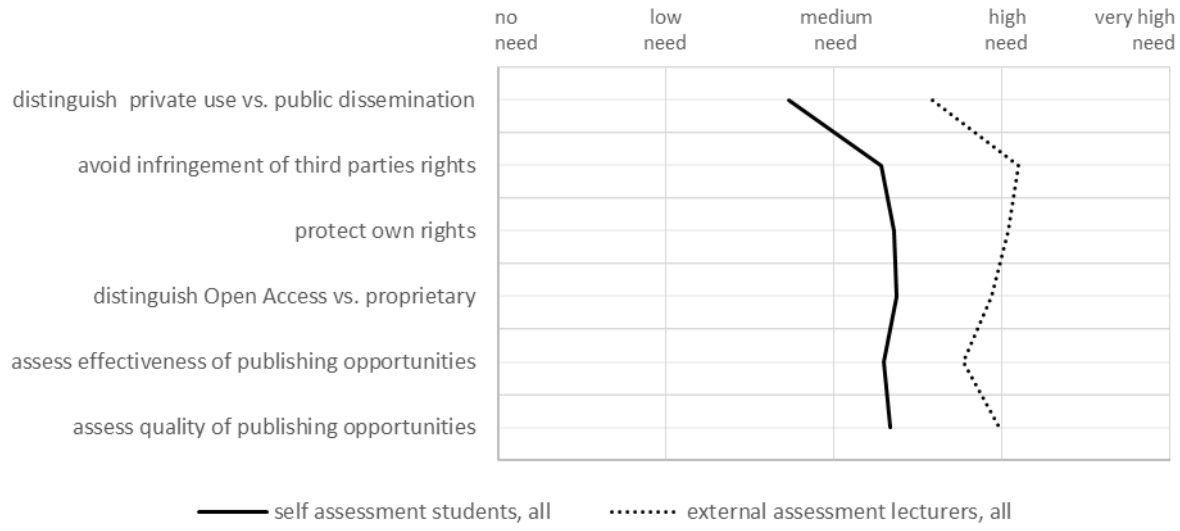


Figure 63 Students' need to improve their disseminating skills, all students and lecturers

Note: students' n=249, lecturers' n=264-266

While the mean of reported self-assessments by students from four different HEIs look very similar (Figure 64), there exist bigger differences between the external assessments from lecturers (Figure 65). While lecturers from DUK see medium to high need for improvement, lecturers from other HEIs see slightly higher need.

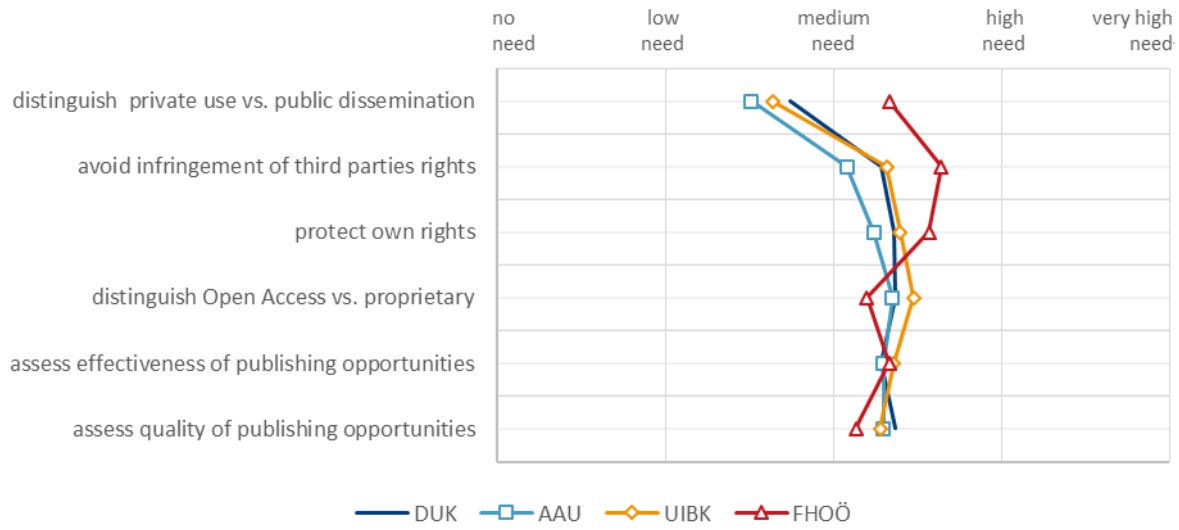


Figure 64 Students' need to improve their disseminating skills, responding students per HEI

Note: DUK n=170-172, AAU n=37, UIBK n=25, FHOÖ n=15

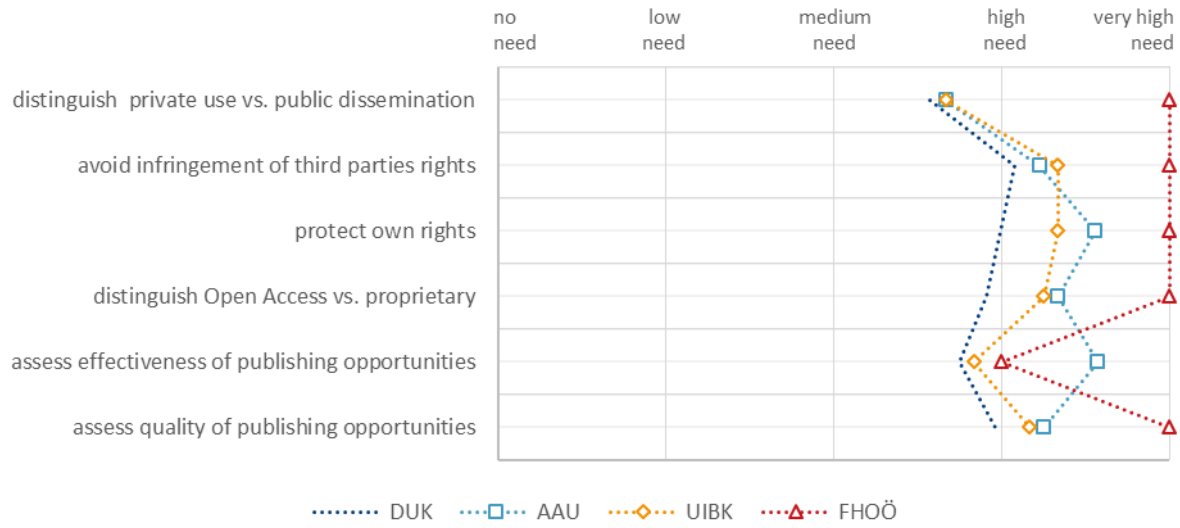


Figure 65 Students' need to improve their disseminating skills, responding lecturers per HEI

Note: DUK n=242-244, AAU n=9, UIBK n=12, FHOÖ n=1

5.5 Collaborating skills

The development of academic or professional texts and information is increasingly becoming a joint endeavour. Therefore, cooperation with other people is becoming more and more important.

The respective set of items comprises the ability to take the perspective of others; the ability to collaborate with people from other disciplines or fields of practice; the ability to set objectives and to organise tasks in a group; the ability to deal spontaneously with unexpected problems; the ability to spontaneously make use of unforeseen opportunities in a collaboration; and the ability to improvise creatively in the collaboration with other people.

In all of these items, the self-assessment of responding students is close to medium need, while the external assessment by all responding lecturers tends to be a little below high need (Figure 66). In both cases, the most important abilities are to cooperate with people from other fields and to organise as teams.

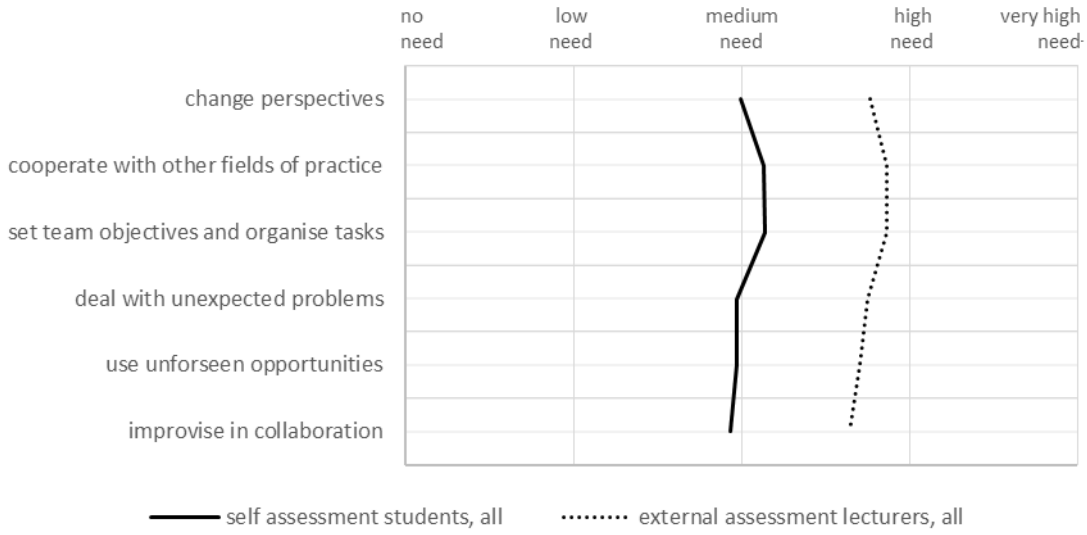


Figure 66 Students' need to improve their collaborating skills, all students and lecturers

Note: students' n=247-249, lecturers' n=264-266

Interestingly, in this set of questions the responses of students from four different HEIs (Figure 67) differ more, than the responses of lecturers (Figure 68). Students from DUK see the (comparatively) least need for improvement in this sub-skill.

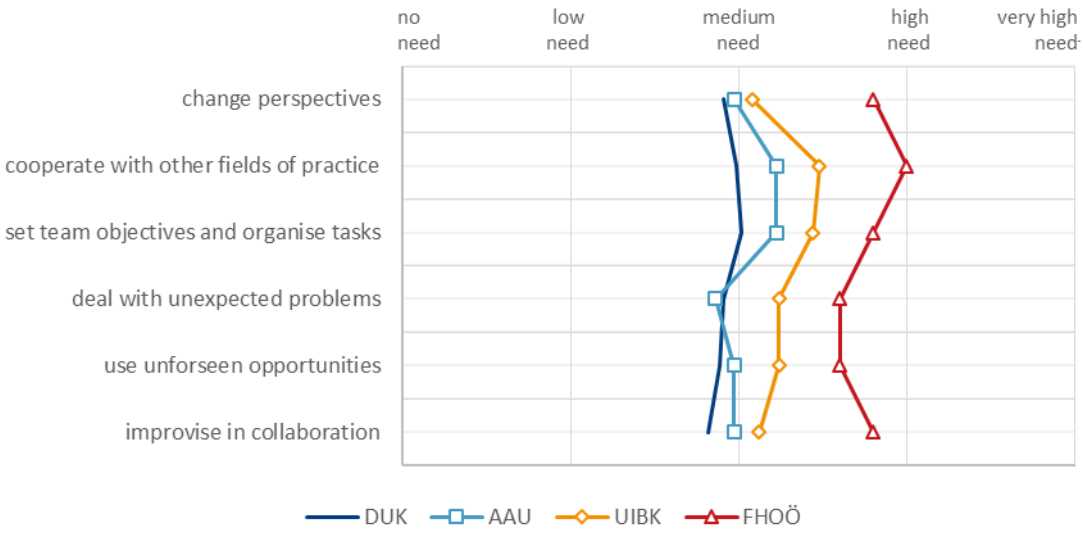


Figure 67 Students' need to improve their collaborating skills, responding students per HEI

Note: DUK n=170-172, AAU n=37, UIBK n=25, FHOÖ n=15

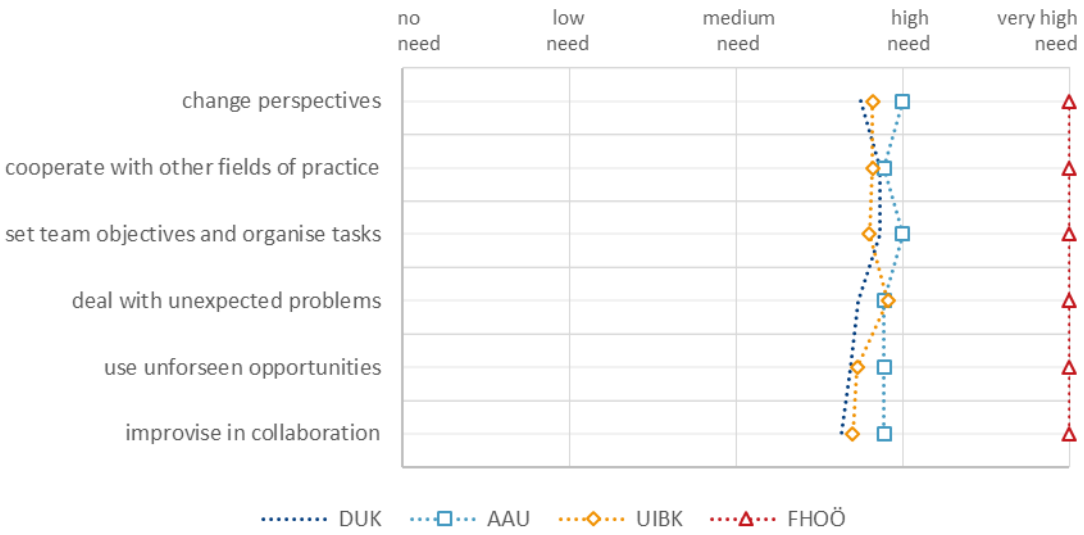


Figure 68 Students' need to improve their collaborating skills, responding lecturers per HEI

Note: DUK n=242-244, AAU n=9, UIBK n=12, FHOÖ n=1

5.6 Aggregated means: Five sub-skills

Above, we have described the five sub-skills of research literacy in detail. Now, we cluster these sub-skills in their meanings, by distinguishing between *searching skills* (the ability to search, assess and select academic or professional documents); *reading skills* (the ability to read, comprehend, and extract information from academic or professional documents); *writing skills* (the ability to express information, arguments and results in different formats, genres, levels of complexity); *distributing skills* (the ability to present, share and publish information in different contexts); and *collaborating skills* (the ability to collaborate and to co-create texts and information). For each of the respective sub-scales, we condensed the means of items to an aggregated mean per sub-scale.

Two general trends are observed at this level of comparison (Figure 69). On the one hand, the two trend lines (which represent the means of self-assessment of students, and the external assessment of students' needs for improvement by lecturers) follow a similar pattern, showing rather high levels of needs, which slightly decrease in the sequence of skills. On the other hand, self-assessments of students and external assessments by lecturers differ in their extents. Students and lecturers agree how to rank the different sub-skills, but they differ in the extent to which they perceive needs for improvements. Lecturers tend to see much higher needs for improvement of students' literacy skills than students themselves do.

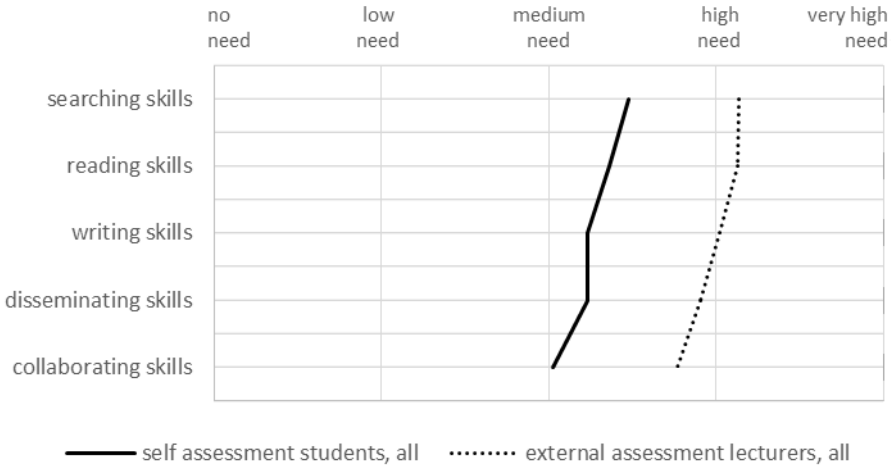


Figure 69 Students' need to improve five sub-skills of research literacy, aggregated, all students and lecturers

Note: students' n=246-250, lecturers' n=260-266

Comparing the assessments at four different HEIs, it is interesting to see that the self-assessments of reporting students (Figure 70) and the external assessments from reporting lecturers (Figure 71) are very similar at DUK, AAU and UIBK, and deviate from the general pattern at FHOÖ.

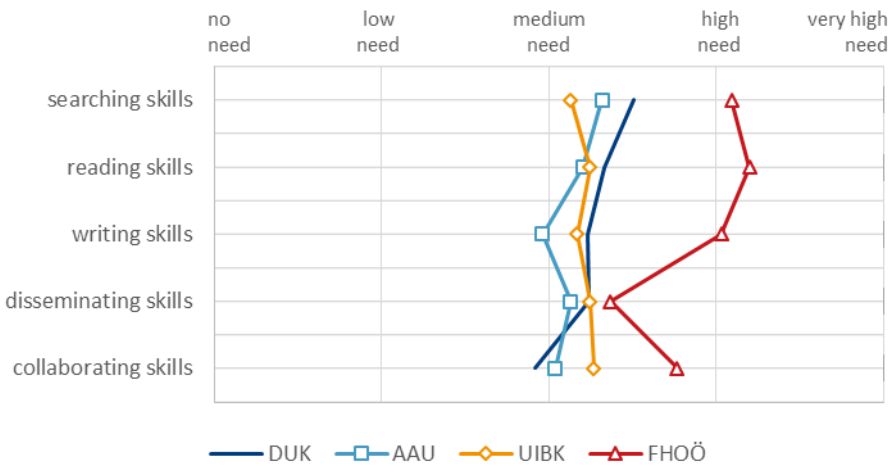


Figure 70 Students' need to improve five sub-skills of research literacy, aggregated, responding students per HEI

Note: DUK n=168-173, AAU n=37, UIBK n=25, FHOÖ n=14-15

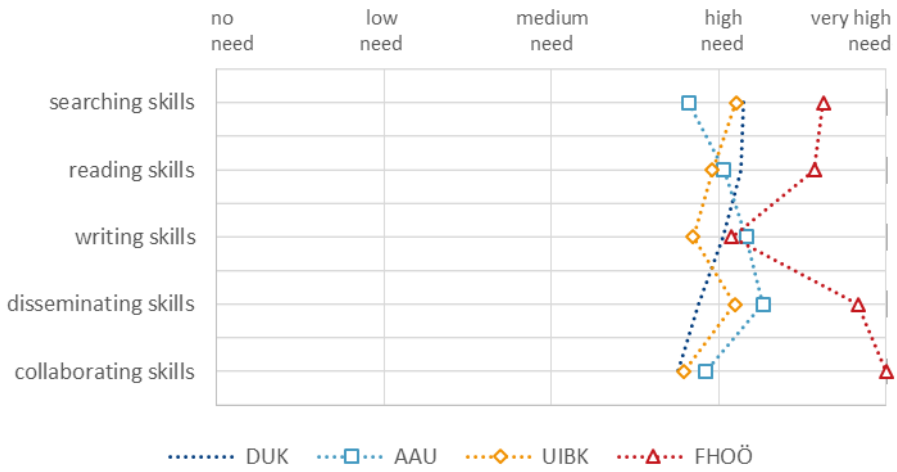


Figure 71 Students' need to improve five sub-skills of research literacy, aggregated, responding lecturers per HEI

Note: DUK n=238-246, AAU n=9, UIBK n=12, FHOÖ n=1

5.7 Aggregated means: Comparison by prior educational attainment

To assess the effect of different educational backgrounds on students' need for improvement of research literacy, we directly asked lecturers, if they see differences in the level of needs between students with higher education degree (bachelor or above), students with formal higher education (HE) entrance qualification (e.g., Matura or similar), and students without such a formal higher education (HE) entrance qualification. With respect to students' self-assessment, we grouped the answers along demographic data (=reported prior educational attainment).

As expected, lecturers made a clear difference between these groups, suggesting that a lower level of prior educational attainment leads to a higher need for improving literacy skills. (Figure 72) In any case, lecturers see more than just a medium need for improvement with HE graduates already. Students also see need for improvement. Interestingly, the variety of self-assessments between different educational groups is less pronounced than expected.

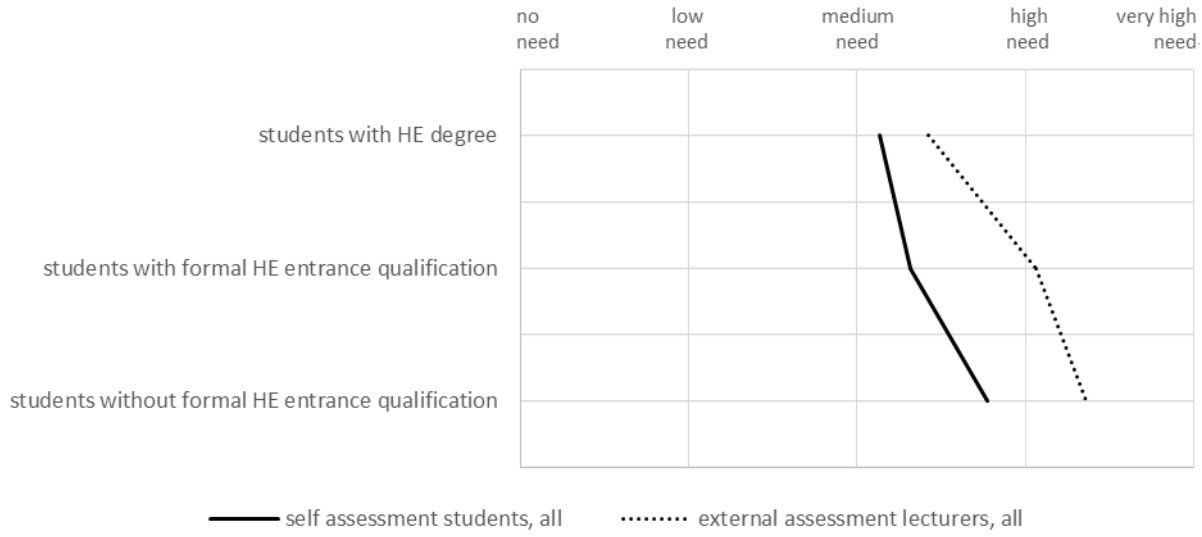


Figure 72 Students' need to improve their research literacy by prior educational attainment, aggregated means, all students and lecturers

Note: students' n=241 (with HE degree n=144, with HE entrance qualification n=75, without HE entrance qualification n=22), lecturers' n=260-263

Analysing the comparison of self-assessments of students from different HEIs, it is important to note, that from UIBK no students without formal HE entrance qualification reported to the survey. (Figure 73) However, lecturers from UIBK still reported their assessments of needs for all three groups of students (Figure 74). Again, the patterns look very similar, apart from the response of one single lecturer from FHOÖ.

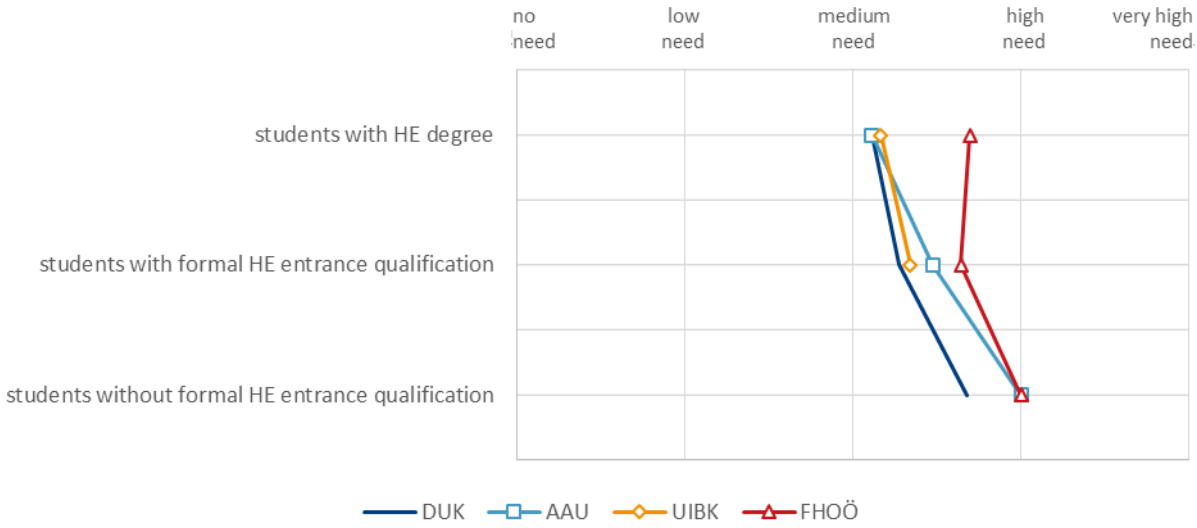


Figure 73 Students' need to improve research their research literacy by prior educational attainment, aggregated means, responding students per HEI

Note: DUK n=169, AAU n=34, UIBK n=24, FHOÖ n=14

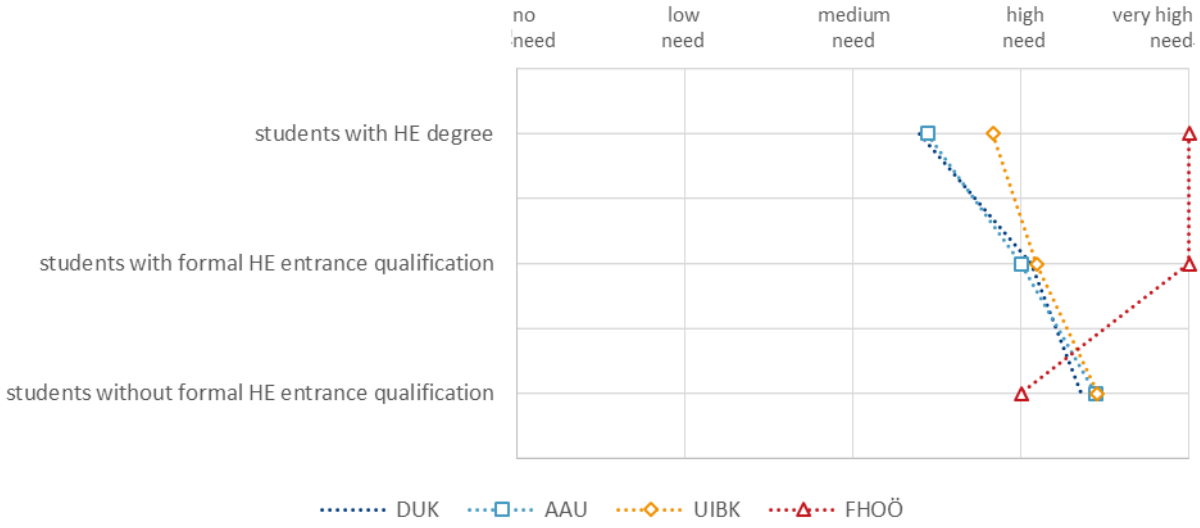


Figure 74 Students' need to improve their research literacy by prior educational attainment, aggregated means, responding lecturers per HEI

Note: DUK n=238-241, AAU n=9, UIBK n=12, FHOÖ n=1

5.8 Imparting research literacy

In a separate part of the survey, lecturers were asked to assess two sets of questions, one dealing with their own needs for support in imparting research literacy to their students, the second dealing with different measures for imparting research literacy.

Since the survey distinguished five sub-skills of research literacy, lecturers were asked to assess their own need for support in imparting each of these sub-skills to their students. On average across all respondents, lecturers see about medium need for support in their own teaching. (Figure 75)

However, while lecturers from DUK and UIBK are close in this assessment, those from AAU see a higher need for support, in particular with imparting searching, reading and writing skills.

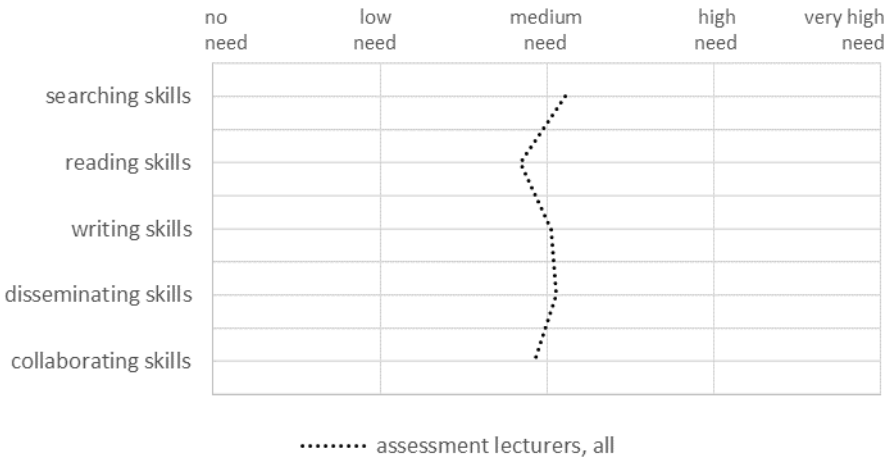


Figure 75 Lecturers' need for support for imparting five sub-skills, all lecturers

Note: lecturers' n=265-268

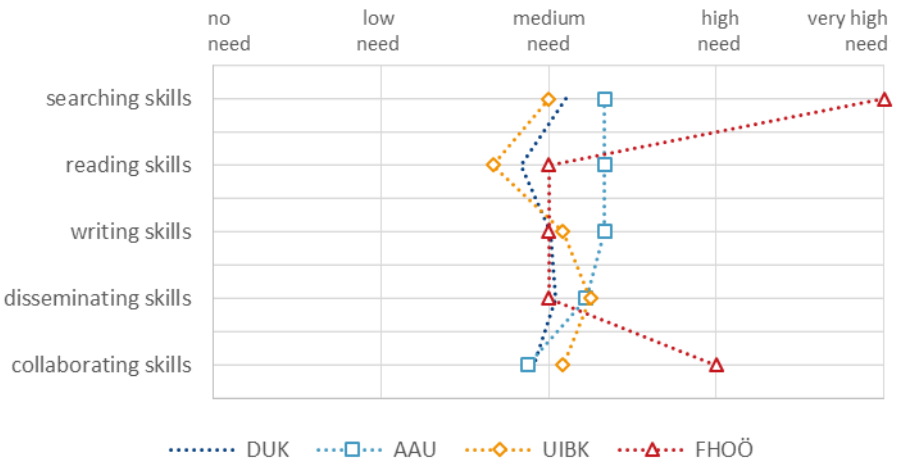


Figure 76 Lecturers' need for support for imparting sub-skills, responding lecturers per HEI

Note: DUK n=243-246, AAU n=9, UIBK n=12, FHOÖ n=1

The survey also tried to assess a range of measures for imparting research literacy, which are beyond the individual skills of lecturers, namely the establishment of research literacy as an explicit educational goal of the curriculum (and part of the qualification profile), the continuous and coordinated transmission of research literacy throughout the entire course of studies, the transmission in specialised courses, the transmission in content related courses, the transmission in extra-curricular offerings (without ECTS); and the involvement of central support unites (e.g., library, learning services) in the transmission of research literacy.

As can be seen in the following line chart for all lecturers (Figure 77), highest level of importance was given to research literacy as a general goal of a curriculum and for continuous transmission throughout the course of studies. Still rather important is the transmission of research literacy in specialised courses.

However, looking at the comparison of these assessments from different HEIs, these assessments vary a bit. While DUK dominates the average with its large share of respondents, lecturers from UIBK give slightly higher importance to the first three measures, while lecturers from AAU give lower importance to measure two and three.

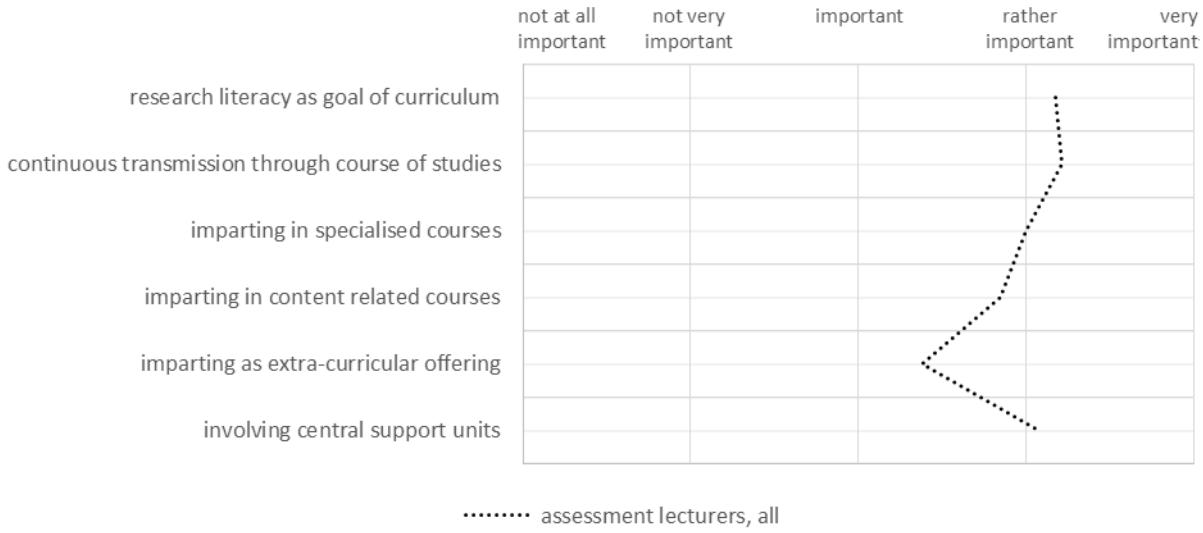


Figure 77 Importance of different measures for imparting research literacy, all lecturers

Note: lecturers' n=265-267

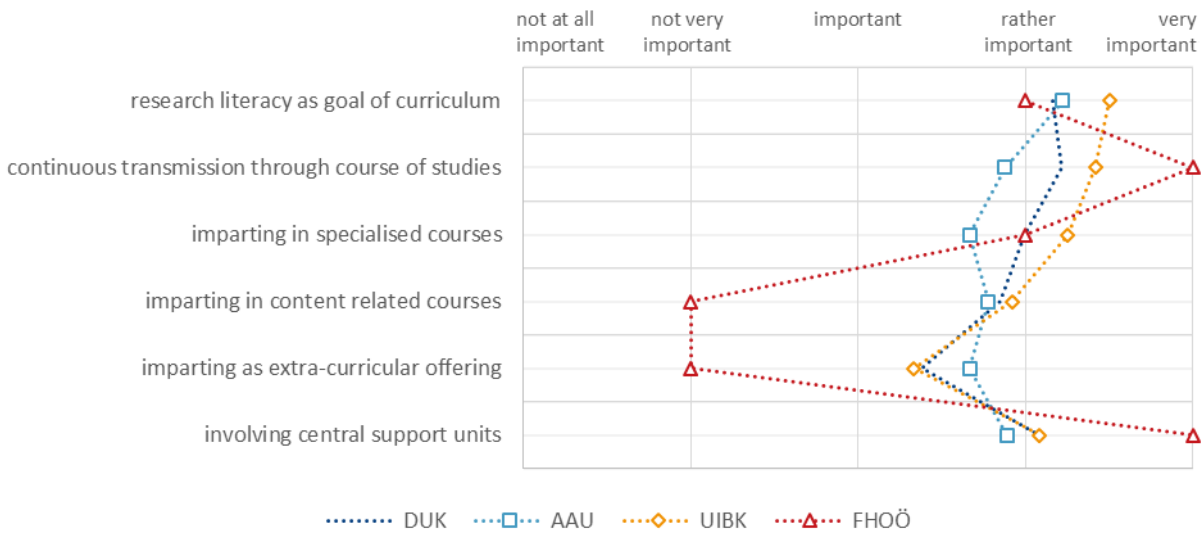


Figure 78 Importance of different measures for imparting research literacy, lecturers per HEI

Note: DUK n=243-245, AAU n=9, UIBK n=12, FHOÖ n=1

6 Summary and conclusions of the comparative study

At earlier stages of the ReaLiCE project, we developed a concept of research literacy, which comprises five sub-skills, namely searching skills, reading skills, writing skills, distributing skills and collaborating skills. The concept was operationalised by developing distinct sets of items for each of these sub-skills. Two complementary survey questionnaires were based on these sets of items, which focused on the needs of students to improve these skills, one for the self-assessment of students, the second for the external assessment by lecturers. These questionnaires also comprised sets of questions regarding the assumed research environments of students for dealing with academic and professional texts, and sets of questions to gather demographic data.

The survey was conducted at four different HEIs in Austria, in 2019 at Danube University Krems (DUK), and in 2020 at Alpen-Adria Universität Klagenfurt (AAU), at University of Innsbruck (UIBK), and at Fachhochschule Oberösterreich (FHOÖ). The following paragraphs connect and compile the findings from this comparative study.

Sample demographics

DUK provided by far the largest amount of responses from students (174) and lecturers (247) to the overall samples of both groups, followed by AAU (37/9), UIBK (25/15) and FHOÖ. Given this large share from the samples (69.3%/90.8%), it is obvious that DUK's share dominates the mean results in both groups. However, it is interesting to see that in most institutional comparisons the responses do not differ very much, at least not between DUK, AAU and UIBK. Only FHOÖ's results differ a little more from those of other institutions, at least in some cases.

Demographics could be an explanation for this difference between FHOÖ and other HEIs. While the majority of responding students from other HEIs already have a HE degree, only 13.3% of respondents from FHOÖ have one. Only 25.0% of responding students from FHOÖ are enrolled in Master programs, while the respective share of respondents from UIBK is 40.0%, from AAU 94.1% and from DUK 95.2%. This may explain why respondents from FHOÖ tend to see a comparatively higher need for improvement in research literacy skills.

Research environments

The first four sets of questions addressed the relevance of different research contexts for dealing with academic or professional texts, about potential addressees or audiences for self-produced texts, about tools for the search, and about channels for the acquisition of academic or professional texts. In all four sets, the period has been limited to the next 2-3 years. In all four sets of questions, the ratings of responding students and lecturers tend to be very close to each other.

Both students and lecturers regard academic contexts as the most important for sharing texts, closely followed by professional contexts, which indicates that working with texts is not just an academic affair. Compared to that, private contexts or civil society are regarded as less important.

Similarly, the most important addressees for texts have been superiors, teachers or clients, closely followed by colleagues in courses, working groups or organisations. These results confirm the importance of written communication in the workplace. The audience of a wider public was rated as important, but not to the same extent as the other two options. Addressing a wider public can be of relevance for academic or professional communication.

General search engines are in the sole lead among the platforms most frequently used for searching academic or professional literature, closely followed by library catalogues and special databases, and

websites from research or public institutions. Platforms for the file sharing by academic authors or platforms for the distribution of pirated copies of academic texts are often not known and less frequently used.

Different channels for the acquisition of texts are another characteristic element for the research environment of students, scholars and professionals. A frequently used channel is the sharing of text by speakers or among colleagues. Among library services, downloads via the local library are more common than borrowing from libraries or interlibrary loans, which is a clear sign for the growing importance of digital library services. Both self-assessments by students and external assessments by teachers confirm that students purchase print or digital texts, but more frequently download materials from scientific or other public institutions. This last result highlights the importance of freely available Open Access publications by trusted institutions. Universities are among these institutions and have a responsibility as publishers and providers of trustworthy academic publications.

Students' need to improve their research literacy skills

The comprehensive concept of research literacy has been split up into five sub-skills, by distinguishing between searching skills (the ability to search, assess and select academic or professional documents); reading skills (the ability to read, comprehend and extract information); writing skills (the ability to express information, arguments and results in different formats, genres, levels of complexity); distributing skills (the ability to present, share and publish information in different contexts); and collaborating skills (the ability to collaborate and to co-create texts and information). To operationalise these sub-skills, a range of items and respective questions has been developed.

By aggregating the means of all items within a set of question to a condensed mean per sub-skill, it is possible to generate an overview on the assessments of students and lecturers about the needs of students to improve their research literacy skills. Several observations can be made at this level of analysis. The two trend lines, which represent the means of all students and all lecturers look very similar: the level of need for improvement declines slowly, starting from searching skills with, declining gradually with reading, writing, disseminating and collaborating skills. The range of decline is narrow: students' self-assessments starts in the middle between and high need, and declines to middle need, external assessment by lecturers starts a little above high need and declines to a little below high need. Interestingly, the assessments of students and lecturers differ more strongly than they had in the prior section on research environments. Both groups of respondents see a need for students to improve their research literacy skills, but lecturers generally see a considerably stronger need than students themselves do.

Comparing the trend lines of responses from different HEIs, these trend lines look remarkably similar between DUK, AAU and UIBK. Only the responses from FHOÖ indicate significantly higher needs in some of the sub-skills, which probably has to do with the demographic composition of the group of respondents from FHOÖ. Overall, the need to improve students' research literacy skills could be confirmed in all four HEIs.

For the purpose of analysis, we additionally analysed responses according to the prior educational attainment of students. For this purpose, we formed three different groups: students who already have a higher education degree, students who have a higher education entrance qualification as their highest educational attainment, and students who do not have a higher education entrance qualification. As expected, the need for improvement was assessed as lowest for students with a higher education and highest for students without a higher education entrance qualification. However, the difference between the three groups was not very big, neither in the self-assessment of students, nor in

the external assessment by lecturers. The improvement of research literacy skills is of relevance for all groups of students, even for those who already have an academic degree.

Imparting research literacy skills to students

Two sets of questions dealt with issues regarding the imparting of research literacy skills to students.

First, lecturers were asked about their needs for support in imparting the five sub-skills of research literacy to students. Among all responding lecturers, the average assessment was medium need for support. Even if there are some smaller differences between HEIs (e.g., lecturers from AAU have slightly more than medium need for support), one can assume that can use some support, but also regard themselves as reasonable competent.

Second, lecturers were asked to assess the importance of a range of different measures, which all have organisational implications, such as making research literacy a general goal of the curriculum and an ongoing task throughout the entire course of studies. The mean assessments from all responses have been close to rather important in most of these items, even if there have been small, but interesting differences between the mean responses from individual HEIs.

Comparing the results from these two sets of items, it becomes clear that imparting research literacy skills cannot be left in the individual responsibility of lecturers. It is not just a question of individual competencies of lecturers, but more a question of organisational decisions to put research literacy high on the list of priorities of HEIs.

Appendices

Appendix A1: Guidelines for systematic review

Following guideline and inclusion/exclusion criteria were used during the key word search, abstract and full text review.

objectives	• To identify the concepts and area of competencies related to research literacy in continuing education • Substantiate and further develop the draft concept of research literacy • In case no study was found regarding research literacy in adult / continuing, we will focus on the higher education
research questions	1) How is the concept of "research literacy" defined in the literature? 2) What types of studies exist on research literacy that can be related to continuing/higher education (and/or professional occupations)? 3) Which sub-literacies, skills and competencies can be ascribed to research literacy? 4) Which measurement tools exist in the literature to study research literacy? How is research literacy measured? 5) Which theories and concepts are used to study research literacies? 6) Which disciplines, fields and actors deal with questions of research literacy?
list of key words	• #1 continuing education, adult education, postgraduate education, further education, non-formal education, adult training, adult education • #1a: higher education, university, college • #2: research literacy, academic skill*, academic literacy*ies, research skill*, academic competencies
list of databases	Web of Science

Systematic review guidelines

criterion type	inclusion criteria
topic	research literacy, academic literacy studies focused on continuing education, adult education, post graduate education, or higher education NOT: study skills, learning skills, generic skills, lifelong learning, academic writing, information literacy, academic writing, academic reading, media literacy
recency (dates)	2015-2020
age-range/sample	continuing education/university students/new entrants/post graduate education,
geographical spread/ language	English
research base	All empirical studies, (theoretical, quantitative, qualitative, mixed, case,)
type of publication	Peer-reviewed articles, book chapters, project reports, thesis, conference proceedings

Inclusion criteria for ReaLiCE systematic review

Appendix A2: List of articles included in the full text review

Out of 857 scientific articles, that have been found by key word search in Web of Science for the year 2015-2019, a selection of 72 publications has been analysed in a full text review. The following information was extracted from each article: name of the author(s), year of publication, country, the purpose, type of publication, research design, data collection methods, definition of key concept, key skills, measurement tools/scales used, theories adopted, concepts adopted, and discipline/area. Not all of the articles yielded all the necessary information.

A list of the 72 articles included in the full text review, as well as the extracted information is presented in the table on the following pages.

Abstract #	Publication	Authors	Recency (Year)	Country	Type of Publication	Research design	Data Collection Method/s	Concepts	Discipline / Area
17	Academic literacy, a barrier to learning? The views of engineering students	Magda Pinheiro, M. Lourdes Dionísio, Rosa M. Vasconcelos	2016	Portugal	Article	Quantitative	Questionnaire (likert-type)	academic literacy/-ies	engineering
20	What academics really think about information literacy	Stebbing, D., Shelley, J., Warnes, M. and McMaster	2019	UK	Article	Qualitative	Semi-structured	information literacy	
22	Academic literacy of South African higher education level students: Does vocabulary size matter?	Déogratias Nizonkiza, Tobie van Dyk	2015	South Africa	Article	quantitative	test with students	academic literacy, academic vocabulary. Academic literacy as linguistic ability	
27	Embedded provision to develop source-based writing skills in a Year 1 health sciences course: How can the academic literacy developer contribute?	Rosemary Wette	2019	New Zealand	Article	mixed method	questionnaire, interview, observation, document analysis (student works)	academic literacy, source based writing skill	population health
28	Barriers to reading in higher education: Rethinking reading support	Kristien Andrianatos	2019	South Africa	Article	Qualitative	interviews & focus groups		several disciplines
29	Visual and non-literal representations as academic literacy modalities	Desiree Scholtz	2019	South Africa	Article	Qualitative	interviews with lecturers and document analysis	pluralities of literacies, disciplinary literacy,	different fields
30	The constructions of early childhood practitioners' literacy needs on an in-service Bachelor of Education course	Karin Hackmack	2019	South Africa	Article	Qualitative	focus group interviews and assessment	academic literacy/ies, Academic discourse	early childhood education
32	Creating epistemic access through a scaffold approach: Academic literacy skills development for South African first-year public administration students	Gerda HG van Dijk; Brenda A Vivian; Lianne P Malan	2019	South Africa	Article	mixed method	interviews & assessments	academic literacy, scaffolding,	business

33	Empowering the point: Pains and gains of a writer's traversals between print-based writing and multimodal composing	Yiqiong Zhanga, Kay L. O'Halloran	2019	Australia	Article	Qualitative	interview, academic products, ppt, e-mails,	multimodality,	
34	College Reading and Studying: The Complexity of Academic Literacy Task Demands	Jodi Patrick Holschuh	2019	USA	Commentary				
36	In-between access and transformation: Analysing a university writing centre's academic support programme for education students as third space	Namakula and Prozesky	2019	South Africa	Article	Qualitative	focus group interviews with peer tutors	Dominant discourses of academia, third space, academic literacy,	
37	Definition and design: Aligning language interventions in education	Albert Weideman	2019	South Africa	Article	theoretical		academic discourse	
38	Developing academic literacy through a decentralised model of English language provision	Neil Murray & Amanda Muller	2019	Australia	Article	mixed method	questionnaire, interview		nursing
39	On the outside I'm smiling but inside I'm crying.' Communication successes and challenges for undergraduate academic writing	Elliott, S., Hendry, H., Ayres, C., Blackman, K., Browning, F., Colebrook, D., Cook, C., Coy, N., Hughes, J., Lilley, N., Newboult, D., Uche, O., Rickell, A., Rura, G.P., White, P., and Wilson, H.	2018	UK	Article	NA	questionnaire, interview and visual data	academic writing, transitional scaffolding	
41	A didactic innovation project in Higher Education through a Visual and Academic Literacy competence-based program	Miguel Angel Marzal García-Quismondoa; , Eduardo Cruz-Palaciosb and Federico Castros Morales	2019	Spain	Article	Curriculum development		visual literacy, digital literacy, academic literacy	

42	Academic literacy program implementation in an Ecuadorian University: a multinomial logit approach	Silvia Mariela Méndez Prado, María Isabel Alvarado Sánchez & Joel Alejandro Rosado Anastacio	2019	Ecuador	Article	Quantitative	questionnaire	reading literacy	
46	Teaching multilingual learners in Canadian writing-intensive classrooms: Pedagogy, binaries, and conflicting identities	Steve Marshalla, Jennifer Walsh Marrb	2018	Canada	Article	Qualitative	interviews with writing instructors	academic discourse	
47	Show me your true colours: Scaffolding formative academic literacy assessment through an online learning platform	Weronika Fernando	2018	UK	Article	mixed method	questionnaire with interviews and student work analysis	formative assessment of academic literacy	
48	First year students' perceptions of academic literacies preparedness and embedded diagnostic assessment	Lorinda Palmera, Tracy Levett-Jones and Rosalind Smith	2018	Australia	Article	mixed method	test	academic literacies	nursing
49	Developing Academic Literacy: Breakthroughs and Barriers in a College-Access Intervention	Jon-Philip Imbrenda	2018	USA	Article	Not clear		academic discourse, academic literacy	
50	"Degrees of deception" to degrees of proficiency: Embedding academic literacies into the disciplines	Anna M. Maldoni	2018	Australia	Article	mixed method	student data and open-ended questionnaire	academic literacies, embedded curriculum approach	
51	Friends or foes? A theoretical approach towards constructivism, realism and students' well-being via academic literacy practices	O.O. Eybers	2018	South Africa	Article	theoretical analysis		social discourses, Discourse (Gee), well-being	
52	Exploring Academic Literacy Practices in Postgraduate Level Pratiwi	Pratiwi Retnaningdyah and Kisyani Laksono	2018	Indonesia	Conference proceeding	mixed method	questionnaires with follow up interviews		

54	Research skill development spanning higher education: Critiques, curricula and connections	John W. Willison	2018	Australia	Editorial	Review		research skill development, research based learning	
55	The differential predictive validity of a test of academic literacy for students from different English language school backgrounds	Kabelo Sebolai	2018	South Africa	Article	quantitative	validity study of test		
57	Teaching Academic Literacy Using Popular Science Texts: A Case Study	Wu, Siew Mei; Lee, Sze Han; Chun, Eric; Chan, Yong	2018	Singapore	Article	quantitative	essay rating with a rubric	Academic literacy, science communication, writing literacy	
58	Student evaluation of academic literacy workshops and individual consultations: A study in an Australian university	Lai Ping Florence Ma	2018	Australia	Article	quantitative	online survey	academic literacy support	
59	Exploring intentional use of a technological proxy, Turnitin, to enhance student academic literacy practices	Joanne Orlando, Jose Hanham, Jacqueline Ullman	2018	Australia	Article	Qualitative	think-aloud protocols and focus groups to elicit data on students' interpretation and use of Turnitin feedback		
60	Literacies: skills and practices in developing writing identity	Verbra Pfeiffer	2018	South Africa	Article	Qualitative	autobiographical writing, interviews,	expressive writing,	
61	The process of academic literacy in Civil Engineering Computer Science. An approach to academic writing and its genres in a learning community	Juana Marinkovich; Enrique Sologuren; Maha Shawky	2018	Chile	Article	Qualitative	focus group and interviews	writing in discipline	
63	Voices from the Ground Up: Transfer of Learning within the Context of Research and Study Activities	Kimberly Mullins, Natalia Tomlin, Eamon Tewell & Valeda Dent	2018	USA	Article	Qualitative	interviews	research skills, library work, study behaviors	

64	Relocalising academic literacy: Diversity, writing and collective learning in an international Master's programme	Nana Clemensen and Lars Holm	2017	Denmark	Article	Qualitative	interviews	international study programmes like the AEG as temporarily situated, 'local-global' discourse communities in which students' and teachers' academic understandings, experiences, expectations, language and literacy backgrounds and learning preferences are brought together, negotiated and relocated. writer identity, academic literacy	education and globalization
66	Undergraduate students' perspectives on digital competence and academic literacy in a Spanish University	Fernando Guzm an-Simon, Eduardo García-Jimenez, Isabel Lopez-Cobo	2017	Spain	article	Quantitative	survey with 786 students	Digital competence, Academic literacy, Information literacy, Computer/ICT literacy	
68	Institutional policies on plagiarism: The case of eight Chinese universities of foreign languages/international studies	Guangwei Hu, Xiaoya Sun	2017	china	Article	Qualitative	policy analysis	plagiarism	
69	Developing communication as a graduate outcome: using 'Writing Across the Curriculum' as a whole-of-institution approach to curriculum and pedagogy	Rowena Harper & Karen Orr Vered	2017	Australia	Article	Review		academic language and learning, communication, as Writing Across the Curriculum (WAC) and	

								Writing Inside the Disciplines (WID)	
70	Academic writing as a key component of academic literacy	Elvira Rafaelevna Daminova, Veronika Vladimirovna Tarasova, Anna Andreevna Kirpichnikova	2017	Russia	Article	Review		academic writing, academic literacy, New literacy studies	
71	Enhancement of Higher Degree Candidates' Research Literacy: A Pilot Study of International Students	Jinghe Han, James Schuurmans-Stekhoven	2016	Australia	Article	quantitative	online pre-test post test survey to both training and control group	research literacy	
72	Tracing interacting literacy practices in master's dissertation writing	Kathrin Kaufhold*	2017	Sweden	Article	Qualitative	case study with interviews with one person	academic literacies,	
73	Tracing academic literacies across contemporary literacy sponsorscapes: Mobilities, ideologies, identities, and technologies	Jon M. Wargo, Peter I. De Costa	2017	USA	Article	Qualitative	interview-ethnographic	Academic literacies	
74	Constructing bridges for academic discourses: the role of the information professional in the new academic literacy agenda for Latin America	Daniel Cruz Bautista, Carlos E. Montano Durán, Miguel Ángel Marzal García-Quismondo and Carmen Álvarez	2016	Spain	Article	Review		academic discourse, academic literacy, information literacy, visual literacy; media literacy; data literacy, statistical literacy and meta-literacy	
75	Building resilience and resourcefulness. The evolution of an academic and information literacy strategy for first year social work students	Tricia Jane Bingham, Josie Wirjapranata, and Allen Bartley	2017	New Zelland	Article	Qualitative	longitudinal data collection		sociology for human services

77	Pedagogies of Academic Writing in Teacher Education: from Epistemology to Practice and back again	Beighton, Christian; Blackman, Alison	2017	UK	Article	Qualitative	interviews with students and teachers		
78	Differences in Research Literacy in Educational Science Depending on Study Program and University	Groß Ophoff, Jana; Schladitz, Sandra and Wirtz, Markus	2017	Germany	Article	quantitative	survey with 1213 students		education
79	Assessment of Educational Research Literacy in Higher Education: Construct validation of the factorial structure of an assessment instrument comparing diff erent treatments of omitted responses	Jana Groß Ophoff , Raff aela Wolf, Sandra Schladitz & Markus Wirtz	2017	Germany	Article	quantitative	survey with 1360 students	research literacy, research based education,	
80	Effects of different response formats in measuring Educational Research Literacy	Sandra Schladitz, Jana Groß Ophoff & Markus Wirtz	2017	Germany	Article	quantitative	survey		
81	Building teachers' research literacy: integrating practice and research	Carol Evans, Michael Waring & Andri Christodoulou	2017	UK	Article	programme development	programme development		
82	Early career teachers' research literacy: what does it look like and what elements support its development in practice?	Carol Evans	2017	UK	Article	Review			
84	Impact of Google Earth and ePals Models on Perceptions, Research and Oral Presentation Skills	Awada & Diab	2016	Lebanon	Article	mixed method	pre-test post test control design and qualitative data		geographical research
85	A Collaborative Approach to Integrating Information and Academic Literacy into the Curricula of Research Methods Courses	Claudia Adams, Stephen Buetow, Richard Edlin, Neda Zdravkovic, Josta Heyligers	2016	New Zelland	Article	Quilitative	programme development	research skills, academic literacy, information literacy	population health

86	Replacing the Traditional Graduate Chemistry Literature Seminar with a Chemical Research Literacy Course	Vincent F. Scalfani, Patrick A. Frantom, Stephen A. Woski	2016	USA	Article	Qualitative	course development		Chemistry education
87	Challenges of academic literacy for in-service teachers	Irene J. Roy, Jacqueline M. van Wyk	2016	South Africa	Article	Qualitative	open ended questionnaire and student work assessment	academic literacy, adult learners	
88	Distinguishing between English proficiency and academic literacy in English	Kabelo Sebolai	2016	South Africa	Article	quantitative	assessment test NBT AL	academic literacy, language profeciency, NBT	
89	Inferences from the Test of Academic Literacy for Postgraduate Students (TALPS)	Colleen du Plessis	2016	South Africa	Article	mixed method	test and student work assessment	academic literacy, postgraduate level, test of academic literacy	
90	Academic Language Feedback toolkit: Making progress with post-entry language skills development	Anna Podorova	2016	Australia	Article	Quantitative	questionnnaire and student work	academic language, Embedded models of academic language development	educational sciences
92	Academic literacy, a barrier to learning? The views of engineering students	Magda Pinheiro, M. Lourdes Dionísio, Rosa M. Vasconcelos	2016	Portugal	Conference Proceeding	quantitative	questionnaire with 30 students	academic literacy, reading, writing, barriers	engineering
93	A Bourdieusian approach to academic reading: reflections on a South African teaching experience	Lloyd Hill & Analía Inés Meo	2015	South Africa	Article	quantitative	questionnaire	academic reading; academic literacy, competence, habitus	
94	Framing the curriculum for participation: a Bernsteinian perspective on academic literacies	Jane Tapp	2015	UK	Article	Qualitative	transciptions of students' engagement in collaborative work/process	academic literacies; communities of practice	

95	Effectiveness of Academic Writing Activities and Instruction in an Academic Literacy Writing Course at the University of Botswana	Beauty B. Ntereke; Boitumelo T. Ramoroka	2015	Bostwana	Article	mixed method	questionnaires with follow up interviews with students and lecturers	academic writing, students' perceptions	
96	Measuring the Impact of an Academic Literacy Programme at a South African University of Technology	K. Sebolai and D.Y. Dzansi	2015	South Africa	Article	quantitative	pre-post research design	academic literacy, academic writing	
98	The National Benchmark Test in Academic Literacy: How might it be used to support teaching in higher education?	Alan Cliff	2015	South Africa	Article	quantitative	test results form 6000 students	academic literacy,	
100	Towards impact measurement: An overview of approaches for assessing the impact of academic literacy abilities	Ilse Fouché	2015	South Africa	Article	programe evaluation	review	academic literacy, programme evaluation	
101	Reading to Learn: A literature review within a South African context	Tracey Millin	2015	South Africa	Article	review			
102	Social-Scientific Research Competency Validation of Test Score Interpretations for Evaluative Purposes in Higher Education	Christopher Gess, Christoph Geiger, and Matthias Ziegler	2019	Germany	Article	quantitative	test application (validation study-test construction)	research competency, research skills, competency assessment	
104	Relationships between academic literacy support, student retention and academic performance	Paul J. Glew, Lucie M. Ramjan, Mandy Salasa, KatherineRaper, Heidi Creed, Yenna Salamonson	2019	Australia	Article	quantitative	student uptake of support and retention (correlational study)	academic literacy support	nursing
105	A theoretical approach to teaching academic literacy through the use of genres: A knowledge about language for preservice teachers	Simthembile Xeketwana	2018	South Africa	Article	Qualitative	document analysis	academic literacy, language support,	education

106	Academic literacies: the word is not enough	Kendall Richards & Nick Pilcher	2018	UK	Article	Qualitative	interviews with lecturers	Academic literacies; written text; multiple modalities	nursing and design
107	Developing academic literacy through self-regulated online learning	Emmaline Lear, Linda Li and Sue Prentice	2016	Australia	Article	mixed method (pre-post test)	pre- and post-program questionnaire, interviews, a focus group discussion, and reflective online learning logs.	self-regulated learning, academic literacy	
108	Fostering and evaluating learner engagement with academic literacy support: Making the most of Moodle	Fiona Willans; Aluwesi Fonolahi; Ralph Buadromo; Tilisi Bryce; Rajendra Prasad	2019	Fiji islands	Article	quantitative	students scores on moodle for access and compliance	academic literacy, embedded course design, virtual learning environment	
109	From Research Skill Development to Work Skill Development	Suniti Bandaranaike	2018	Australia	Article	Not clear		Research skills, work skills, learner autonomy, Work Integrated Learning	
110	From diagnosis towards academic support: developing a disciplinary, ESP-based writing task and rubric to identify the needs of entering undergraduate engineering students	Janna Fox; Natasha Artemeva	2017	Canada	Article	mixed method	multiple stage evaluation	academic writing	engineering
111	Perceptions of academic literacy courses in a postgraduate programme in Israel	Tsafi Timor	2018	Israel	Article	mixed method	questionnaire and interviews		
	Academic literacy: Five new tests	Albert Weideman	2018	South Africa	workbook on AL	NA			

Appendix B1: Students' questionnaire

1. Introduction

Ladies and Gentlemen!
Dear students!

This survey is part of the research project *Research Literacy in Continuing Education (ReaLiCE)*, which is funded by the Austrian Federal Ministry of Education, Science and Research. It examines

how students of the Danube University Krems assess their own needs for support in the field of "research literacy". The term "research literacy" (or also: capacity to study, capacity to work scientifically) for us comprises the following abilities:

1. the ability to search for literature (searching and selecting scientific or professional texts)
2. reading ability (understanding and exploiting scientific or professional texts)
3. writing ability (producing scientific or professional texts)
4. the ability to share, disseminate or publish scientific or professional texts
5. the ability to cooperate in the development of information and texts

It will take approximately 15-20 minutes to complete the questionnaire.

The collected data will be handled anonymously and will be exclusively used for statistical evaluations, which may also be included in scientific publications.

Your answers will help us gain insights into your needs in the field of research literacy. We will use these results to make recommendations for the provision of targeted support to current and future students.

2. Research context for dealing with texts and information

Please provide us with some information about the context in which you will be undertaking research in the next 2-3 years. We assume that – beyond the university – other social environments might be relevant for systematically dealing with texts and information as well, and that you might address different audiences for sharing and disseminating.

Additionally, we assume that you may use different platforms to search for texts and different channels to acquire them.

Research environment

In the next 2-3 years, how important will it be for you to process, share or publish texts and information in the following research environments?

	very important	somewhat important	important	not very important	not at all important
In university or academic environment (e.g., as part of your studies or when writing your thesis)	o	o	o	o	o
In professional environment (e.g., in the context of gainful employment or in the professional community)	o	o	o	o	o
In private environment (e.g., in the family or among friends)	o	o	o	o	o
In civil society environment (e.g., in the local community or non-profit organisations)	o	o	o	o	o

Audience

In the next 2-3 years, how important will it be for you to process, share or publish texts and information for the following audience?

	very important	somewhat important	important	not very important	not at all important
Superiors, teachers, clients	o	o	o	o	o
Course, working group, organisation with limited/known number of people	o	o	o	o	o
A wider public, with unlimited/unknown number of people	o	o	o	o	o

Search platforms

In the next 2-3 years, how often will you use the following search engines or document repositories to search for scientific or professional texts?

	very frequently	frequently	sometimes	rarely	never	platform unknown
General search engines (google, google scholar)	o	o	o	o	o	o
Library catalogues (national, international)	o	o	o	o	o	o
Special databases (e.g., journal databases)	o	o	o	o	o	o
Websites of scientific institutions or individual researchers	o	o	o	o	o	o
Websites of Public institutions and international organisations (e.g., national: Statistik Austria, RIS; international: Eurostat, OECD, UN, etc.)	o	o	o	o	o	o
Online platforms based on file sharing (e.g., Academia.edu, ResearchGate, Kudos, Mendeley, ArXiv)	o	o	o	o	o	o
Online platforms for pirated copies of texts (e.g., libgen, sci-hub)	o	o	o	o	o	o

Channels for the acquisition of texts

In the next 2-3 years, how often will you use the following channels to acquire scientific or professional texts?

	very frequently	frequently	sometimes	rarely	never	platform unknown
Requesting / accepting texts passed on by speakers or colleagues	o	o	o	o	o	o
Borrowing from the print holdings of the local university or specialist library	o	o	o	o	o	o
Downloading electronic full texts via portal of the local university or specialist library	o	o	o	o	o	o
Requesting interlibrary loans of books or ordering of articles via local university or specialist library	o	o	o	o	o	o
Purchasing of print texts (books, magazines, etc.)	o	o	o	o	o	o
Purchasing of digital texts (journal articles, e-books, etc.)	o	o	o	o	o	o
Downloading from websites of scientific institutions or individual researchers	o	o	o	o	o	o
Downloading from websites of public institutions or international organisations	o	o	o	o	o	o
Downloading from platforms based on file sharing	o	o	o	o	o	o
Downloading from platforms for pirated copies of texts	o	o	o	o	o	o

3. Literature research (searching and selecting texts)

Literature search refers to all activities for the search and selection of scientific or professional texts.

What is the level of need that you have to improve the following skills in literature research?

	very high need	high need	medium need	low need	no need
The ability to identify the most important search platform for a specific topic from various sources (e.g., search engines, library catalogues, specialist databases, websites of scientific institutions or individual researchers, portals for disseminating one's own or third-party texts).	o	o	o	o	o
The ability to distinguish between scientific and non-scientific texts (e.g., scientific books and journals vs. policy documents, newspapers, social media posts).	o	o	o	o	o
The ability to select concrete objectives and effective strategies for the search of relevant texts.	o	o	o	o	o
The ability to narrow down, reduce and condense search results (e.g., lists of proposed texts) in relation to a specific search objective.	o	o	o	o	o
The ability to assess the relevance and quality of search results (e.g., lists of proposed texts) before obtaining and reading selected texts.	o	o	o	o	o
The ability to obtain relevant texts by appropriate means (e.g., borrowing from a local library, interlibrary loan, downloading via a library portal or freely accessible portals, purchasing, etc.).	o	o	o	o	o
The ability to organise all the texts in such a way that they can be easily retrieved.	o	o	o	o	o
The ability to use literature management software (e.g., Zotero, Citavi, Endnotes).	o	o	o	o	o

4. Reading (understanding and exploiting texts)

Reading refers to all activities that are necessary for understanding and exploiting scientific or professional texts.

What is the level of need that you have to improve the following skills in the reading, understanding and exploiting of texts?

	very high need	high need	medium need	low need	no need
The ability to set and pursue clear reading objectives and effective strategies for reading individual texts.	○	○	○	○	○
The ability to find specific information and statements in scientific or professional texts.	○	○	○	○	○
The ability to identify whole lines of argument (i.e. the way in which several information and statements are linked) in texts.	○	○	○	○	○
The ability to assess texts and statements with regard to their relevance to a specific question.	○	○	○	○	○
The ability to place individual texts in a broader context (e.g., author, discipline, genesis and publication context).	○	○	○	○	○
The ability to connect the statements and information of different texts (e.g., via literature review).	○	○	○	○	○
The ability to document results (e.g., paraphrase, quote, excerpt, as well as own comments, ideas, considerations) of the reading process.	○	○	○	○	○

5. Writing (producing texts)

Writing refers to all activities that belong to the production of scientific or professional texts. We distinguish between content-related and formal aspects of writing.

What is the level of need that you have to improve the following skills in the ***content-related aspects of writing*** and producing scientific or professional texts?

	very high need	high need	medium need	low need	no need
The ability to introduce the topic of a text (e.g., by presenting the starting point, problem and objective of the text).	o	o	o	o	o
The ability to formulate the main question of a text, and to limit the field of investigation (e.g., spatial, factual, temporal).	o	o	o	o	o
The ability to name the research objects to be investigated (e.g., cases, objects, actors).	o	o	o	o	o
The ability to make one's own assumptions and theories explicit and to formulate expectations about possible results, statements and products.	o	o	o	o	o
The ability to describe the methodological approach to answering a question.	o	o	o	o	o
The ability to present results at the end of a scientific and professional text (e.g., main findings, conclusions and possible recommendations).	o	o	o	o	o
The ability to put the main elements of the text (objective, research question, theory, method, results) into a consistent context so that a thread can be identified and followed.	o	o	o	o	o

What is the level of need that you have to improve the following skills in the ***formal aspects of writing*** and producing of scientific or professional texts?

	very high need	high need	medium need	low need	no need
The ability to know the formal requirements of different types of texts (e.g., seminar paper, thesis, PowerPoint).	o	o	o	o	o
The ability to produce and present the same content in different text formats (e.g., seminar paper, thesis, PowerPoint, blog post).	o	o	o	o	o
The ability to prepare a concrete text with all the necessary elements (e.g., title, introduction, main part, conclusions, references, etc.).	o	o	o	o	o
The ability to distinguish between main and secondary aspects of a text and to structure texts clearly (e.g., by headings).	o	o	o	o	o
The ability to develop and consistently use clear-cut concepts, categories and generalisations.	o	o	o	o	o
The ability to refer to other people's statements in an appropriate way (e.g., paraphrase, analogous or literal quotation) and to indicate the source in an appropriate way.	o	o	o	o	o

6. Sharing, disseminating, publishing texts and information

The development of digital media is creating more and more opportunities for the sharing, dissemination and publication of scientific or professional texts and information.

What is the level of need that you have to improve the following skills in the sharing, dissemination and publication of texts and information?

	very high need	high need	medium need	low need	no need
The ability to distinguish between private sharing and public distribution of texts and information.	o	o	o	o	o
The ability not to infringe the rights of third parties (e.g., copyright, data protection, trade secrets) when passing on or publishing external texts and information.	o	o	o	o	o
The ability to protect one's own rights (e.g., copyright, data protection, trade secrets) when passing on or publishing one's own texts and information.	o	o	o	o	o
The ability to distinguish between Open Access and proprietary forms of publication.	o	o	o	o	o
The ability to assess different possibilities for publishing one's own texts (e.g., book publishers, journals, document memories, self-publishing, etc.) with regard to the desired effect (e.g., target audience, reach, accessibility).	o	o	o	o	o
The ability to assess publication possibilities with regard to their trustworthiness (e.g., unsolicited offers, excessive sales prices), the quality of their services (e.g., editorial review, editing and proofreading, advertising, etc.), as well as business conditions (e.g., rights of use, embargo regulations, etc.).	o	o	o	o	o

7. Cooperating in the development of texts and information

In the development of scientific or professional texts and information, cooperation with other people is becoming more and more important.

What is the level of need that you have to improve the following skills when cooperating in developing texts and information?

	very high need	high need	medium need	low need	no need
The ability to take on the perspectives of other people in the cooperation.	o	o	o	o	o
The ability to cooperate with persons from other disciplines or fields of practice.	o	o	o	o	o
The ability to set objectives, organise tasks, track team progress towards achievement of objectives and adapt the process as necessary.	o	o	o	o	o
The ability to deal spontaneously with unexpected problems in cooperation with others.	o	o	o	o	o
The ability to spontaneously use unforeseen opportunities in cooperation with other persons.	o	o	o	o	o
The ability to improvise creatively in collaboration with other people.	o	o	o	o	o

8. General remarks on the subject of “research literacy”

If you want to share some general remarks on “research literacy” (e.g., about personal challenges, questions, wishes, recommendations, etc.), please enter your comments here:

9. General information about the person

Please help us with your personal details so that we can distinguish between different target groups and their respective needs.

In the development of scientific or professional texts and information, cooperation with other people is becoming more and more important.

Demographic data

How old are you?	○ 18-24	○ 25-34	○ 35-44	○ 45-54	○ 55-64	○ 65+
What is your gender?	○ Female	○ Male	○ Other			
Where do you currently reside?	○ Austria	○ Germany	○ EU (minus AT and DE	○ Non-EU Europe (e.g CH, TR)	○ Other countries	

Information about your studies

Highest educational attainment before starting current program	○ Apprenticeship certificate	○ Vocational school without higher education entrance qualification	○ College or Academy	○ Higher education entrance qualification (Matura, etc.)	○ Bachelor
	○ Master, DI, Magister	○ PhD, Dr.	○ University continuing education	○ Other	
Type of continuing education program enrolled	○ Master	○ acad. expert, certified program	○ other		
Semester currently enrolled	○ 1	○ 2	○ 3	○ 4	○ 5
	○ 6	○ 7	○ not specified		
What kind of professional or scientific texts have you written so far?	○ Dissertation	○ Master thesis, Diploma thesis	○ Bachelor thesis	○ Seminar paper / course work	○ Blog post / newspaper article

Appendix B1: Lecturers' questionnaire

1. Introduction

Dear lecturers and heads of study programs!

This survey is part of the research project *Research Literacy in Continuing Education (ReaLiCE))*, which is funded by the Austrian Federal Ministry of Education, Science and Research. It examines, how you as lecturers or heads of study programs at Danube University Krems asses the needs of your students for support in the field of "research literacy". The term "research literacy" (or also: capacity to study, capacity to work scientifically) for us comprises the following abilities:

1. the ability to search for literature (searching and selecting scientific or professional texts)
2. reading ability (understanding and exploiting scientific or professional texts)
3. writing ability (producing scientific or professional texts)
4. the ability to share, disseminate or publish scientific or professional texts
5. the ability to cooperate in the development of information and texts

It will take approximately 15-20 minutes to complete the questionnaire.

The collected data will be handled anonymously and will be exclusively used for statistical evaluations, which may also be included in scientific publications.

Your answers will help us to assess the "research literacy" of your students. We will use these results to make recommendations for the provision of targeted support to current and future students.

2. Research context for dealing with texts and information

Please provide us with your assumptions about the contexts in which your students will be undertaking research in the next 2-3 years. We assume that – beyond the university – other social environments might be relevant for systematically dealing with texts and information as well, and that your students might address different audiences for sharing and disseminating. Additionally, we assume that your students may use different platforms to search for texts and different channels to acquire them.

Research environment

In the next 2-3 years, how important will it be for your students to process, share or publish texts and information in the following research environments?

	very important	somewhat important	important	not very important	not at all important
In university or academic environment (e.g., as part of your studies or when writing your thesis)	o	o	o	o	o
In professional environment (e.g., in the context of gainful employment or in the professional community)	o	o	o	o	o
In private environment (e.g., in the family or among friends)	o	o	o	o	o
In civil society environment (e.g., in the local community or non-profit organisations)	o	o	o	o	o

Audience

In the next 2-3 years, how important will it be for your students to process, share or publish texts and information for the following audience?

	very important	somewhat important	important	not very important	not at all important
Superiors, teachers, clients	o	o	o	o	o
Course, working group, organisation with limited/known number of people	o	o	o	o	o
A wider public, with unlimited/unknown number of people	o	o	o	o	o

Search platforms

In the next 2-3 years, how often will your students use the following search engines or document repositories to search for scientific or professional texts?

	very frequently	frequently	sometimes	rarely	never	platform unknown
General search engines (google, google scholar)	o	o	o	o	o	o
Library catalogues (national, international)	o	o	o	o	o	o
Special databases (e.g., journal databases)	o	o	o	o	o	o
Websites of scientific institutions or individual researchers	o	o	o	o	o	o
Websites of Public institutions and international organisations (e.g., national: Statistik Austria, RIS; international: Eurostat, OECD, UN, etc.)	o	o	o	o	o	o
Online platforms based on file sharing (e.g., Academia.edu, ResearchGate, Kudos, Mendeley, ArXiv)	o	o	o	o	o	o
Online platforms for pirated copies of texts (e.g., libgen, sci-hub)	o	o	o	o	o	o

Channels for the acquisition of texts

In the next 2-3 years, how often will your students use the following channels to acquire scientific or professional texts?

	very frequently	frequently	sometimes	rarely	never	platform unknown
Requesting / accepting texts passed on by speakers or colleagues	o	o	o	o	o	o
Borrowing from the print holdings of the local university or specialist library	o	o	o	o	o	o
Downloading electronic full texts via portal of the local university or specialist library	o	o	o	o	o	o
Requesting interlibrary loans of books or ordering of articles via local university or specialist library	o	o	o	o	o	o
Purchasing of print texts (books, magazines, etc.)	o	o	o	o	o	o
Purchasing of digital texts (journal articles, e-books, etc.)	o	o	o	o	o	o
Downloading from websites of scientific institutions or individual researchers	o	o	o	o	o	o
Downloading from websites of public institutions or international organisations	o	o	o	o	o	o
Downloading from platforms based on file sharing	o	o	o	o	o	o
Downloading from platforms for pirated copies of texts	o	o	o	o	o	o

3. Literature research (searching and selecting texts)

Literature search refers to all activities for the search and selection of scientific or professional texts.

What is the level of need that your students have to improve the following skills in literature research?

	very high need	high need	medium need	low need	no need
The ability to identify the most important search platform for a specific topic from various sources (e.g., search engines, library catalogues, specialist databases, websites of scientific institutions or individual researchers, portals for disseminating one's own or third-party texts).	○	○	○	○	○
The ability to distinguish between scientific and non-scientific texts (e.g., scientific books and journals vs. policy documents, newspapers, social media posts).	○	○	○	○	○
The ability to select concrete objectives and effective strategies for the search of relevant texts.	○	○	○	○	○
The ability to narrow down, reduce and condense search results (e.g., lists of proposed texts) in relation to a specific search objective.	○	○	○	○	○
The ability to assess the relevance and quality of search results (e.g., lists of proposed texts) before obtaining and reading selected texts.	○	○	○	○	○
The ability to obtain relevant texts by appropriate means (e.g., borrowing from a local library, interlibrary loan, downloading via a library portal or freely accessible portals, purchasing, etc.).	○	○	○	○	○
The ability to organise all the texts in such a way that they can be easily retrieved.	○	○	○	○	○
The ability to use literature management software (e.g., Zotero, Citavi, Endnotes).	○	○	○	○	○

4. Reading (understanding and exploiting texts)

Reading refers to all activities that are necessary for understanding and exploiting scientific or professional texts.

What is the level of need that your students have to improve the following skills in the reading, understanding and exploiting of texts?

	very high need	high need	medium need	low need	no need
The ability to set and pursue clear reading objectives and effective strategies for reading individual texts.	○	○	○	○	○
The ability to find specific information and statements in scientific or professional texts.	○	○	○	○	○
The ability to identify whole lines of argument (i.e. the way in which several information and statements are linked) in texts.	○	○	○	○	○
The ability to assess texts and statements with regard to their relevance to a specific question.	○	○	○	○	○
The ability to place individual texts in a broader context (e.g., author, discipline, genesis and publication context).	○	○	○	○	○
The ability to connect the statements and information of different texts (e.g., via literature review).	○	○	○	○	○
The ability to document results (e.g., paraphrase, quote, excerpt, as well as own comments, ideas, considerations) of the reading process.	○	○	○	○	○

5. Writing (producing texts)

Writing refers to all activities that belong to the production of scientific or professional texts. We distinguish between content-related and formal aspects of writing.

What is the level of need that your students have to improve the following skills in the ***content-related aspects of writing*** and producing scientific or professional texts?

	very high need	high need	medium need	low need	no need
The ability to introduce the topic of a text (e.g., by presenting the starting point, problem and objective of the text).	o	o	o	o	o
The ability to formulate the main question of a text, and to limit the field of investigation (e.g., spatial, factual, temporal).	o	o	o	o	o
The ability to name the research objects to be investigated (e.g., cases, objects, actors).	o	o	o	o	o
The ability to make one's own assumptions and theories explicit and to formulate expectations about possible results, statements and products.	o	o	o	o	o
The ability to describe the methodological approach to answering a question.	o	o	o	o	o
The ability to present results at the end of a scientific and professional text (e.g., main findings, conclusions and possible recommendations).	o	o	o	o	o
The ability to put the main elements of the text (objective, research question, theory, method, results) into a consistent context so that a thread can be identified and followed.	o	o	o	o	o

What is the level of need that your students have to improve the following skills in the ***formal aspects of writing*** and producing of scientific or professional texts?

	very high need	high need	medium need	low need	no need
The ability to know the formal requirements of different types of texts (e.g., seminar paper, thesis, PowerPoint).	o	o	o	o	o
The ability to produce and present the same content in different text formats (e.g., seminar paper, thesis, PowerPoint, blog post).	o	o	o	o	o
The ability to prepare a concrete text with all the necessary elements (e.g., title, introduction, main part, conclusions, references, etc.).	o	o	o	o	o
The ability to distinguish between main and secondary aspects of a text and to structure texts clearly (e.g., by headings).	o	o	o	o	o
The ability to develop and consistently use clear-cut concepts, categories and generalisations.	o	o	o	o	o
The ability to refer to other people's statements in an appropriate way (e.g., paraphrase, analogous or literal quotation) and to indicate the source in an appropriate way.	o	o	o	o	o

6. Sharing, disseminating, publishing texts and information

The development of digital media is creating more and more opportunities for the sharing, dissemination and publication of scientific or professional texts and information.

What is the level of need that your students have to improve the following skills in the sharing, dissemination and publication of texts and information?

	very high need	high need	medium need	low need	no need
The ability to distinguish between private sharing and public distribution of texts and information.	o	o	o	o	o
The ability not to infringe the rights of third parties (e.g., copyright, data protection, trade secrets) when passing on or publishing external texts and information.	o	o	o	o	o
The ability to protect one's own rights (e.g., copyright, data protection, trade secrets) when passing on or publishing one's own texts and information.	o	o	o	o	o
The ability to distinguish between Open Access and proprietary forms of publication.	o	o	o	o	o
The ability to assess different possibilities for publishing one's own texts (e.g., book publishers, journals, document memories, self-publishing, etc.) with regard to the desired effect (e.g., target audience, reach, accessibility).	o	o	o	o	o
The ability to assess publication possibilities with regard to their trustworthiness (e.g., unsolicited offers, excessive sales prices), the quality of their services (e.g., editorial review, editing and proofreading, advertising, etc.), as well as business conditions (e.g., rights of use, embargo regulations, etc.).	o	o	o	o	o

7. Cooperating in the development of texts and information

In the development of scientific or professional texts and information, cooperation with other people is becoming more and more important.

What is the level of need that your students have to improve the following skills when cooperating in developing texts and information?

	very high need	high need	medium need	low need	no need
The ability to take on the perspectives of other people in the cooperation.	o	o	o	o	o
The ability to cooperate with persons from other disciplines or fields of practice.	o	o	o	o	o
The ability to set objectives, organise tasks, track team progress towards achievement of objectives and adapt the process as necessary.	o	o	o	o	o
The ability to deal spontaneously with unexpected problems in cooperation with others.	o	o	o	o	o
The ability to spontaneously use unforeseen opportunities in cooperation with other persons.	o	o	o	o	o
The ability to improvise creatively in collaboration with other people.	o	o	o	o	o

8. Transmission of research literacy

What is the level of need for support in the field of research literacy among the following groups of your students?

	very high need	high need	medium need	low need	no need
Students holding a higher education degree (Bachelor or above)	o	o	o	o	o
Students with formal higher education entrance qualification	o	o	o	o	o
Students without formal higher education entrance qualification	o	o	o	o	o

In your role as a lecturer or head of a study program, what is your own level of need for support in transmitting research literacy to your students?

	very high need	high need	medium need	low need	no need
The ability to search for literature (searching and selecting scientific or professionaltexts)					
Reading ability (understanding and exploiting scientific or professional texts)					
Writing ability (producing scientific or professional texts)					
The ability to share, disseminate or publish scientific or professional texts					
The ability to cooperate in the development of information and texts					

How important do you consider the following measures for transmitting research literacy?

	very important	somewhat important	neutral	rather important	very important
Establishing research literacy as an explicit educational goal of the curriculum (part of the qualification profile)					
Continuous and coordinated transmission of research literacy throughout the entire course of studies					
Transmission of research literacy in specialised courses					
Transmission of research literacy in content related courses					
Transmission of research literacy as extra-curricular offering (withour ECTS)					
Involving central support units (e.g. library, learning services) in the transmission of research literacy					

9. General remarks on the subject of “research literacy”

If you want to share some general remarks on “research literacy” (e.g., about personal challenges, questions, wishes, recommendations, etc.), please enter your comments here:

10. General information about the person

Please help us with your personal details so that we can distinguish between different target groups and their respective needs.

In the development of scientific or professional texts and information, cooperation with other people is becoming more and more important.

Demographic data

How old are you?	○ 18-24	○ 25-34	○ 35-44	○ 45-54	○ 55-64	○ 65+
What is your gender?	○ Female	○ Male	○ Other			
Where do you currently reside?	○ Austria	○ Germany	○ EU (minus AT and DE	○ Non-EU Europe (e.g CH, TR)	○ Other countries	

Details about your educational attainments

Highest educational attainment before starting current program	○ Apprenticeship certificate	○ Vocational school without higher education entrance qualification	○ College or Academy	○ Higher education entrance qualification (Matura, etc.)	○ Bachelor
	○ Master, DI, Magister	○ PhD, Dr.	○ University continuing education	○ Other	

Details about your teaching activities

Do you (did you) also teach at any other higher education institution as well?	○ Yes	○ No			
Are you also active in research?	○ Yes	○ No			
What is (was) your role in university continuing education at your higher education institution?	○ external lecturer	○ internal lecturer			
In which of the following teaching activities have you been involved so far	○ lectures	○ Supervision of term papers	○ Supervision of final theses	○ Development of courses	○ Development of curricula