

# A Comparison of Nursing and Teacher Education Students' Information Literacy Learning: Results from Norway, 2016

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This study measures first-year undergraduate students' self-assessments and learning outcomes in information literacy skills in their first months of higher education in Norway. Comparisons are made between nursing students and teacher education students. Surveys were conducted before the library's information literacy course and after both library instruction and the submission of an academic paper in which citations were required. Survey questions were specifically related to evaluating sources, avoiding plagiarism, and citing sources. Results show significant improvement, especially in students' ability to cite sources. There were small differences between student groups.

## Introduction

Instruction in information literacy (IL) is provided by librarians to all students at Hedmark University of Applied Sciences (HUAS). In addition to searching instruction, all first-year undergraduate students are required to attend the 90-minute course *Evaluating and Citing Sources*, which is the basis for this study. The study was conducted in an effort to evaluate the effect of this course on student learning, to improve both course content and librarians' teaching. This course focuses on how to critically evaluate information sources, cite them correctly in academic writing, and avoid plagiarism. A previous study<sup>1</sup> documented HUAS students' proficiency in these three topics *prior* to library instruction, while the current study compares those results with a follow-up survey, conducted after both library instruction and the submission of written work in which citations were required.

Due to low response rates from some student groups in the follow-up survey, it was difficult to draw meaningful conclusions for the original sample. A selection of respondents from two disciplines was therefore focused upon, namely *nursing* and *teacher education*. This study is the first of its kind in comparing these two student groups and can provide useful information about the IL skills and needs of future teachers and nurses—two of the largest and most central professions in society today.

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The definition of information literacy used most often in Norway is "the ability to identify when information is required, to search for and find the information you need, to evaluate the information critically, and to use it appropriately for your needs."<sup>2</sup> This study excludes searching, however, and encompasses only the aspects of IL related to evaluating and using information.

Three research questions are explored in this study:

1. How much did nursing and teacher education students learn about evaluating and citing sources and avoiding plagiarism in their first months of higher education?
2. How did their self-assessed skill levels in these topics change?
3. What differences are there between nursing and teacher education students?

### Background

In Norway, higher education at public institutions such as HUAS is free, although there is a small registration fee. Prospective students apply to a specific study program within a college or university, instead of deciding on their major later as is common in the United States, for example. Students typically earn a bachelor's degree after three years.

Professional studies, such as teacher education and nursing, have traditionally been offered by regional "university colleges" or "universities of applied sciences," whereas more theoretical studies have been the domain of the often larger and more urban universities. This regional strategy was developed to decentralize and increase access to higher education in Norway. Admission to study programs at the smaller regional schools is often less competitive than to programs such as law or medicine offered by the larger universities, and this, combined with the lack of tuition, enables people with varying backgrounds and incomes to enroll in Norway's university colleges/universities of applied sciences. Approximately one-third of Norwegian students in higher education attend these institutions.

In an effort to increase the quality of higher education and research in Norway, the Ministry of Education and Research is actively encouraging small institutions to merge to create universities with stronger research and learning environments. Several regional schools have recently fused, and HUAS has plans for a fusion in the near future. This structural reform is also affecting academic libraries, whose collections and instruction are becoming increasingly multidisciplinary. Librarians at multiple campuses collaborate on everything from the acquisition of resources to IL-teaching. New colleagues can draw upon each other's expertise, a synergy to the mutual benefit of all involved. Mergers are especially advantageous for small institutions' libraries, which may lack specialists in fields such as bibliometrics or web design.

The four (current) campuses of HUAS are located in Hedmark County in southeastern Norway. Of Norway's nineteen counties, Hedmark has the lowest income and educational levels. Each HUAS campus has a library with librarians who teach IL, and there is much cross-campus collaboration. The largest study programs are nursing and teacher education, and upon graduation, students in these programs receive a bachelor's degree and are qualified to work as nurses and teachers. There are thirteen other schools with nursing and fourteen others with teacher education programs in Norway. HUAS had 7,700 undergraduate and graduate students during the 2014/2015 academic year when this study was conducted. Most HUAS students come directly from upper secondary school, while others have had some previous higher education or job experience.

IL is anchored officially in all study plans at HUAS, as well as in the school's strategic plan for preventing plagiarism. In addition, the *Norwegian Qualifications Framework* specifies knowledge, skills, and general competencies to be achieved at various levels of education in Norway. Several of these are related to information literacy. For example,

after completing a bachelor's degree, students should be able to "find, evaluate and cite information, and present it so that it illustrates a research problem."<sup>3</sup>

Plagiarism is a problem in Norway as well as in other countries. Ten to twenty students are found guilty of plagiarism each year at HUAS, despite the school's efforts to prevent its occurrence. The use of plagiarism-detection software and the library's IL-course *Evaluating and Citing Sources* both contribute to these efforts.

### Literature Review

The literature review encompasses the three aspects of IL addressed in this study—evaluating sources, avoiding plagiarism, and citing sources—and excludes research on searching. The review is limited to recent research that is relevant to survey questions. Literature relevant specifically to the IL skills and needs of teacher education students and nursing students is emphasized.

#### *Evaluating Sources, Avoiding Plagiarism, and Citing Sources*

One general study of students' skills in evaluating sources, which specifically examines information on the Internet, concluded that, although students often are aware of criteria for evaluating sources, they do not always use these criteria.<sup>4</sup> The study shows that students are often uncritical and use little time evaluating search results. Other research regarding source evaluation has focused exclusively on Wikipedia; for example, Head and Eisenberg,<sup>5</sup> who found that many students use Wikipedia preliminarily for background information in the start-phase of information collecting and more reliable sources later in their research process.

Student plagiarism is a serious problem that has received much attention in IL-literature. John Ehrich et al.<sup>6</sup> define plagiarism as "the act of misappropriating the scholarly work of others and claiming them as one's own," and results of their study indicate that, while there are cultural differences between student groups, undergraduate students in general lack an understanding of what constitutes plagiarism. Gullifer and Tyson<sup>7</sup> found variations between individual university students' understandings of plagiarism, and underlined the necessity of identifying these varying perceptions to create effective IL-instruction. Sutton, Taylor, and Johnston<sup>8</sup> compare different types of plagiarism, differentiating between dishonest acts, poor referencing, and plagiarism in group work.

While source evaluation and plagiarism have received much attention in IL-literature, fewer studies have focused primarily on citing sources. Lee<sup>9</sup> emphasizes the necessity of teaching not only appropriate citation techniques to students but also the reasons for citing in the first place, such as giving due credit to others, academic integrity, avoiding plagiarism, and providing the ability to locate original sources. Tomaiuolo<sup>10</sup> found that many students and researchers are uninterested in learning citation technique, find it tedious to construct proper citations in their texts, and frequently commit errors.

#### *Nursing vs. Teacher Education Students*

Nursing professionals and pedagogues widely embrace the concept of "evidence-based practice" (EBP). EBP involves making professional decisions based on scientific evidence, clinical expertise, and patient/caregiver perspectives. EBP is integrated into nursing curricula in various ways, often through IL-instruction.<sup>11</sup> Two important steps in EBP are *finding* and *critically evaluating* research- and evidence-based literature, so teaching these IL skills is an integral part of developing competency in EBP for nursing students.<sup>12</sup> A study comparing frameworks of IL and EBP,<sup>13</sup> based on the Association of College and Research Libraries' [ACRL] *Information Literacy Competency Standards*

for *Higher Education*<sup>14</sup> and a commonly accepted model of EBP,<sup>15</sup> found that the two frameworks are quite similar. Adams<sup>16</sup> writes that "...the skills and attitudes that academic librarians can inculcate through IL instruction are those that will prepare students to be successful in EBP-influenced professions." Adams<sup>17</sup> found, however, that the two frameworks differ in certain ways. Conventional IL instruction emphasizes the authority of the information producer, their credentials, previous publications, and affiliations, as an indicator of quality to a greater extent than EBP. EBP attaches more importance to the degree of empirical evidence presented in the study and to the lack of bias and error.<sup>18</sup>

In ACRL's<sup>19</sup> recently updated *Framework for Information Literacy in Higher Education*, this issue is addressed. The framework states that "information resources reflect their creators' expertise and credibility, and are evaluated based on the information need and the context in which the information will be used."<sup>20</sup> When critically evaluating sources of information, the level of authority now required is more contextual and may vary in different disciplines. The framework recognizes that "unlikely voices can be authoritative, depending on the need"<sup>21</sup> and recommends that IL-learners "question traditional notions of granting authority and recognize the value of diverse ideas and worldviews."<sup>22</sup> Although the framework does not specifically address EBP, the ACRL's modernized view of the creator's contextual authority is more complementary to EBP's premises.

EBP is a familiar concept in teacher education as well, but it is not as widely embraced as in nursing education. A more common term in education is "best practice," which is similar to EBP, but with less emphasis on documented outcomes that others can replicate.

Teacher education students are unique in that their IL instruction serves a dual purpose.<sup>23</sup> Not only is it vital for the students *themselves* to become information literate, it is also important for them, as tomorrow's teachers, to learn IL pedagogy to pass on these skills to their own students. While some research indicates that current IL instruction for teacher education students may not adequately prepare them for this task,<sup>24</sup> another study finds that IL programs that librarians develop and conduct in cooperation with education faculty can be more successful in this respect.<sup>25</sup>

## **Methods**

This study is based on pre- and post-surveys, with no comparison to a control group, and participation was voluntary. The preliminary survey (appendix A), administered in the first weeks of the fall semester in 2014, measured IL skills and self-assessed abilities of new HUAS students, before they had received library instruction. Survey questions were designed to reflect content in the library course *Evaluating and Citing Sources*, which is a requirement for all first-year undergraduate students. In an effort to make the sample representative, the survey was distributed to a cluster selection of six classes, with a total of 507 students, whose gender ratio and age composition reflect HUAS as a whole. Classes were selected from the largest faculties at each campus, namely teacher education, nursing, environmental sciences, and business administration.

The second survey (appendix B) was administered 5–17 weeks later to those students who had completed the first survey. At this time, students had both attended the library's IL-course and written a paper that required using and citing sources. The wide disparity in time interval between surveys is due to the timing of the students' first academic paper and could affect students' responses. Nursing students, who completed their first paper earlier than teacher education students, may have answered more correctly because the IL course was fresher in their minds. Teacher education students, on the other hand, may have better results because they

had more time to process course content and gain experience with IL practices and concepts. This source of error could have been prevented by choosing respondents with closer deadlines for their papers. However, the intention of the second survey was not to measure short-term memory of library instruction, but rather to determine which information students retained over time and how much knowledge they gained after writing a paper that required them to evaluate and cite sources and avoid plagiarism.

Pre- and post-surveys were designed and administered anonymously with the online survey tool Questback and took approximately fifteen minutes to answer. To maximize the response rate, surveys were completed in the classroom with a librarian present. After providing their age, gender, study program, and highest completed level of education, students assessed their own abilities for each of the three main topics: evaluation of sources, avoiding plagiarism, and citing sources. They then answered twelve questions related to these topics to determine their actual skill levels. Questions in the follow-up survey were nearly identical to the preliminary survey, making it possible to compare results and measure learning outcomes. Seven questions were multiple choice, with up to three correct alternatives; three were yes/no, with up to six subquestions; in one question, students ranked their positions on a Likert scale for five different statements; and, in another question, students prioritized four alternatives in terms of their learning effect. Results were statistically analyzed in Questback and Excel with cross-tabulations to compare results from the two surveys.

In the second survey, there was an underrepresentation of students in environmental sciences and business administration. In fact, a total of only seven students from these programs completed the follow-up survey. Since this is too few to make any significant conclusions, these programs have been excluded. This study is therefore based solely upon responses from nursing and teacher education students, and the results apply only to those programs rather than for the entire school, which was the original intention. The two programs were analyzed as groups, rather than analyzing the progress of individual students within those groups. As a result, it is possible that those who answered correctly in the follow-up survey were also those who originally answered correctly, in which case results would provide little evidence of actual learning.

The comparison between nursing and teacher education students is useful not only because these are the two major faculties at HUAS, but also because these professions are among the largest and most central in Norway and internationally. Both professions are practice-based, and students have the same basic approaches to theory and practice in their education and training. HUAS's nursing and teacher education departments are at two different campuses, and a comparison between student groups may uncover variations between the teaching practices of the different campus's faculty members and librarians. In the national curriculum, teacher education is currently a 4-year bachelor program, while nursing is a 3-year program. There are stricter admission requirements to teacher education than to nursing programs.

A total of 676 first-year students enrolled in these two programs in 2014, and 37 percent of these were nursing students. Fully 418 of the 676 newly enrolled students were selected to receive the first survey, and 38 percent of these were nursing students, so the sample represents a realistic distribution between student groups. Of the 418 who received the first survey, 361 responded, again with the same proportion of nursing students. After library instruction and having written a paper in which citing was required, the follow-up survey was administered to these 361 respondents, and 199 responses were received (see table 1). This time the distribution was more skewed, with only 22 percent being nursing students.

**TABLE 1**  
**Number of Respondents and Response Rates, Both Surveys**

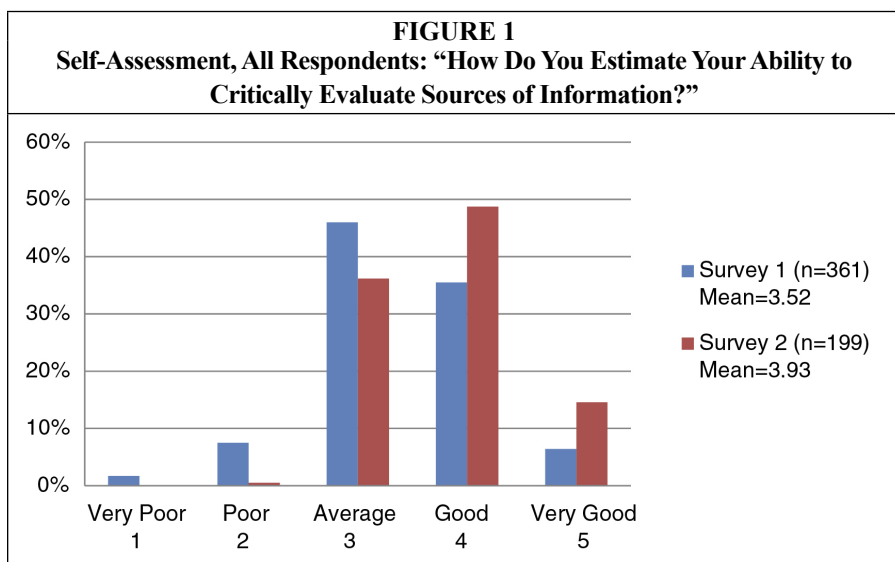
Study Program	First Survey	Second Survey	Response Rate
Nursing	134	44	33%
Teacher Education	227	155	68%
Total	361	199	55%

The total response rate for the follow-up survey for both groups of students was 55 percent, a proportion that is too low to garner authoritative results. While 155 teacher education students completed the second survey, only 44 nursing students responded, which limits the confidence level especially for this group and makes the comparison between student groups less reliable. Survey results are therefore not representative for a larger population of students and can only be considered possible indicators of the general situation, providing clues about how new undergraduate students' self-assessed and actual IL-skills develop during their first months of higher education.

There are several possible explanations for the low response rate among nursing students in the second survey. These students had recently completed another researcher's questionnaire and may have been suffering from "survey fatigue." Second, nursing students received the second survey only five weeks after the first, so they could have recognized questions and thought it unnecessary to complete the "same survey" twice. Third, different librarians administered the pre- and post-surveys to nursing students, and this may somehow have influenced their participation.

**Results and Analyses**

Results from the first survey, administered just before library instruction, showed a correlation between prior education level and IL skills.<sup>26</sup> As could be expected, students who had previously completed some higher education were more information literate than those with less education. There were no correlations with other variables, such as gender or age, in either the first or the second survey.

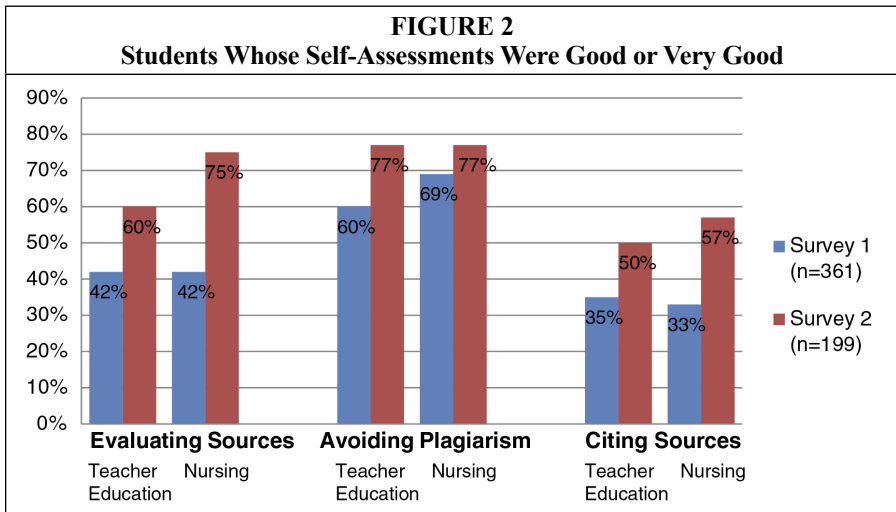


Results from the most relevant questions are presented below, grouped by the three main topics. For each topic, students first assessed their own abilities.

**Critically Evaluating Sources of Information**

In the first survey, a total of 42 percent of respondents assessed their ability to critically evaluate sources of information as good or very good. In the follow-up survey, this number increased to 64 percent, indicating that students had more confidence in their abilities after having attended the library course and written an academic paper. On a scale from 1 (very poor) to 5 (very good), the mean increased from 3.52 to 3.93 from the first to the second survey (see figure 1).

Nursing students had higher self-assessments than teacher education students in the second survey, despite their identical self-assessments in the first survey (see figure 2). If the nursing students with the most self-confidence from the first survey were those who completed the second survey, then this could partially explain this disparity. The difference may also be the result of the parallel emphasis on source evaluation in nursing students' EBP instruction, which was also conducted between pre- and post-surveys.



In a multiple-choice query requiring students to identify essential criteria when critically evaluating sources, more students chose correctly in the second survey. For example, in the second survey, 23 percent more respondents realized that the presence of the publication date is an important evaluation criterion. There were no significant differences in responses from the two student groups.

A question regarding the critical evaluation of Wikipedia had similar positive results, with little difference between student groups. Those who recognized that "faculty members do not consider Wikipedia to be a reliable source" increased by 19 percent, and this was the alternative with the most improvement between surveys. Respondents who realized that "Wikipedia can be used in the start-phase of research (for example, to find facts and definitions that you can work further with)," increased only slightly, from 59 percent to 61 percent. Although students frequently consult Wikipedia for this purpose,<sup>27</sup> results indicate that many respondents did not realize that this is in fact acceptable.

The next question, where students chose criteria that characterize a scholarly article, was one of the few in which there were more correct answers in the first than in the

second survey. A common misconception was that scholarly articles must be published in *printed* journals, although the medium, whether printed or electronic, has no correlation to the scholarliness of an article. For five of six criteria, a larger percentage of teacher education students than nursing students answered correctly. Library instructors should devote more time to this topic in the future, especially since students are often required to cite scholarly articles.

The last question in the section about source evaluation was also answered more correctly in the first survey than in the second. Students were to read a paragraph from an online article and judge whether or not the article was reliable. A source of error in this question is that different excerpts were selected in the two surveys. Both included supposed research results but neglected to cite the original research. Although both excerpts were clearly from unreliable sources, students were more able to detect this in the first survey. A majority of respondents in both surveys chose the "safe answer" for this question, namely that they did not have sufficient information to evaluate the source. There were no differences between responses from the two study programs. Although students are aware of the criteria for evaluating sources, they did not seem to use these criteria in this example, confirming research results of Walraven et al.<sup>28</sup> who found that students can be uncritical in their evaluation of sources.

In conclusion, students felt much more confident in their ability to evaluate sources in the second survey than in the first, especially nursing students. Although results in the follow-up survey show some improvement, it is perhaps not as much as the students themselves perceive. For three of the five questions in this section, results show that students' ability to evaluate sources increased considerably. In two of the questions, however, results do not indicate that learning has occurred. More emphasis should therefore be placed on these two topics in library instruction, namely identifying scholarly articles and recognizing the necessity of citing others' research results.

One question in this section was answered more correctly by nursing students, while another was answered more correctly by teacher education students. Total percentages for all five questions together reveal no significant differences between student groups, despite the fact that nursing students had higher assessments of their abilities than teacher education students did.

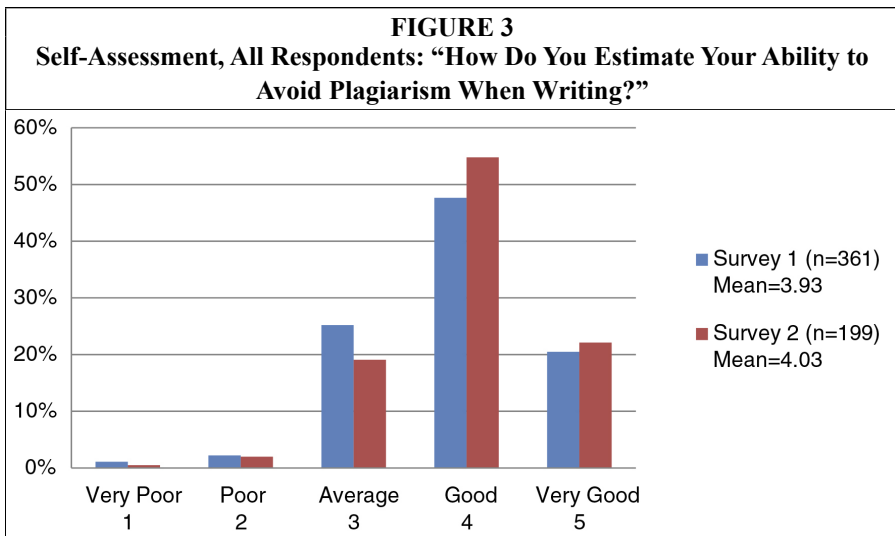
### ***Plagiarism***

More than two-thirds, 68 percent, of all respondents in the first survey estimated their ability to avoid plagiarism when writing as good or very good. This percentage increased to 77 percent in the follow-up survey. Students' self-assessments were higher for this topic than for the critical evaluation of sources, and the mean increased from 3.93 to 4.03 from the first to the second survey (see figure 3). This increase is not as large as for the previous topic, but it is still substantial.

The self-assessed abilities of teacher education students increased to a greater extent than nursing students between surveys (see figure 2). In the first survey, 60 percent of teacher education students and 69 percent of nursing students believed that they were good or very good at avoiding plagiarism. In the second survey, this number increased to 77 percent in both student groups.

Respondents were asked when it is necessary to cite sources to avoid plagiarism. The three correct options—when quoting an author directly, when paraphrasing others' theories, and when using statistics from research—were chosen by a majority of respondents in both surveys. The proportion of correct answers increased by 19 percent, showing a positive learning outcome. However, 20 percent of respondents in the second survey did not realize that they should cite the source when referring





to others' theories, indicating that students still have much to learn. There were no significant differences between student groups.

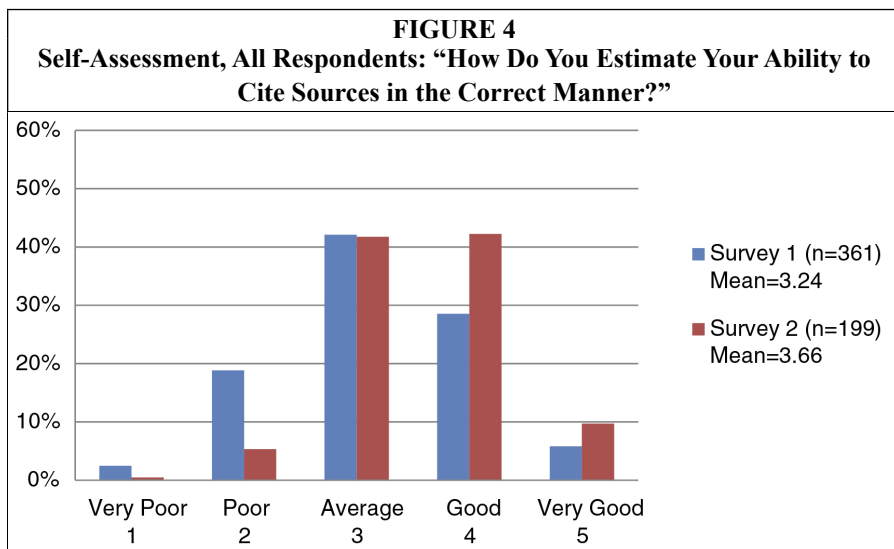
For six scenarios in the next question, respondents were to choose which represented plagiarism. There were no noteworthy differences between pre- and post-surveys in four of the cases; but, for two scenarios, learning was significant. In the second survey, there were differences between student groups in only one of the six scenarios. One-quarter (25%) more nursing students than teacher education students believed that it constitutes plagiarism to not provide the source of an easily found fact—the dates of the Gulf War—although citing in this case is unnecessary. Results from this question confirm findings from Gullifer and Tyson,<sup>29</sup> who documented variations between students' understanding of plagiarism.

The last two questions in this section focused on ethical aspects of plagiarism and were based on a scenario in which a student copies and pastes text from the Internet. The student provides the sources in the reference list but does not write proper quotes or citations in the text, a practice that is dishonest and demonstrates poor referencing technique. Results indicate that respondents realized that this behavior is serious and unacceptable, in accordance with findings of Sutton, Taylor, and Johnston,<sup>30</sup> who found that students consider dishonest behavior the most serious kind of plagiarism. Respondents were also asked to estimate how much the student learned by copying and pasting compared to other methods of using sources in writing. This learning aspect is important, since the main reason that students write papers is to learn. This question illustrates the point made by Lee,<sup>31</sup> who emphasizes the importance of teaching students not only *how*, but also *why* to cite sources. Respondents ranked four different writing methods in terms of learning outcome and correctly found that most learning is achieved by paraphrasing ideas from various sources, arguing for/against their viewpoints, and citing sources correctly. There were no significant differences between results from nursing and teacher education students.

In this section, students show much improvement in their understanding of both formal and ethical aspects of plagiarism. Students' higher self-assessments in their ability to avoid plagiarism are justified by survey results. Results in this section, as in the previous section about evaluating sources, show few differences between nursing and teacher education students.

**Citing Sources**

In the second survey, 52 percent of all respondents estimated that they were good or very good at citing sources in the correct manner, while only 35 percent said the same in the first survey. The mean increased from 3.24 to 3.66 between surveys (see figure 4). Although this is a substantial increase, students still have less self-confidence in their ability to cite sources than in their abilities to evaluate sources and avoid plagiarism. Self-assessments from the two students groups varied only slightly. A total of 57 percent of nursing students and 50 percent of teacher education students believed that they were good or very good at citing sources (see figure 2).



When asked to decide if sources must be cited in six different cases, respondents showed improvement in five of these. The only case in which the percentage of correct answers *decreased*, was for the alleged claim "men have a better sense of direction than women," where 5 percent fewer respondents answered correctly in the follow-up survey. Although this assertion should be supported by research and therefore cited, only slightly more than half of respondents realized this. This confirms results from Tomaiuolo,<sup>32</sup> who found that many students are unsure about when it is necessary to cite sources.

Interestingly, for all six alternatives in the second survey, nursing students answered more frequently than teacher education students that sources must be cited, whether or not citations actually were required. For example, although it is unnecessary to cite sources of easily found facts, such as dates of birth and death of famous individuals, 47 percent of nursing students believed that such sources must be cited, while only 19 percent of teacher education students said the same. Could there be different traditions for referencing in the two disciplines? Are nursing students unsure of the requirements and cite too often just to be on the safe side?

The next question addressed the connection between references and in-text citations. A common error in citation technique among new students is that many do not realize that each reference in the reference list must be cited in the main text, and each in-text citation must have a corresponding reference.<sup>33</sup> A typical result of this misunderstanding is a paper with many references in the reference list but only a few citations in the

main text. In the second survey, the percentage of respondents who understood the interconnection between in-text citations and references increased by 28 percent. There was no noteworthy difference between student groups.

In this section, students showed significant improvement in their understanding of referencing. Their ability to cite sources correctly increased substantially after attending the library course and by operationalizing their newly learned skills when writing an academic paper. Students' higher self-assessments are justified by their increased knowledge and skills.

There are noteworthy differences between student groups in the section. Nursing students cite sources more frequently than teacher education students do, both when necessary *and* when unnecessary.

## Discussion

Results from this research cannot be used to generalize for all nursing and teacher education students, either at HUAS or elsewhere. Only 44 nursing students from the first survey completed the follow-up survey, a small population that makes it difficult to draw significant conclusions. In comparison, 155 of the original teacher education students partook in the second survey, making results from this group more reliable. Despite this limitation, the study provides useful information about the development of perceived and actual IL-skills in a selection of new students during their first months in higher education.

Some differences found between nursing and teacher education students may be related to the disciplines' varying emphasis on practice-based research. Since practice is important in both professions—both in the classroom and in the hospital room—practice-related literature is found in the curricula of both teacher education and nursing students at HUAS. There is, however, more emphasis placed on *evidence-based practice* in nursing, and more placed on *best practice* in teacher education. Despite this variance, the three IL skills that are the focus of this study—critically evaluating sources, avoiding plagiarism, and citing sources—are equally important to both student groups.

Regarding students' self-assessments, there are notable differences between the student groups in the second survey. Nursing students were 15 percent more confident than teacher education students in their ability to critically evaluate sources of information. Aside from possibly being a consequence of low response rates, this disparity may partially be accounted for by the nursing students' instruction in EBP, where the evaluation of sources is discussed in depth. According to Moch, Cronje, and Branson,<sup>34</sup> Kirton,<sup>35</sup> and Adams,<sup>36</sup> an emphasis on the critical evaluation of sources is essential for the development of nursing students' EBP competency. Another possible explanation could be that HUAS health-science librarians teach nursing students that the reliability of articles is ensured when they are retrieved from certain quality-controlled, subscription databases, while librarians in other disciplines focus on the more conventional criteria for evaluating sources, including the authority of the author.<sup>37</sup> When searching outside these specific databases, however, health-science librarians also teach the importance of critically evaluating individual articles. They underline that an author's authority is contextual and not necessarily dependent on their previous publications, in accordance with the updated framework for IL in higher education from ACRL.<sup>38</sup>

Nursing students were also slightly more confident than teacher education students in their abilities to avoid plagiarism and correctly cite sources. However, despite the nursing students' higher levels of self-confidence, survey results indicate that their actual skill levels in all three topics are comparable to those of teacher education students.

Another difference between student groups is that nursing students believe more often than teacher education students that the sources of easily found facts must be cited in academic work, although this is not necessary. In other cases as well, nursing students report more often than teacher education students that they would cite sources of information, whether or not citing is actually required. According to a health-science librarian,<sup>39</sup> several nursing teachers at HUAS require students to cite *all* sources, including sources of easily found facts, which would explain this disparity. One nursing instructor<sup>40</sup> confirms this and adds that some teachers may lack knowledge about when it is necessary to cite sources and are preoccupied with drilling correct citation technique instead of teaching students when citing is required. This illustrates the necessity of integrating library and EBP instruction with nursing curricula and improving communication between library and nursing staff, which is in accordance with findings from Earp.<sup>41</sup>

At some institutions of higher education in Norway, including HUAS, it is difficult to recruit faculty members with advanced degrees to their nursing departments. This is especially challenging for institutions outside large cities, such as HUAS. Nursing has traditionally been more practical than academic, and nursing teachers are therefore actively encouraged to acquire advanced degrees. At HUAS's campus for public health, for example, the proportion of faculty members with doctoral/postdoctoral degrees is approximately half of that at the other three campuses. Although this may be a result of prioritizing and funding at HUAS, this imbalance is an acknowledged challenge also at several other nursing schools in Norway, implying that nursing faculty may, in some cases, have less experience in research than other academic staff. This could potentially explain why some require their students to provide the sources of easily found facts, as they are perhaps uncertain themselves as to when citations are required.

This discussion has so far focused on unique features of nursing programs. As previously noted, teacher education also has a distinctive characteristic with respect to IL, namely its dual purpose: creating information-literate students and giving them the pedagogical expertise to later teach these IL skills to their own students.<sup>42</sup> Those who teach IL to teacher education students should emphasize this two-fold function in their instruction and convey the significance of IL in the students' future profession.

Although survey results provide an estimate of students' abilities in avoiding plagiarism, it would be tempting to compare numbers of plagiarizing students in the different disciplines to determine their *actual* abilities. However, data of this kind are inherently unreliable. HUAS uses plagiarism-prevention software for most exams and term papers, but this software does not detect all incidences of plagiarism. In addition, individual faculty members decide which exams/papers to check and which cases to report. It is commonly known that some faculty members simply fail plagiarizing students instead of registering plagiarism cases to avoid a reputedly time-consuming, bureaucratic procedure.

### Conclusions

Survey results from HUAS indicate that students' IL skills increased substantially in all three topics—evaluating sources, avoiding plagiarism, and citing sources—with the greatest improvements in the latter two areas. Students' levels of confidence in all three topics increased as well, seemingly to a greater extent than their actual abilities. Results from two student groups were compared, and findings indicate that, despite their comparable skill levels, nursing students are more confident than teacher education students, especially in their ability to evaluate sources. Another difference is that nursing students more frequently cite information sources, also when citing is unnecessary. Variations in the teaching methods of librarians and faculty members at

the two campuses have been uncovered and can partially explain these differences between student groups. Results also give indications about which areas librarians should devote more time to in their instruction.

Further research with a greater number of respondents, preferably from several different institutions, is necessary to generalize for larger populations of nursing and teacher education students. It would be especially interesting to determine whether or not the requirement for citing easily found facts is common at other nursing schools as well. It would also be valuable to analyze results for individual students, in addition to student groups, to follow each student's development. A longitudinal study, documenting the progression of students' IL skills over a longer period of time, is another idea for future research.

## APPENDIX A. Survey 1 on Information Literacy, Pretest (translated from Norwegian)

### In e-mail:

This survey is for first-year Bachelor students at Hedmark University of Applied Sciences. The survey is in two parts. The first part is conducted before students attend the library course *Evaluating and Citing Sources*, and the second part will be conducted after the library course and after students have written a paper that requires citing sources in the correct manner. The purpose of this study is to measure student learning outcomes.

### In survey:

It will take approximately 15 minutes to answer the survey. If you are not sure of the correct answer, just guess—but don't look it up on the Internet! We are only interested in your knowledge. It is voluntary to participate, and your answers will be anonymous.

1. Gender
  - Female
  - Male
2. Age
  - Under 20
  - 20–24
  - 25–29
  - 30–34
  - 35–39
  - 40 or older
3. What is your highest level of completed education before beginning the bachelor program at HUAS?
  - Upper secondary school (academic program)
  - Upper secondary school (vocational program)
  - Individual undergraduate or graduate courses
  - Continuing education
  - Bachelor's degree
  - Master's degree or PhD
  - Other \_\_\_\_\_
4. Are you a full-time or a part-time student?
  - Full-time
  - Part-time
5. Your program is:
  - Net-based
  - Campus-based
6. To which campus do you belong?
  - Elverum
  - Evenstad
  - Hamar
  - Rena

### Evaluation of Sources

It is important to critically evaluate sources to distinguish between reliable and unreliable information.

7. How do you estimate your ability to critically evaluate sources of information?
  - Very poor
  - Poor

- Average
  - Good
  - Very good
  - Don't know
8. Have you previously learned how to critically evaluate sources?
- No
  - Yes, in lower secondary school
  - Yes, in upper secondary school
  - Yes, in college or university
  - Don't remember
  - Other \_\_\_\_\_
9. Select three of the following six criteria that you believe to be important when critically evaluating information sources:
- Is the author's name provided?
  - Are there illustrations?
  - Is it searchable in Google?
  - Is the publication date provided?
  - Is it easy to read?
  - Is there a reference list?
10. Select three of the following six statements about Wikipedia that you believe to be true:
- Wikipedia can be used in the start-phase of research (for instance, to find facts and definitions that you can work further with).
  - Faculty members do not consider Wikipedia to be a reliable source.
  - Wikipedia is the best source of information.
  - Anyone can write in Wikipedia.
  - Only experts write in Wikipedia.
  - All articles in Wikipedia are quality-controlled.
11. Ann heard on public radio that new research proves that girls learn to read later than boys. She writes this in her paper. Should she cite the radio program as her source?
- Yes, public radio is considered a reliable source.
  - Yes, but only if the radio program explicitly names the researcher.
  - No, it is best to read the original research article and cite that.
  - No, because she believes that the results must be wrong.
12. Select three of the following six criteria that you believe characterize a scholarly article:
- It is published in a printed journal.
  - It is peer-reviewed prior to publication.
  - It is based on research.
  - It is written in everyday language that is easy to understand.
  - It has a reference list and an abstract.
  - It is written by a faculty member.
13. The paragraph below is taken from an article in an online magazine: R.K. Myhre (2013). *Influenza som vitamin D3-mangel: Velg D3-behandling!* (Retrieved from [www.nyhetsspeilet.no](http://www.nyhetsspeilet.no))

“Research in the 2000's documents the increasingly strong causal relationship between seasonal vitamin-D3 deficiency and the seasonal influenza. One can safely take 5–10 times the recommended daily dose of 800 IU vitamin-D3 which health authorities recommend.”

Would you say that the article is a reliable source?

- Yes
- No
- I don't have enough information to judge the reliability.

**Plagiarism**

Plagiarism is presenting another's work as if it were your own. Plagiarism is academic dishonesty and is considering cheating.

14. How do you estimate your ability to avoid plagiarism when writing?
  - Very poor
  - Poor
  - Average
  - Good
  - Very good
  - Don't know
15. Have you previously learned about plagiarism?
  - No
  - Yes, in lower secondary school
  - Yes, in upper secondary school
  - Yes, in college or university
  - Don't remember
  - Other \_\_\_\_\_
16. Joe is writing a paper in college and has learned that he must cite his sources to avoid plagiarism. When must he cite the sources he used (choose three alternatives)?
  - When he uses someone else's ideas, opinions, or theories
  - When he uses statistics from a research article
  - When he uses facts that are easy to look up, such as the population of Norway
  - When it's common knowledge in his discipline
  - After every chapter in his paper
  - When he quotes someone directly
17. Is this considered plagiarism?

	Yes	No
Liv uses statistics from an article and cites the sources both in the text and in the reference list.		
Oda borrows a paper from a previous student and rewrites it in her own words. She does not cite the source.		
Kai translates research results from German to English. He does not cite the source.		
Jon uses others' theories and rewrites them with his own words. He does not cite the sources.		
Eva finds the dates of the Gulf War on the Internet. She writes this in her paper and does not cite the source.		
Ali copies a text from the Internet and pastes it into his paper. He exchanges some words with synonyms. He does not cite the source.		



18. Thea must hand in a 20-page paper next week, but she’s been busy and hasn’t started. The paper counts for 50 percent of her grade, and she has to pass to retain her stipend. Thea solves the problem by copying entire paragraphs from articles she’s found on the subject, and putting them together in her paper. She writes a short introduction and conclusion in her own words. She provides all sources in her reference list.

Read the text above. To which extent do you agree/disagree with the statements below?

	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
Thea’s actions comply with recognized ethical norms in academia.					
Thea’s method of writing is traditionally and culturally acceptable.					
Thea’s method of writing is accepted at our school.					
Several students write papers in a similar fashion.					
Thea’s actions are not morally justifiable.					

19. Rank how much Thea learns by writing her paper using the methods below:

1 = much learning

2 = some learning

3 = little learning

4 = very little learning

- Thea writes her paper using the method described in the previous question.
- Thea paraphrases ideas from the articles she has read and uses them in her paper to answer her research question. She cites the sources in her text.
- Thea combines copied texts with articles that she has reformulated in her own words. She cites the sources in her text.
- Thea summarizes the articles she has read and cites the sources in her text.

**Citing Sources**

Correct citing of sources in written work requires both citations in the text and references in the reference list (bibliography).

20. How do you estimate your ability to cite sources correctly?

- Very poor
- Poor
- Average
- Good
- Very good
- Don’t know

21. Have you previously learned to cite sources?

- No
- Yes, in lower secondary school

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- Yes, in upper secondary school
  - Yes, in college or university
  - Don't remember
  - Other \_\_\_\_\_
22. Which three of the following statements about in-text citations are correct?
- An in-text citation should include enough information so that the reader can find the reference in the reference list.
  - There is a direct correlation between in-text citations and references in the reference list.
  - An in-text citation should contain enough information that readers can find the source.
  - An in-text citation shows that you have used a different source and that the information is not your own.
  - An in-text citation contains the name of the publisher.
23. If Paul writes the following sentences, does he have to cite the source?

	Yes	No
Nine of ten Norwegians buy Christmas presents on the Internet.		
Alf Prøysen (a famous Norwegian) was born on July 23, 1914 and died on Nov. 23, 1970.		
The Conservative Party received 26.9% of votes in the latest election.		
New research shows that those who have been bullied in school have a greater chance of being unemployed as adults.		
Men have poorer memories than women.		
According to Vygotsky's sociocultural theory of human learning, learning occurs through use of language and participation in social practice.		

24. You have learned that you must include a reference list at the end of your paper. Which three of the following statements about reference lists are correct?
- The references should be written in the order that you used them.
  - The references should be written in alphabetical order by author's last name.
  - All references should be written in the same list.
  - References in the reference list should have been cited in the main text.
  - The references should be listed in chronological order, with the oldest first.
  - References from the Internet should be written in a separate list.

## APPENDIX B. Survey 2 on Information Literacy, Posttest (translated from Norwegian)

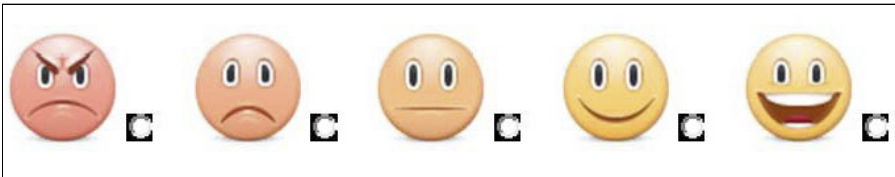
### In e-mail:

This is the second part of the survey in information literacy for bachelor students at Hedmark University of Applied Sciences. This part is answered after the library course *Evaluating and Citing Sources*, and after you have written a paper that requires citing sources in the correct manner. The purpose of this study is to measure student learning outcomes.

### In survey:

It will take approximately 15 minutes to answer the survey. If you are not sure of the correct answer, just guess—but don't look it up on the Internet! We are only interested in your knowledge. It is voluntary to participate, and your answers will be anonymous.

25. How satisfied were you with the library course *Evaluating and Citing Sources*?



26. Gender

- Female
- Male

27. Age

- Under 20
- 20–24
- 25–29
- 30–34
- 35–39
- 40 or older

28. What is your highest level of completed education before beginning the bachelor program at HUAS?

- Upper secondary school (academic program)
- Upper secondary school (vocational program)
- Individual undergraduate or graduate courses
- Continuing education
- Bachelor's degree
- Master's degree or PhD
- Other \_\_\_\_\_

29. Are you a full-time or a part-time student?

- Full-time
- Part-time

30. Your program is:

- Net-based
- Campus-based

31. To which campus do you belong?

- Elverum
- Evenstad
- Hamar
- Rena

### **Evaluation of Sources**

It is important to critically evaluate sources to distinguish between reliable and unreliable information.

32. How do you estimate your ability to critically evaluate sources of information?

- Very poor
- Poor
- Average
- Good
- Very good
- Don't know

33. Select three of the following six criteria that you believe to be important when critically evaluating information sources:

- Is the author's name provided?
- Are there illustrations?
- Is it searchable in Google?
- Is the publication date provided?
- Is it easy to read?
- Is there a reference list?

34. Select three of the following six statements about Wikipedia that you believe to be true:

- Wikipedia can be used in the start-phase of research (for instance, to find facts and definitions that you can work further with).
- Faculty members do not consider Wikipedia to be a reliable source.
- Wikipedia is the best source of information.
- Anyone can write in Wikipedia.
- Only experts write in Wikipedia.
- All articles in Wikipedia are quality-controlled.

35. Ann heard on public radio that new research proves that girls learn to read later than boys. She writes this in her paper. Should she cite the radio program as her source?

- Yes, public radio is considered a reliable source.
- Yes, but only if the radio program explicitly names the researcher.
- No, it is best to read the original research article and cite that.
- No, because she believes that the results must be wrong.

36. Select three of the following six criteria that you believe characterize a scholarly article:

- It is published in a printed journal.
- It is peer-reviewed prior to publication.
- It is based on research.
- It is written in everyday language that is easy to understand.
- It has a reference list and an abstract.
- It is written by a faculty member.

37. The paragraph below is taken from an article in an online magazine: L. Bjøringsøy (2013). *Informasjon fra transetilstand*. (Retrieved from [www.nyhetsspeilet.no](http://www.nyhetsspeilet.no))

“In a higher state of consciousness we have access to information which is far above our level of knowledge. In this state we can receive information about everything that has ever happened and everything that will happen in the future. Even changes on a physical plan are possible in this state.”

Would you say that the article is a reliable source?

- Yes
- No
- I don't have enough information to judge the reliability.

**Plagiarism**

Plagiarism is presenting another's work as if it were your own. Plagiarism is academic dishonesty and is considering cheating.

38. How do you estimate your ability to avoid plagiarism when writing?

- Very poor
- Poor
- Average
- Good
- Very good
- Don't know

39. Joe is writing a paper in college and has learned that he must cite his sources to avoid plagiarism. When must he cite the sources he used (choose three alternatives)?

- When he uses someone else's ideas, opinions, or theories
- When he uses statistics from a research article
- When he uses facts that are easy to look up, such as the population of Norway
- When it's common knowledge in his discipline
- After every chapter in his paper
- When he quotes someone directly

40. Is this considered plagiarism?

	Yes	No
Liv uses statistics from an article and cites the sources both in the text and in the reference list.		
Oda borrows a paper from a previous student and rewrites it in her own words. She does not cite the source.		
Kai translates research results from German to English. He does not cite the source.		
Jon uses others' theories and rewrites them with his own words. He does not cite the sources.		
Eva finds the dates of the Gulf War on the Internet. She writes this in her paper and does not cite the source.		
Ali copies a text from the Internet and pastes it into his paper. He exchanges some words with synonyms. He does not cite the source.		

41. Thea must hand in a 20-page paper next week, but she's been busy and hasn't started. The paper counts for 50 percent of her grade, and she has to pass to retain

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her stipend. Thea solves the problem by copying entire paragraphs from articles she's found on the subject, and putting them together in her paper. She writes a short introduction and conclusion in her own words. She provides all sources in her reference list.

Read the text above. To which extent do you agree/disagree with the statements below?

	Strongly disagree	Disagree	Unsure	Agree	Strongly agree
Thea's actions comply with recognized ethical norms in academia.					
Thea's method of writing is traditionally and culturally acceptable.					
Thea's method of writing is accepted at our school.					
Several students write papers in a similar fashion.					
Thea's actions are not morally justifiable.					

42. Rank how much Thea learns by writing her paper using the methods below:

1 = much learning

2 = some learning

3 = little learning

4 = very little learning

- Thea writes her paper using the method described in the previous question.
- Thea paraphrases ideas from the articles she has read and uses them in her paper to answer her research question. She cites the sources in her text.
- Thea combines copied texts with articles that she has reformulated in her own words. She cites the sources in her text.
- Thea summarizes the articles she has read and cites the sources in her text.

### Citing Sources

Correct citing of sources in written work requires both citations in the text and references in the reference list (bibliography).

43. How do you estimate your ability to cite sources correctly?

- Very poor
- Poor
- Average
- Good
- Very good
- Don't know

44. Which three of the following statements about in-text citations are correct?

- An in-text citation should include enough information so that the reader can find the reference in the reference list.
- There is a direct correlation between in-text citations and references in the reference list.

- An in-text citation should contain enough information that readers can find the source.
- An in-text citation shows that you have used a different source and that the information is not your own.
- An in-text citation contains the name of the publisher.

45. If Paul writes the following sentences, does he have to cite the source?

	Yes	No
80% of Norwegians pay their bills on the Internet.		
Edvard Grieg was born on June 15, 1843 and died on Sept. 4, 1907.		
The Centre Party received 5.5% of votes in the latest election.		
New research shows that there was substantially more sea ice in the Arctic in fall 2013 than in the previous fall.		
Men have a better sense of direction than women.		
According to Gaillard’s theory of aging, certain species have a decreased risk of dying as they grow older.		

46. You have learned that you must include a reference list at the end of your paper. Which three of the following statements about reference lists are correct?

- The references should be written in the order that you used them.
- The references should be written in alphabetical order by author’s last name.
- All references should be written in the same list.
- References in the reference list should have been cited in the main text.
- The references should be listed in chronological order, with the oldest first.
- References from the Internet should be written in a separate list.

47. Do you have any comments? Please write why you were satisfied/dissatisfied with the library course or how the course could be improved. We appreciate your feedback!

**Notes**

1. Ellen Nierenberg and Øyvind Gjems Fjeldbu, “How Much Do First-Year Undergraduate Students in Norway Know About Information Literacy?” *Journal of Information Literacy* 9, no. 1 (2015): 15–33, available online at <http://dx.doi.org/10.11645/9.1.1983> [accessed 21 October 2015].
2. Bente Rasch and Unni Trondsen, *Informasjonskompetanse: Brukerundervisning i Universitets- og Høgskolebibliotek* (Oslo: Riksbibliotekjenesten, 1999), 6 (own translation).
3. Norwegian Agency for Quality Assurance in Education, “The Norwegian Qualifications Framework for Lifelong Learning” (last modified Apr, 2014), available online at [www.nokut.no/Documents/NOKUT/Artikkelbibliotek/Norsk\\_utdanning/NKR/20140606\\_Norwegian\\_Qualifications\\_Framework.pdf](http://www.nokut.no/Documents/NOKUT/Artikkelbibliotek/Norsk_utdanning/NKR/20140606_Norwegian_Qualifications_Framework.pdf) [accessed 29 November 2015].
4. Amber Walraven, Saskia Brand-Gruwel, and Henny P.A. Boshuizen, “How Students Evaluate Information and Sources When Searching the World Wide Web for Information,” *Computers & Education* 52, no. 1 (2009): 234–46, available online at <http://dx.doi.org/10.1016/j.compedu.2008.08.003> [accessed 11 October 2015].
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7. Judith Gullifer and Grahama Tyson, "Exploring University Students' Perceptions of Plagiarism: A Focus Group Study," *Studies in Higher Education* 35, no. 4 (2010): 463–81, available online at <http://dx.doi.org/10.1080/03075070903096508> [accessed 24 November 2014].
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10. Nicholas Tomaiuolo, "Citations and Aberrations," *Searcher* (July/Aug. 2007): 17–24.
11. Carl A. Kirton, "Strategies and Tools for Developing an Evidence-Based Practice," in *Nursing Research: Methods and Critical Appraisal for Evidence-Based Practice*, eds. Geri LoBiondo-Wood and Judith Haber, 396–417 (St. Louis, Mo.: Elsevier, 2014).
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13. Nancy E. Adams, "A Comparison of Evidence-Based Practice and the ACRL Information Literacy Standards: Implications for Information Literacy Practice," *College & Research Libraries* 75, no. 2 (2014): 232–48, available online at <http://crl.acrl.org/index.php/crl/article/view/16360/17806> [accessed 13 September 2015].
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16. Adams, "A Comparison of Evidence-Based Practice," 243.
17. *Ibid.*, 243.
18. *Ibid.*, 238.
19. Association of College and Research Libraries, "Framework for Information Literacy for Higher Education," last modified February 2, 2015, available online at [www.ala.org/acrl/sites/ala.org/acrl/files/content/issues/infolit/Framework\\_ILHE.pdf](http://www.ala.org/acrl/sites/ala.org/acrl/files/content/issues/infolit/Framework_ILHE.pdf) [accessed 21 December 2015].
20. *Ibid.*, 4.
21. *Ibid.*, 4.
22. *Ibid.*, 5.
23. Cindy Kovalik et al., "Information Literacy, Collaboration, and Teacher Education," *Communications in Information Literacy* 4, no. 2 (2011): 145–69, available online at [www.comminfolit.org/index.php?journal=cil&page=article&op=view&path\[\]=Vol4-2010AR6](http://www.comminfolit.org/index.php?journal=cil&page=article&op=view&path[]=Vol4-2010AR6) [accessed 9 September 2015].
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26. Nierenberg and Fjeldbu, "First-year Undergraduate Students in Norway," 18.
27. Head and Eisenberg, "How Today's College Students Use Wikipedia," in *Results*.
28. Walraven et al., "How Students Evaluate Information," 235.
29. Gullifer and Tyson, "Exploring University Students' Perceptions," 469.
30. Sutton et al., "A Model for Exploring Student Understandings of Plagiarism," 140.
31. Lee, "It's Time to Teach Citation Basics," 56.
32. Tomaiuolo, "Citations and Aberrations," in section "A lost art."
33. Nierenberg and Fjeldbu, "First-year Undergraduate Students in Norway," 29.
34. Moch et al., "Undergraduate Nursing," 6.
35. Kirton, "Strategies and Tools," 398.
36. Adams, "A Comparison of Evidence-Based Practice," 237.
37. Personal communication with health-science librarian Elin Opheim, 27 January 2016.
38. ACRL, "Framework," from the frame "Authority Is Constructed and Contextual."
39. Personal communication with Elin Opheim, 27 January 2016.
40. Personal communication with Jette Foss, 17 June 2016.
41. Earp, "Integrating Information Literacy," 176.
42. Kovalik et al., "Information Literacy, Collaboration, and Teacher Education," 146.