Carol Tenopir*, Elina Late, Sanna Talja and Lisa Christian

Changes in Scholarly Reading in Finland Over a Decade: Influences of E-Journals and Social Media

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Abstract: Nationwide surveys of researchers in Finland in 2007 and 2016 distributed with the assistance of FinELib, the Finnish national consortium, show that researchers use a growing range of sources to find and access scholarly articles and that some reading patterns are changing. The percentage of articles found by searching and browsing are decreasing, while researchers are using more social ways to locate articles. Research social networking sites are rated as important to their work. They read more on-screen, although still print some material out for final reading. Reading patterns for books are different, as researchers still rely more on printed books than e-books, in spite of an increase in e-book collections through their libraries. This study shows a continuous process of incremental change, enabled by changes in scholarly publishing, social networking, and library collection decisions. More changes can be expected, as researchers adopt systems and patterns that fit with their work patterns and make the finding, locating, and reading of scholarly materials easier. Libraries must both lead and adapt to these new reading patterns by providing links and access to a variety of journal services and by maintaining a balance of print and e-book collections.

Keywords: social media, scholarly journals, sharing by scholars, e-journals, scholarly reading

Introduction

Over the last decade there have been many changes in the landscape of scholarly literature, ways of getting access to publications, library collection policies, and, consequently, changes in the patterns of reading scientific literature. We continue to witness an increase in the overall number of peer reviewed journals, near-universal availability of journals in e-format in most disciplines, increased availability of e-journals, including open access journals and articles, and the dominance of Google and Google Scholar as generic search engines, reducing time needed to locate and access articles (Laakso and Bjork 2012; Laakso et al. 2011; Ware and Mabe 2015). Libraries' journal collections and collection policies have changed as well; with a continued increase in subscription costs (Bosch, Albee, and Henderson 2018), libraries favor e-journal packages over print subscriptions, rely on consortia for license negotiation, advocate for open access journals, and build institutional repositories (Tenopir et al. 2009; Bosch and Henderson 2017).

This study focuses on scholarly readings and readers from Finland only, a country with a population of 5.5 million and one of the highest literacy rates in the world (Miller and McKenna 2016). In Finland, the National Library of Finland oversees the consortium FinELib, which centrally negotiates, licenses, and provides access to digital resources for member libraries across the country (finelib.fi).

The need for academics to access and read scholarly material and the pressure to publish in peer reviewed journals has not changed (Tenopir et al. 2018; Van Dalen and Henkens 2012). Scholars use citations, abstracts, literature reviews, social networks, colleagues, students, alert services, and a variety of other sources to identify important pieces of literature. This study focuses on potential changes in how scholars find, access, read, and use journal articles. How are the changes in journal publishing and increased diversity in ways of finding and obtaining relevant literature reflected in scholars' reading? Can we discern changes in the amounts of reading, ways of seeking literature, and obtaining it? Has the digital format of articles influenced the physical act of reading, or scholars' work patterns? What is the role of various social media services such as academic social networking services and other types of social media in the identification and sharing of relevant literature?

This article used data from two nationwide surveys (2007 and 2016) of academics in Finnish universities.

***Corresponding author: Carol Tenopir,** School of Information Sciences, University of Tennessee, Knoxville, TN, USA,
E-mail: ctenopir@utk.edu
https://orcid.org/0000-0002-9056-8251
Elina Late, Faculty of Communication Sciences, Tampere University, Tampere, Finland, E-mail: Elina.Late@uta.fi
Sanna Talja, Tampere University, Tampere, Finland,
E-mail: sanna.k.talja@uta.fi
Lisa Christian, University of Tennessee, Knoxville, TN, USA,
E-mail: lchrist2@utk.edu

These surveys, conducted a decade a part, have a potential to indicate some of the ways in which patterns of access and reading of scholarly materials have changed over time. In this paper we compare the results from the two studies concerning e-reading and also examine some influences of e-access and social media. The 2016 survey offers information about the role and importance of different social media platforms in scholarly work and directly asks respondents their opinion on past and future changes with the open-ended question: "How has your reading and sharing of scholarly materials changed in the last few years and how do you expect it to change in the next year or two?"

Related Research

Changes in Reading with E-Journals

A comprehensive overview of scientific and scholarly publishing written for the International Association of STM Publishers examines trends in e-journal and e-book usage from multiple sources (Johnson, Watkinson, and Mabe 2018). There is consistency in findings from multiple studies of e-journal use reported by STM. The studies reported in this article build on four decades of scholarly reading surveys in many countries by Tenopir and colleagues, many of which are covered in the Johnson, Watkinson, and Mabe report (Tenopir et al. 2003, 2009, 2015). The recent study of Finland reported in this article builds on a 2007 study in Finland (Tenopir et al. 2010; Vakkari 2006; Vakkari and Talja 2006). These series of studies looked mostly at how scholars find, access, read, and use journal articles. Using a variation of the critical incident technique to focus on the last article reading, the studies consistently show that a growing number of article readings are obtained from an electronic source, even if many were ultimately printed out to be read. In a recent study of US academics (Tenopir et al. 2015), although three-quarters of article readings were from e-sources, about one third (28 %) of the article readings were printed for reading and just over half were read on-screen. Reading from the screen was most typical for scholars in the sciences. Most of the readings (62 %) took place in the scholar's office or lab. Other studies (Hemminger et al. 2007; Niu et al. 2010; Smith 2003) also surveyed scholars' use of journal articles, finding that journal articles are accessed, read, and used electronically.

Comparing North American scholarly reading in these surveys conducted periodically from 1977 to 2012, a continual increase in the number of article readings per scholar was found until it began to level off in 2012 (Tenopir et al. 2015). This increase in reading corresponded to the rise of e-journals, conversion of library journal collections to e-collections, the dominance of Google and Google Scholar as generic search engines, and an increase in journal, including open access, titles and articles.

The main reason for the increase in reading is probably the greater availability of journals through online access, which reduces time needed to locate or access articles (King et al. 2003; Voorbij and Ongering 2006). At the same time that the number of readings increased, the average time spent per reading decreased as scholars have only so much time in the day to devote to scholarly literature (Tenopir et al. 2009, 2015). Screen-based reading has been observed to be different than reading from print journals: readers read less carefully, do more one-time reading, non-linear reading, and keyword spotting, while paying less attention (Liu 2005).

Studies by the CIBER research group (e. g. Rowlands and Nicholas 2005) also show that reading practices in a digital environment are very different. Scholars have moved from vertical to horizontal reading; that is, scholars view many materials but each only for a short time. According to log data analysis, CIBER studies show that scholars do not read while connected, as only the span of a few minutes is spent typically on any one site. These studies assumed that most articles are downloaded first then printed for reading. However, not all articles that are downloaded or printed are actually read; in fact, Rowlands and Nicholas posit that most of the downloaded articles are never read, but rather merely archived for later use. Nicholas and Clark (2012) have described scholars' behavior in the digital environment as bouncing, flicking, and skittering. Scholars do not stay long with one article; rather, they look at many articles in a short period. They describe the phenomenon as "power browsing", in which users try to get a grip on information overload.

Because of the large number of articles published every year, some articles are read widely while others are read by almost no one. Nicholas and colleagues (2010) found that 30–50 % of page views in the ScienceDirect database focus on 5 % of journals. For handling large quantities of text and to avoid using time to read extensive amounts of text, scholars read strategically. A scholar may work with many articles at the same time, to search, filter, compare, arrange, link, annotate, and analyze fragments of content. For avoiding unnecessary reading, scholars use citations, abstracts, literature reviews, social networks

(colleagues), students, and alert services to identify important pieces of literature (Renear and Palmer 2009). One cannot read every article published, even within a narrow specialty. The fairly well-established structure of scientific articles enables researchers to identify the key components of an article, such as the outline of its contents, references, figures, formatted lists, equations, and scientific names (Bishop 1999).

Social Media and Sharing

Of course, scientists and other scholars have always shared ideas and research results in both formal and informal ways (Csiszar 2018), but social media and email make discovery and sharing quicker and easier. In many ways listservs, blogs, and microblogs (i. e. Twitter) serve the same function as alert services, while social networking, preprint sites, videos, and academic sharing sites serve the function of conference conversation and sharing of early versions of research. Email is faster than mail, but basically serves the same function.

Although many social media services are two-way, in that participants both contribute and consume contributions made by others, a distinction can be made between authoring or creating social media (a research blog or Twitter account, for example) and reading or consuming content. In a study of social media use and creation among U.K. academics, it was found that frequent users or creators of social media also read more traditional forms of scholarly information (Tenopir, Volentine, and King 2013). Ease of sharing means the ability to locate and read additional relevant articles.

Academic social networking services such as ResearchGate and Academia.edu were developed specifically for researchers to emulate the long-time practices of researchers. They allow collaboration across time and distance and provide systems for sharing documents as well as ideas among peer groups. They have the advantages of generic platforms like Facebook, but with a work-related focus and purpose. Academic social networking sites have been growing in popularity particularly among social scientists and scientists who work in groups and most expect to increase their sharing of publications and readings in social networking sites in the future (Jeng, He, and Jiang 2015; Tenopir et al. 2017.)

Attitudes towards using social media in scholarly work are important to consider as well as practices. Interviews with scholars in the U.K. and U.S. found an overall continued positive attitude about the importance of peer reviewed articles and books from recognized journals or publishers and a cautious attitude towards social media for work-related purposes. Social media as an outreach mechanism was recognized as a positive development, however (Watkinson et al. 2015).

In a comprehensive overview of the literature on scholarly use of social media, Sugimoto and colleagues (2017) detail the growing number of studies that examine scholarly use of social media. Their analysis of these studies shows that scholars now use a variety of types of social media for their work, but the value and penetration of the use varies considerably with type. Therefore, the specific type of application needs to be distinguished, for example use and value of reference management systems or data sharing systems will vary from that of social networking sites or email.

Conclusions from the studies of scholars' social media use even vary even from study to study (Sugimoto et al. 2017). Therefore, we cannot conclusively say whether use of social media varies by age, gender, discipline, or other demographic factors. Sugimoto and colleagues (2017) recommend caution in generalizing from the hundreds of studies, but they do see a distinction between the earliest adoption of social media by scholars and the newer and forthcoming waves of use:

> While the first wave of digitization of scholarly communication – in which we include emails, listservs, as well as electronic journals – translated into faster discussions within the scientific community, this second wave of digitization includes the use of tools that do allow for broader discussion outside the scientific community and, thus, could allow for more public conversation about research. (Sugimoto et al. 2017)

We recommend the Sugimoto study for an in-depth literature review on how scholars are using all types of social media that we will not replicate here.

Limits

The survey invitation was distributed for us by academic librarians in Finland. We do not know how many faculty members actually received the invitation, so we cannot calculate an exact response rate. Questions about behavior are self-reported, so we must assume that the respondents remember and report their behavior relatively accurately.

Methods

Data were collected via an online survey distributed from October to mid-December 2016 throughout the country of

Finland. The FinELib consortium asked its member libraries to distribute an email with a link to the questionnaire to their respective faculty members, doctoral students, and other researchers. We have no knowledge of how many libraries actually distributed the questionnaire and to how many researchers. The total population of researchers in Finland is approximately 25,000. After reviewing the initial responses and comparing with the subject discipline characteristics of our total population (see Table 1), we found that respondents from the natural sciences were under-represented. For this reason, we also distributed 1,000 email invitations with a link to the survey directly, targeting natural scientists and other under-represented groups. In total, 528 scholars working in Finnish universities, universities of applied sciences, state research institutes, or other research institutes responded to the survey.

The subject disciplines were considered close enough to the target population to proceed with analysis. Although the sample is relatively small, subject disciplines are equally represented in the data. Doctoral students make up about 22 % of the respondents, with lecturers making up 21 %. The remaining respondents include project researchers (17 %), postdoctoral researchers (16 %), professors (15 %), and directors and project managers (9 %). Because the Human Subjects permission from the Institutional Review Board at the University of Tennessee required that respondents be allowed to skip any question, the response rate varies from question to question, with all analysis done on the number of respondents for a particular question.

The survey instrument was built on the Qualtrics platform at the University of Tennessee and all analysis was done using SPSS (see Appendix). Questions were mostly closed questions, but with an "other, please specify" option allowed for most. An open-ended question asked "How has your reading and sharing of scholarly materials changed in the last few years and how do you expect it to change in the next year or two?" Comments received for this open-ended question are used as additional data in this article. The comments offer insights to changes experienced by scholars, whereas the quantitative responses show concrete trends and changes. Quantitative questions included: demographic questions (for example, age, rank/job title, subject discipline); questions about the amount of reading (for example, number of articles read in the last month); opinions (for example, the importance of articles for their work); and critical incident questions about the latest scholarly article and other publications reading.

The critical incident method focuses on the single instance of last reading, while another part of the questionnaire asked more widely about scholars' reading, including a wide range of publications (such as monographs, newspapers, social media, blogs). "Reading" was defined as going beyond the title, table of contents, and/or abstract into the body of the work, so what we count as a "reading" may vary from skimming to in-depth reading. In total, scholars reported on 452 latest article readings and 431 other readings. After focusing on the critical incident of reading, respondents were asked specific questions about that reading, for example in which format the article was read, how they become aware of the article, and where the reading took place.

We also asked questions about the use of social media. Scholars were asked their opinions about the importance of reading social media in their work in general and also the importance of different types of social media and other digital services.

Some results from the survey are compared here to a similar survey we conducted in Finland in 2007 in collaboration with the FinELib consortia (Tenopir et al. 2010; Vakkari and Talja 2006). A total of 1,000 scholars working in Finnish universities representing different disciplines responded to the survey in 2007. Disciplinary profiles of the two data sets are comparable (see Table 1). In both surveys the critical incident method was used to obtain a sample of readings, focused on the last scholarly article read. Two questions can be compared: where the last reading took place and how scholars became aware of the article they read. The survey from 2007 focused only

Table 1: Representativeness of different disciplines in the data.

Disciplinary group	Total population*	%	Survey 2016	%	Survey 2007	%
Sciences	6729	26.5	154	29.5	232	28.0
Technical sciences	5358	21.1	80	15.3	91	11.0
Medical sciences	3816	15.0	90	17.2	70	8.4
Social sciences	6489	25.5	158	30.3	270	32.6
Humanities	2655	10,4	40	7.7	166	20.0
Total	25,428		522		1000	

*data gathered from Vipunen portal, May 25, 2017 (https://vipunen.fi/en-gb/).

on electronic articles, while the later survey included both print and e-reading. Thus, when comparing the results, only the subset of critical incidents of articles obtained in electronic format are considered for analysis from the 2016 data.

This article focuses on the social media questions and changes in e-article reading results compared to the earlier study. Other papers from the 2016 survey focus on the value and role of libraries (Tenopir et al. 2018) under review and reading from a wider range of types resources (Late et al. in review).

Most of the scholarly journal publications made available by the FinELib consortia are in English, although many books and other resources are in Finnish, Swedish, and other languages. The results from this study of Finland are generalizable because researchers in Finland read materials in many languages and often publish scholarly works in international English-language venues. An earlier cross-country comparison of scholarly e-reading patterns in Australia, Finland, and the United States (Tenopir et al. 2010) showed that although there were some minor variations in e-reading patterns among the countries, most differences in reading patterns resulted instead from differences in subject discipline.

In the analysis of the open-ended question regarding changes in reading, the 233 answers were read through closely and roughly classified based on content into six classes (Table 2). Irrelevant comments (n = 8) were removed from the analysis. After this, the data was analysed again to check the validity of the classification. Because many of the scholars discussed more than one dimension of change in their reading practices, some of the comments were classified into two to three classes. For this reason, one comment can appear in more than one class; thus, the number of comments in the data increased to 264. Comments were translated from Finnish to English. Scholars in the age groups of 41–50 and 51–60 were most represented in the open-ended question, since the response rate for these groups was over 50 %. We can assume that these groups have experienced more changes in their reading patterns during their careers than the younger age groups and therefore commented more actively. For other groups the response rate to the open-ended question varied between 24 and 45 %.

Both quantitative and open-ended question results from the 2016 study are presented here, together with relevant results from the 2007 study, according to the themes identified above.

Table 2: Classification of answers on open-ended questions.

	N	%
Digital reading	83	31.4
Obtaining information	37	14
Sharing	20	7.6
Social media	24	9.1
Amount of reading	71	26.9
Not changed	29	11.0
Total	264	100

Results

Digital Reading

Different Formats

Although journal subscriptions in Finnish universities and research institutes are now overwhelmingly in digital form, using print publications or printed versions of e-articles for final reading are still a part of some reading patterns. In the 2016 survey we asked about the final format of reading for scholarly articles and other publications (Table 3), and also asked whether the original article was from a digital source or a print source. A slight majority (53.6 %) of publications overall were read in electronic format. However, there are clear differences between preferred form of reading by publication type. While over half of journal article readings are in e-form, 40 % of scholarly articles are downloaded and printed for reading. Nearly three-quarters (73 %) of scholarly books and almost half of scholarly book chapters originate and were read in print.

Table 3: The format of latest readings (2016).

	Print %	Downloaded and printed on paper %	Electronic %
Journal article (N = 455)	5.3	40.4	54.3
Scholarly monograph (N = 41)	73.2	7.3	19.5
scholarly book chapter (N = 53)	43.4	26.4	30.2
Conference proceedings (N = 38)	5.3	21.1	73.5
Research report (N = 54)	5.6	31.5	62.9
Total	15.6	32	536

The largest group of comments to the open-ended question concerned digital reading (83 comments). A majority of the comments were related to how readers had changed from printing out for reading to reading from the screen. More ergonomic equipment and workspaces have facilitated reading from the screen. Some scholars have given up printing articles because electronic versions are more convenient when collaborating internationally, and when working from a distance or out of the office. Electronic articles are also easier to organize and keep on hand whenever needed:

> *Today, I keep everything digital. Working across the globe on various projects, it is the only way that works.* (professor, technical sciences)

> *I read articles more and more from the screen only, although I experience it as more laborious than reading from paper. It's likely that I'll give up printing on paper almost entirely, because the printouts tend to get lost anyway after the first glimpse.* (researcher, sciences)

New formats in articles such as videos, visualizations, and maps are more convenient in electronic format. In addition, new possibilities to take notes, and export references, encourage reading in electronic format. Some scholars also choose electronic format for ecological reasons:

> *I've moved on to reading scholarly articles mainly from a tablet, sometimes I read from computer screen. I rarely print on paper anymore. When reading I use programmes through which I make annotations and notes, and through which I have access to these from different places, now Mendeley, whose library resides in a separate cloud service, Dropbox*. (doctoral student, social sciences)

Some scholars have adopted e-books, but still many say that although they read a majority of articles from the screen, books are still read in print. One lecturer worried about students' information seeking abilities of printed materials:

> *In my field, printed books are still used as sources, because they are not available electronically. The most recent information is fetched electronically. The young people cannot find any information that is in books – if the information can't be found via a search engine, it does not exist.* (lecturer, technical sciences)

> *Strange but I am giving up reading books and printed publications.* (lecturer, humanities)

Location of Information Access

Reading from mobile devices such as tablets and reading outside of the office were also mentioned in the comments. However, reading from tablets is not yet common for work-related readings, since only 2.6 % of scholarly articles reported in the 2016 survey were read from a mobile phone or tablet. Part of this may be due to the further technical developments needed for reading from tablets or mobile devices:

> *I believe will be reading everything from a tablet in future as making notes to PDF documents will become easier with an electronic pen.* (professor, sciences)

Results from the surveys of 2007 and 2016 show that a majority of article readings take place at the office (Table 4). However, the share of reading from home and "elsewhere" has clearly increased from 2007 to 2016. Reading may take place for example at the cafeteria, while travelling, at hotels, or meeting rooms. Reading of e-articles rarely takes place in the library.

Table 4: Where were you when reading the last electronic article (2007; 2016)?

	2007 (N = 931)	2016 (N = 430)
Office or lab	72.4 %	66.3 %
Home	20.3 %	22.3 %
Library	2.1 %	0.5 %
Elsewhere	5.1 %	10.9 %
Total	100 %	100 %

Changes in the Ways of Finding and Obtaining Information

Digitization has influenced scholars' information seeking practices and the way scholars obtain the articles they read. Comparing the critical incident results for the two surveys from 2007 and 2016 shows changes in the ways articles are found. We asked how scholars became aware of the last electronic article they read. Results show that although in both years a majority of the articles were found by searching, the share of searching has decreased from 2007 to 2016 (Table 5). In addition, the share of readings found by browsing seems to be decreasing as well. Getting information about relevant articles from other persons, from citations, and other sources/ means has increased. Articles are found increasingly from social media and e-mail alerts/ RSS feeds.

The change is reflected also in the open-ended comments (37 comments). Journals are easy to find via Google and Google Scholar, or by other means such as social

Table 5: How scholars become aware of the last e-article they read.

	2007 (N = 913)	2016 (N = 430)
Searching	64 %	47.3 %
Browsing	13.1 %	7.9 %
Cited in another publication	10.5 %	12.5 %
From another person	5.4 %	19.2 %
Other	6.7 %	13.1 %
Total		

media alerting or sharing sites. If the article is not available online it is easy to send an email to the author requesting the article. Consequently, scholars see the role of the library as decreasing as the availability of electronic materials increase:

> *I don't need the physical library or printed books for anything. I rarely use the possibility to order materials (usually you can get the article from the author if it's not available from Google). The search services available in the Web are completely sufficient for finding materials so there is no need for special search services provided by the library.* (professor, technical sciences)

Browsing may have changed from browsing journals to browsing search results or databases:

> *I have stopped reading and browsing of whole journals completely. I get one or two printed journals in my hands per year.* (professor, medical sciences)

In general, respondents expressed satisfaction concerning the availability of scholarly materials and only a few scholars see a decrease in the availability. Open access is praised by scholars. However, even if the availability is good, some scholars see negative sides to open access or widespread availability of journals, such as the decreased quality of publications and information overload:

> *Availability of articles has increased and I can read interesting articles from my own office. The number of publications is increasing and the quality of publications is not always clear.* (doctoral student, social sciences)

> *New up to date research information is available via the Internet in large amounts; setting priorities to reading is difficult when various sources feed new information and concentrating on the essential in research gets more demanding.* (doctoral student, sciences)

> *Although availability have increased a lot, it has also increased the reading of useless materials.* (researcher, sciences)

> *I am more selective when choosing the articles I read.* (lecturer, technical sciences)

> *Open Access publishing gets more common which is good, accessibility is vital. (lecturer, social sciences)*

Importance of Social Media Platforms

Reading on Social Media

In 2016 respondents were asked to evaluate the importance of different social media platforms to their work (see Figure 1). Research social networking sites, such as ResearchGate or Academia.edu, were rated as most important, with one-third of respondents considering these networks as very important. Reference management software such as Mendeley or Zotero were ranked almost as important; however, one-third ranked these services as not important at all. General social networking sites such as Facebook seem to have only a small role in scholars' work and blogging is reported to have only minor importance for scholarly work in general.

We also asked respondents to evaluate the importance of "reading" of social media in their work in a five-point scale (1 = Absolutely essential, 5 = Not at all important).

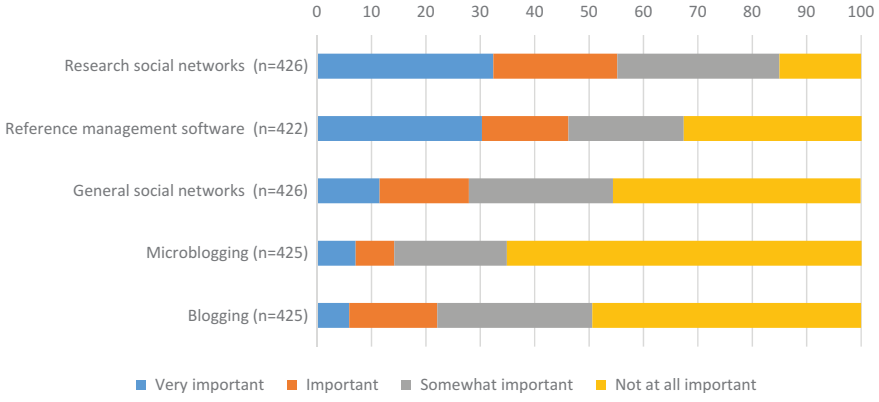

Figure 1: Perceived importance of social media platforms.

Only about 2% of the respondents evaluated reading social media as essential for their work. However, for the majority (65.9%) reading social media content was at least somewhat important. Compared to traditional publication forums such as scholarly journals or newspapers, social media was clearly considered less important. For example, 73% of the respondents evaluated reading scholarly journals as essential and even 10% rated reading newspapers as essential.

Role of Social Media

Scholars bring up changes caused by social media in the open-ended comments (24 comments). ResearchGate was the most frequently mentioned (seven mentions) social media service in the comments; Twitter (5), Mendeley (4), and Academic.edu (3) were also mentioned more than once. Comments related to social media were focused mainly on the role of social media in information searching, sharing, and access. Social media in general was seen to increase the availability of materials. Two important aspects of academic social media services are to serve as publication archives and offer publications at the preprint phase:

> *ResearchGate has made conference publications more easily accessible.* (professor, technical sciences)

> *Articles are read already at the preprint phase from computer and tablets; hopefully all articles will in future be made freely available through repositories such as ResearchGate or Academia.edu. The downside is that currently many publishers are opposed to sharing articles in these services.* (professor, medical sciences)

However, at least for now, the role of social media in information seeking seems to be minimal. According to critical incident questions from 2016, only 6% of the article readings and 3% of other publication readings were obtained from social media. However, this trend might increase, as one of the scholars points out:

> *I discover and read many more articles through ResearchGate, by following researchers of interest. This is easier than having Google Alerts, or browsing journal contents (IEEE, Scopus).* (doctoral student, technical sciences)

In the context of reading, Mendeley and Zotero were mentioned. Scholars appreciate the ability to organize articles in one place and make notes on the articles in electronic format. Reading is also often a part of the writing process and platforms such as Mendeley offer valuable tools for organizing documents around one task:

> *In terms of reading, I use Mendeley more and more because there I can easily link what I've read to what I write.* (doctoral student, social sciences)

> *I have centered all of my referencing, from websites, journals, etc. on Zotero. I left behind EndNote, Mendeley, Reference Manager because Zotero allows me to put all of it in one place. Our local library resources are often not adequate for me to obtain journal articles conveniently. [...] or maybe it is easy and I don't know how to do it.* (professor, sciences)

Sharing Readings and Publications

Comparing the results from the surveys from 2007 and 2016 showed that scholars become aware of articles more often from other people (see Table 5). Results indicate that scholars share more of their readings or publications now compared to ten years ago. In the 2016 survey we asked about the last article and other publication read, whether scholars shared the publication or the ideas raised by the publication. Results show that only a minority of scholars (5.2%) have shared the publication or ideas raised by the publication (Table 6). Sharing was infrequent in all disciplines. Thus, it seems that sharing is very marginal or scholars share mainly their own publications.

Table 6: Sharing the latest read articles and other publications.

	Scholarly article (N = 453)	Other publication (N = 414)	Total (N = 867)
Yes, I shared the publicatIon	2.4	3.1	2.8
Yes, I shared the ideas raised by the publication	2.2	2.7	2.4
No	92.5	91.5	92
No, but will in the future	2.9	2.7	2.8
Total	100	100	100

In the open-ended question scholars commented about changes in sharing of scholarly materials read (20 comments). In general, scholars comment that they share more articles and by different means that what they used to. Articles in electronic format are easy to share. Sharing is seen as a way of communication, making new contacts, and promoting one's own work. Articles are also shared already at preprint phase in different academic social networking services:

I share more often my thoughts about things I've read on the social media. I've also started to share draft versions of my writings via different portals so that everyone would have a possibility to get to know my texts. In terms of reading, I use Mendeley more and more because there I can easily link what I've read to what I write. (doctoral student, social sciences)

The amount of reading will increase along with own research. I could share more of what I read because I think there is a possibility to communicate with others and make new contacts. (postdoc researcher, technical sciences)

However, not all see changes as dramatic:

Has not really changed. Sometimes one asks for an article in pdf format in Research Gate or through email instead of earlier postcards. (researcher, medical sciences)

Changes in the Amount of Reading

Increase in Readings

Scholars in the 2016 survey reported reading approximately 20 articles (range 250, std. 28.3) per month (total, including both print and electronic). In the critical incident question relating to form of the reading, 94.7 % of the overall readings were from e-resources, so we can extrapolate that Finnish scholars in 2016 estimated they read approximately 18.9 articles from electronic sources per month. In 2007 scholars were asked only to give the approximate number of articles from electronic sources that they read per month: the mean value in 2007 was 14 articles (range 100, std. 17.3) from e-sources only. In 2007 it was still more typical to use printed journals, so we cannot say with certainty whether Finnish scholars read more, less, or the same number of total articles (print and electronic) a decade later.

Reflections on changes in the amount of reading is reflected in the open-ended comments (71 comments). Comments show a range of concerns or conflicting changes in behavior, including from some the fact they now read more, from others concerns over not having the time to read enough, and from others the increased need for skimming.

Increase in reading is evident in 25 comments. Scholars explain their increase in reading has been enabled with improved technology and increased availability of materials. In addition, complexity of work and increased multidisciplinary work requires scholars to read more. Career development or stage of career and project phases also have an influence on amount of reading:

I read more and with more concentration. I strive to build circumstances in which I can also concentrate on reading scholarly text during my work hours, because it's vital for my research. (professor, social sciences)

I read more because I can read on the phone and other smart devices. (postdoc researcher, humanities)

It is maybe inevitable that reading increases when the articles are more easily available (electronically). (lecturer, social sciences)

I read more and more all the time, because I work in several scholarly fields simultaneously. (professor, social sciences)

I need to write more, and I have also read more regularly. (doctoral student, sciences)

Reading gets narrower at the writing and finishing phases. A new research cycle is started with broad and multifaceted reading again. (doctoral student, social sciences)

Decrease in Readings

However, some scholars say they actually read less compared what they used to. Reasons for the decrease are, for example, decreased availability due to cuts in journal subscriptions, information overload, and the decrease in browsing journals. However, the most common reason (20 comments) for reading less is the lack of time for reading. Time needed for teaching, applying for research funding, and administration takes time away from reading:

I have read fewer papers compared to earlier years, and had less time to really focus on them. I expect this sad downward trend to continue in the future. (postdoc researcher, technical sciences)

Not enough time with so much teaching and seeking funding for research projects, and other miscellaneous stuff. (professor, sciences)

The number of articles will increase and availability gets better and there is even less time for reading single articles. I guess this development will continue. (professor, technical sciences)

Skimming

Scholars (17 comments) discussed their increased skimming in reading. One reason is the reported less time for reading or the number of articles they read have increased. Thus, articles are read more quickly or skimmed to find out if there is there something interesting to read more closely. Article structures and titles become more

important if the reader needs to know at first sight if they should use their time for reading the article or not. Broadening availability of publications makes scholars also see more potentially relevant readings. Anxiety about the lack of time is obvious in many comments and worry about misunderstandings is evident:

> *More browsing and selective reading because interesting articles are published so much and the availability is good.* (postdoc researcher, sciences)

> *Reading has changed and become shortsighted. Now I don't have time to read whole articles. Reading is merely skimming and making selective searches. I don't have time to read for developing my own know-how.* (professor, sciences)

> *The move to reading electronically means that thorough reading of papers gets rarer. Large numbers of articles are merely skimmed through. This increases the risks of misunderstandings.* (postdoc researcher, sciences)

> *Too much to read and in too many databases. Well-formulated headings and abstracts now have a bigger importance.* (doctoral student, technical sciences)

> *I've started to read more books and use more time for reading. Also, reading blogs and short Facebook comments has increased. I might try to cut down the restless skimming and scanning and following of Facebook.* (researcher, social sciences)

> *Because of haste and time pressures, it's necessary to only browse through articles and pick up the necessary things. There's no time to read the full article in peace. It's already so that a major part of work has to be done outside the working hours on my own. The big amount of the teaching and other responsibilities is now at the shoulders of doctoral students. The time available for research is clearly scarcer. The future is not looking bright; it is difficult to get funding and therefore the worktime is partially already taken up by applying for funding so there is less time for doing the actual work.* (doctoral student, social sciences)

Reading has not Changed

There are a number of scholars (29 comments) who tell us that their reading and sharing of scholarly materials have not changed in the last few years. This may be natural for those who have just started their academic careers or, because most academic journals have been available in electronic format for a long time, scholars are already accustomed to using them:

> *Reading has not changed; academic peer reviewed journals have been available in electronic format for many years. I don't see my reading practices changing in the future.* (postdoc researcher, sciences)

Searching articles from electronic journals and printing articles for reading has become a standard practice and some scholars do not see changes having occurred or anticipate changes taking place in their reading behavior. Taking notes seems to be the critical factor for favoring printed articles. There are also scholars looking for a change but have not yet found a technology that could replace paper and pen for taking notes:

> *Has not changed and I do not believe it will change. I mainly read scholarly articles, and I read them printed on paper. This is the best way to get a grasp of the paper as a whole and to make notes for myself. Paper printouts are easier to control and keep in order and read anywhere.* (doctoral student, medical sciences)

> *Interestingly enough, there has not been a qualitative change. About 18 months ago I got a tablet with a high-resolution screen in the hope I could save some trees. Problematically I've yet to find a better, more intuitive way of making notes than with a real pen on a printed article. I hope some positive changes will come along, but I'm too much a hardware and software pro to expect miracles …* (doctoral student, technical sciences)

A few scholars still prefer print subscriptions:

> *Has not changed, but will change when the university stops buying printed journals.* (professor, technical sciences)

Discussion and Conclusions

How have Digital Formats Changed Reading?

Over 20 years ago, electronic journals for access together with printing out these articles for final reading become a standard practice for many scholars. Now, a new era of scholarly reading is evident, where scholars are beginning to give up printing out articles and are moving more to reading from the screen or from a handheld device. But the change is not yet complete.

By 2016, Finnish scholars reported that more than half of their scholarly readings are done on screen. However, a sizeable minority of scholarly article readings (40 %) are still downloaded and printed for reading. This is consistent with findings from studies done in other countries (Tenopir et al. 2009, 2015), where reading on screen is now slightly in the majority and is gaining ground most quickly in the sciences.

A vast majority of book readings by academics for work-related purposes are still from the original print format, in spite of growing investments in e-book collections by libraries. Among Finnish scholars, only 20 % of

books and 30 % of book chapters are read in electronic format, although this is surely a larger percentage than would have been found before the growth in e-book collections over the last decade. However, in a survey by Corlett-Rivera and Hackman (2014) 44 % (n = 242 for faculty/ staff) of University of Maryland faculty members preferred the library to purchase scholarly monographs in print.

As both availability and technology make e-resources increasingly attractive, growth in on-screen reading will continue to grow. Taking notes seems to be the critical factor for favoring print, but electronic versions are more convenient when collaborating internationally and working from a distance or out of the office. Electronic versions are also easier to organize and keep on hand whenever needed. More ergonomic equipment and workspaces have also facilitated reading from the screen and, of course, embedded videos, visualizations, and maps are more conveniently consumed in electronic format. The trend towards on-screen reading will likely accelerate.

How has Access to Scholarly Information Changed?

Traditional behaviors for finding relevant articles seem to be changing. Although searching options for scholarly journals have improved and articles are readily found with general search engines such as Google and Google Scholar in addition to subject specialized or library integrated journal systems, the percentage of articles found by searching decreased among Finnish scholars from 2007 to 2016. At the same time, the share of articles found through browsing also decreased; with the decline of print journals scholars don't browse whole journals much anymore and with the easier search and discovery of millions of articles choosing the best to read may be overwhelming at times.

Instead, scholars seem to be embracing more social ways to become aware of articles relevant to their work. In the last decade there was an increase in finding out about articles from other people, from citations in relevant articles, and other sources/ means. Other means often mentioned discovering articles from social media (including sharing sites and Twitter) and from e-mail alerts/ RSS feeds.

In Finland as in the U.S. (Tenopir et al. 2015), a majority of article readings take place at the office or laboratory. However, the share of those reading at home and "elsewhere" has increased from 2007 to 2016. Reading may take place for example at the cafeteria, while travelling, at hotels, and meeting rooms.

On the whole, Finnish scholars are satisfied with the availability of scholarly information and praise e-access and increased open access. At the same time some concerns due to too much access have emerged, perhaps explaining the decrease in articles found by searching and the increase in recommendations in social sources. These concerns are reflected in comments on the negative effects of decreased quality of publications or information overload.

What Is the Role of Social Media as a Source of Readings?

Research social networking sites, such as ResearchGate or Academia.edu, were ranked as the most important types of social media as sources for work-related information. Reference management software such as Mendeley or Zotero were ranked almost as important to work. Ortega (2015) showed similar results. Compared to traditional publication sources such as scholarly journals or books, however, social media such as blogs were rated clearly as less important. At least for now, the role of social media in seeking of articles is still considered an "other" source for many, while social media as a replacement for articles or books is marginal and, indeed, suspect (see also Sugimoto et al. 2017).

Greifeneder and colleagues (2018) have stated that presence in social media may even be harmful for scholars, and many actually avoid social media. Social media takes time from the actual work. However, Mas-Bleda and colleagues (2014) argue that scholars' non-use of social media is not a conscious choice, and rather that scholars are rather lagging behind. We have no evidence to support this and scholars seem to adopt the systems that fit with their work practices. For many, social media is becoming important to work. Comments related to social media focused mainly on the increased role of social media in information searching, sharing, and access. Social media is also perceived to have increased the availability of materials. Also, Tenopir and colleagues (2013) showed that scholars participate in social media more than they create it. Van Noorden (2014) as well as Haustein et al. (2014) showed that different social media services are used for different purposes. According to these studies, ResearchGate and Academic.edu are used for archiving and downloading articles. In addition to information retrieval, Google Scholar is also used for verifying citations. Twitter was most convenient service

for following current research news (Van Noorden 2014). Another important aspect of academic social media services is to serve as publication archives and offer publications prior to formal publication at the preprint phase. Reading is also often a part of the writing process and platforms such as Mendeley may offer valuable tools for organizing documents around one task.

It seems that scholars share mainly their own peer reviewed or in press publications. In general, scholars share more articles and by different means than in the past, because social media and email make it convenient and articles in electronic format are easy to share. Sharing is seen as a way of communication, making new contacts, and promoting one's own work. Articles are also shared already at preprint phase in different academic social networking services. This of course mimics what scholars have always done informally or through paper mail. It is just faster and easier to do now.

How has the Amount of Reading Changed?

Scholars in the 2016 survey reported reading a calculated mean of approximately 18.9 e-articles per month. In 2007 the mean value was 14 articles. Thus, the reported amount of e-reading has increased, although we cannot quantify all reading (print and electronic) because we did not ask about print resources in 2007. However, many commented that they read more overall compared to a few years ago. They explain that the increase in reading coincided with improved technology and increased availability of materials. In addition, an increased complexity of work and growing multidisciplinary work requires scholars to read more. Also, earlier studies have shown an increase in the number of read articles (Tenopir et al. 2015). There are significant differences in the amount of reading between academic disciplines, with science faculties reporting significantly more article readings than humanities faculties. A full analysis of disciplinary differences is outside the scope of this paper.

Not all agree; some scholars say they actually read less compared to what they used to. The main reason for the decrease is the lack of time for reading, usually corresponding to a change in job responsibilities or an individual's work stage. Administrators, for example, may have less time to read scholarly articles.

Many scholars now talk about the need for skimming to read as much as possible in as little time as possible. Article structures, titles, and other clues to quality and relevance become more important if the reader needs to know at a quick glance if they should use their limited time for reading the article.

Searching articles from electronic journals and printing out articles for reading has become a standard practice, although printing out has declined in the decade as an increasing percentage of articles are read from the screen. Despite overall trends to some changes, some individual scholars do not see changes to have occurred or anticipate changes to take place in their reading behavior.

Conclusion

Some reading patterns among Finnish scholars have changed noticeably over a decade. Due to increased availability from library e-collections, open access resources, and the growth in ease of sharing, scholars have switched almost completely to e-access for articles and they are reading more.

The same is not true for books, however, as scholars still rely on the printed version. This may also change as e-book collections grow, if the search and use capabilities are considered more useful than print and if there are no restrictions on use.

Scholars use a wide range of materials and tactics for getting access to the scholarly information they need for their work. Use of social media of various types is increasing, at least to discover, access, and share scholarly work.

Libraries lead some of these changes and follow on others. By favoring e-journal collections over print, libraries have led changes, by allowing readers to save time in finding articles, facilitating sharing, and encouraging reading outside the library building. FinELib, the Finnish national consortium, negotiates nationwide licenses to e-journals on behalf of all Finnish libraries and favors e-resources. Now libraries must also react to further changes in article seeking, reading, and use patterns. Libraries remain relevant to new behaviors by providing access and links to resources outside the library collection, maintaining institutional repositories, and recognizing the range of choices for sharing and access to articles.

Specific reading patterns may change when access and use become more convenient, but the value of high-quality and familiar resources remains for scholars. Reading is an essential part of the scholarly work life and they will find, access, and read the resources of the most value to them in the most convenient ways possible.

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Appendix

Completed Survey of Scholarly Reading (Finland)

Section 1: Demographics

1. Which of the following best describes your academic discipline?
   - o Life sciences
   - o Physical sciences
   - o Medical sciences
   - o Computer science
   - o Mathematics
   - o Engineering
   - o Social sciences
   - o Business
   - o Psychology
   - o Education
   - o Humanities
   - o Fine Arts
   - o Law
   - o Other (please specify): _____
2. What is your specific discipline?

   _____
3. I currently work at:
   - o University
   - o University of applied sciences
   - o State research institute
   - o Other research institute
   - o Other (please specify): _____
4. What is your academic status?
   - o Director/ manager of an institute
   - o Professor
   - o Assistant Professor
   - o Project manager/ program coordinator
   - o Postdoctoral researcher
   - o PhD candidate
   - o Research assistant
   - o Lecturer/ university lecturer
   - o Teacher/ university teacher
   - o Other (please specify): _____
5. What is your age?

   _____
6. What percentage of your work time do you spend doing the following? (The total should equal 100 %. If the answer is zero, please enter "0" instead of leaving a blank.)

   % Teaching _____
   % Research and Writing _____
   % Specialist work (chargeable services/ research assignments) _____
   % Administration and service (academic/ societal) _____
   % Consulting/ advising _____
   % Other _____
7. The focus of my research is on:
   - o Basic/ "academic" research
   - o Applied/ practice-oriented research
   - o Development/ constructive research work
   - o Other (please specify): _____
8. In the past two years, how many of the following have you published? (If the answer is zero, please enter "0" instead of leaving a blank.)

   National peer-reviewed scientific articles _____
   International peer-reviewed scientific articles _____
   National non-refereed scientific articles _____
   International non-refereed scientific articles _____
   Chapters in scholarly books _____
   Scholarly books _____
   Conference proceedings _____

Publications intended for the general public _____
Publications intended for professional communities __
Public artistic and design activities _____
Theses _____
Patents and innovation announcements _____
Audiovisual material, ICT software _____
Other _____

9. In the past two years, have you received any awards or special recognition for your research or other profession-related contributions?
   o Yes
   o No

Section 2: Reading Practices

10. How important do you consider reading the following types of publications for your work?
    Scale: absolutely essential, very important, important, somewhat important, not at all important, I don't know
    o Scholarly journals
    o Scholarly article compilations
    o Scholarly books
    o Conference proceedings
    o Research reports
    o Professional magazines/ websites
    o Newspapers/ news sites
    o Social media (e. g. blogs, Facebook, Twitter)
    o Other Internet resources
    o Textbooks/ handbooks
    o Popular science books
    o Fiction
11. From which of the following scholarly fields do you read literature for your work?
    Scale: often, sometimes, never
    o Life sciences
    o Physical sciences
    o Medical sciences
    o Computer sciences
    o Mathematics
    o Engineering
    o Social sciences
    o Business
    o Psychology
    o Education
    o Humanities
    o Fine arts
    o Law
    o Other (please specify):_____

Section 3: Scholarly Article Reading (print and online)

12. In the past month (30 days), approximately how many **scholarly articles** have you read? Articles can include those found in journal issues, websites, or separate copies such as preprints, reprints, and other electronic or paper copies. Reading is defined as going beyond the table of contents, title, and abstract to the body of the article. If none, please enter "0" instead of leaving a blank.

    Number of articles read (including skimmed) in the past month:
    _____**(If "0" skip to Q32).**

    The following questions in this section refer to the SCHOLARLY ARTICLE YOU READ MOST RECENTLY, even if you had previously read this article. Note that while this last reading may not be typical, it will help us establish the range of patterns in reading behavior.

13. What year was the last article you read published/ posted? _____
    o Within the last year
    o Within the last 2–5 years
    o Within the last 6–10 years
    o Within the last 11–15 years
    o More than 15 years ago
14. In what language was the article written?
    o Finnish
    o English
    o Swedish
    o Other (please specify): _____
15. How thoroughly did you read this article?
    o I read all of it with great care
    o I read parts of it with great care
    o I read the main points with attention
    o I read only specific sections (e. g. figures, conclusions)
    o I skimmed it just to get the idea
16. Had you previously read this article, i. e. is this a rereading?
    o Yes
    o No
17. How long (in minutes) did you spend reading this last article at this reading? In minutes: _____
18. How did you become aware of the last article you read?
    o Found while browsing in a publication or website (without a specific objective in mind) **(skip to Q19)**
    o Found while I (or someone on my behalf) was searching (e. g. by subject or author's name) **(skip to Q20)**
    o Cited in another publication **(skip to Q21)**
    o Another person (e. g. a colleague) told me about it **(skip to Q21)**

- o Do not know/ Do not remember **(skip to Q21)**
- o Other (please specify): _____ **(skip to Q21)**

19. Found while browsing: **(after answering, skip to Q21)**
    - o Personal print subscription
    - o Personal online subscription
    - o Library print subscription
    - o Library online subscription
    - o School, department etc. print subscription
    - o School, department etc. online subscription
    - o Website
    - o Open access journals
    - o Research social networks (e. g. ResearchGate, Academia.edu)
    - o Other (please specify): _____
20. Found while I (or someone on my behalf) was searching:
    - o Web search engine (e. g. Google or Google Scholar)
    - o Electronic indexing/ abstracting service (e. g. Academic Search Premier, Web of Science)
    - o Print index or abstract
    - o Online journal collection (e. g. JSTOR)
    - o Online current awareness service (e. g. Current Contents)
    - o Preprint/ e-print service (e. g. arXiv.org)
    - o Open access journals
    - o Research social networks (e. g. ResearchGate, Academia.edu)
    - o Other (please specify):_____
21. After you became aware of this article, from where did you obtain it?
    - o Personal subscription
    - o Library subscription
    - o School, department etc. subscription
    - o Institutional or subject repository
    - o Free web or open access journal
    - o Preprint copy
    - o Copy of the article from a colleague, author etc.
    - o Interlibrary loan/ document delivery service
    - o An author's website
    - o Other website
    - o Research social networking sites (e. g. ResearchGate, Academia.edu)
    - o Other (please specify): _____
22. This source was:
    - o Print
    - o Electronic
23. In what format was the article when you read it?
    - o Print article in a print journal
    - o Downloaded and printed on paper
    - o Previously downloaded/ saved and read on computer screen
    - o Online computer screen (desktop or laptop)
    - o On a mobile phone, e-reader, or tablet screen
    - o Other (please specify): _____
24. Where were you when you read this article?
    - o Office or lab
    - o Library
    - o Home
    - o Traveling or commuting
    - o Elsewhere (please specify): _____
25. For what principal purpose was this article read? (Choose only the best answer)
    - o Research
    - o Teaching
    - o Administration
    - o Current awareness/ keeping up
    - o Writing proposals, reports, articles etc.
    - o Writing funding/ grant opportunities
    - o Consulting, advising others
    - o Internal or external presentations (e. g. lecture or conference paper)
    - o Continuing education for self
    - o Check or verify facts
    - o Interest/ pleasure/ inspiration
    - o Other (please specify): _____
26. For what other purposes did you read this article? (Choose all that apply)
    - ☐ Research
    - ☐ Teaching
    - ☐ Administration
    - ☐ Current awareness/ keeping up
    - ☐ Writing proposals, reports, articles etc.
    - ☐ Writing funding/ grant opportunities
    - ☐ Consulting, advising others
    - ☐ Internal or external presentations (e. g. lecture or conference paper)
    - ☐ Continuing education for self
    - ☐ Check or verify facts
    - ☐ Interest/ pleasure/ inspiration
    - ☐ Other (please specify): _____
27. How important is the article to your work?
    - o Not at all important
    - o Somewhat important
    - o Important
    - o Very important
    - o Absolutely essential
28. In what ways did the reading of the article affect your work? (Choose all that apply)
    - ☐ It improved the result
    - ☐ It narrowed/ broadened/ changed the focus

- ☐ It inspired new thinking/ ideas
- ☐ It resulted in collaboration/ joint research
- ☐ It wasted my time
- ☐ It resulted in faster completion
- ☐ It resolved technical problems
- ☐ It made me question my work
- ☐ It helped to justify my work or make critical comments
- ☐ It saved time or other resources
- ☐ Other (please specify): _____

29. Did you cite this article or do you plan to cite it in a paper or report?
    - o No
    - o Maybe
    - o Already did
    - o Will in the future
30. Did you share the article or ideas raised by the article in social media?
    - o Yes, I shared the article
    - o Yes, I shared the ideas raised by the article
    - o No
    - o No, but I will in the future

Section 4: Other Publication Reading (print and online)

31. In the past month (30 days) approximately how many **other publications** (non- article readings) did you read for work/ research? Include books, conference proceedings, government documents, technical reports, magazines, trade journals, etc. A book reading may include just reading a portion of the book such as skimming or reading a chapter (if none, please enter "0" instead of leaving a blank.)

    Scholarly books _____
    Scholarly book chapters _____
    Article in conference proceedings _____
    Government documents or other technical or research reports _____
    Article in newspapers/ news sites _____
    Article in magazine/ trade journals _____
    Non-fiction _____
    Fiction _____
    Blogs _____
    Other publications _____

    The following questions in this section refer to the PUBLICATION FROM WHICH YOU READ MOST RECENTLY. Note that this last reading may not be typical, but will help establish the range of patterns in reading behavior.

32. What type of publication did you most recently read?
    - o Scholarly book
    - o Scholarly book chapter
    - o Conference proceedings
    - o Government document or other technical or research report
    - o Newspaper/ news site
    - o Magazine/ trade journal
    - o Non-fiction
    - o Fiction
    - o Blog
    - o Other (please specify): _____
33. About how much total time (in minutes) did you spend reading this publication in the past month?

    _____
34. What year was the last publication you read published/ posted?
    - o Within the last year
    - o Within the last 2–5 years
    - o Within the last 6–10 years
    - o Within the last 11–15 years
    - o More than 15 years ago
35. How thoroughly did you read this publication?
    - o I read all of it with great care
    - o I read parts of it with great care
    - o I read the main points with attention
    - o I read only specific sections (e. g. figures, conclusions)
    - o I skimmed it just to get the idea
36. In what language was the publication written?
    - o Finnish
    - o English
    - o Swedish
    - o Other (please specify): _____
37. How did you become aware of this last publication from which you read?
    - o Found while browsing (without a specific objective in mind)
    - o Found while I (or someone on my behalf) was searching (e. g. by subject or author's name)
    - o Cited in another publication
    - o Another person (e. g. a colleague) told me about it
    - o Promotional email or web advertisement
    - o Do not know/ Do not remember
    - o Other (please specify): _____
38. After you became aware of this publication, from where did you obtain it?
    - o I bought it for myself
    - o The library or archive collections

- o Interlibrary loan or document delivery service
- o School or department collection (e. g. not managed by library)
- o Institutional or subject repository
- o A colleague, author, or other person provided it to me
- o A free, advanced, or purchased copy from the publisher
- o Author website
- o Other (please specify): _____

39. In what format was the publication when you read it?
- o Print (e. g. book, newspaper etc.)
- o Downloaded and printed on paper
- o Online computer screen
- o Previously downloaded/ saved and read on computer screen
- o On a mobile, e-reader, or tablet screen
- o Other (please specify): _____

40. Had you previously read this publication (i. e. is this a rereading)?
- o Yes
- o No

41. Where were you when you read this publication?
- o Office or lab
- o Library
- o Home
- o Traveling or commuting
- o Elsewhere (please specify): _____

42. For what principal purpose did you use, or do you plan to use, the publication you read? (Choose only the best answer)
- o Research
- o Teaching
- o Administration
- o Current awareness/ keeping up
- o Writing proposals, reports, articles etc.
- o Writing funding/ grant opportunities
- o Consulting, advising others
- o Internal or external presentations (e. g. lecture or conference paper)
- o Continuing education for self
- o Check or verify facts
- o Interest/ pleasure/ inspiration
- o Other (please specify): _____

43. For what other purposes did you read this publication? (Choose all that apply)
- ☐ Research
- ☐ Teaching
- ☐ Administration
- ☐ Current awareness/ keeping up
- ☐ Writing proposals, reports, articles etc.
- ☐ Writing funding/ grant opportunities
- ☐ Consulting, advising others
- ☐ Internal or external presentations (e. g. lecture or conference paper)
- ☐ Continuing education for self
- ☐ Check or verify facts
- ☐ Interest/ pleasure/ inspiration
- ☐ Other (please specify): _____

44. How important is the information contained in this publication to your work?
- o Not at all important
- o Somewhat important
- o Important
- o Very important
- o Absolutely essential

45. In what ways did the reading of the publication affect your work? (Choose all that apply)
- ☐ It improved the result
- ☐ It narrowed/ broadened/ changed the focus
- ☐ It inspired new thinking/ ideas
- ☐ It resulted in collaboration/ joint research
- ☐ It wasted my time
- ☐ It resulted in faster completion
- ☐ It resolved technical problems
- ☐ It made me question my work
- ☐ It helped to justify my work or make critical comments
- ☐ It saved time or other resources
- ☐ Other (please specify): _____

46. Did you cite this publication or do you plan to cite it in another publication (e. g. article, report, book, published proceeding)?
- o No
- o Maybe
- o Already did
- o Will in the future

47. Did you share the article or ideas raised by the publication in social media?
- o Yes, I shared the publication
- o Yes, I shared the ideas raised by the publication
- o No
- o No, but I will in the future

Section 5: Social Media

You are almost finished!

48. How important do you consider each of these platforms to your work (e. g. research, teaching etc.)? Scale: not at all important, somewhat important, important, very important, absolutely essential
- o Email lists or listservs

- o Blogging (e. g. WordPress, Blogster)
- o Microblogging (e. g. Twitter, Tumblr)
- o Institutional repository
- o Cloud services (e. g. Dropbox, Google Drive)
- o Reference management software (e. g. Mendeley, Zotero)
- o Research social networks (e. g. ResearchGate, Academia.edu)
- o General social networks (e. g. Facebook, Goodreads)
- o Collaborative authoring (e. g. Google Docs, SharePoint)
- o User comments in articles
- o Image sharing (e. g. Instagram, Flickr)
- o Audio sharing (e. g. podcasts)
- o Video sharing (e. g. YouTube, Vimeo)

49. How important do you consider each of these e-publication features to your work (e. g., research, teaching etc.)?
Scale: not at all important, somewhat important, important, very important, absolutely essential
- o Mobile phone compatible
- o Tablet compatible
- o Ability to share publication or content with colleagues
- o Enhanced navigation (ability to jump to footnotes, tables, graphics and back to the body of the text)
- o Note-taking and highlighting capability
- o Global language support (includes vertical writing and writing from left to right and vice versa)
- o Video embeddedness component
- o Audio embeddedness component
- o Other (please specify): _____

50. What other features/ characteristics would you like to see in e-scholarly articles in the future?
_____
_____
_____
_____

51. How has your reading and sharing of scholarly materials changed in the last few years and how do you expect it to change in the next year or two?
_____
_____
_____
_____

You've reached the end of the survey. We appreciate your participation. Thank you!