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Adapting the New ACRL Framework to IL Education at Tampere University of Technology

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Abstract. In 2016, the Tampere University of Technology (TUT) Library adopted the new ACRL Framework for Information Literacy for Higher Education to its information literacy education. ACRL encourages libraries to deploy the frames to best suit their own situation and needs and, accordingly, the TUT Library has adapted the frames to better suit the needs of its technical students and researchers. This paper will present the ways in which the TUT Library has adapted the Framework to teaching of information literacy, how partnership with teaching staff members was built through active collaboration, and the initial results of these changes as evaluated by both students and teaching staff.

Keywords: Information literacy, ACRL framework, new IL frames, higher education, academic libraries, collaboration, teaching.

1 Introduction

Information literacy (IL) has been widely recognized as one of the most important skills in the future: systematic and high-quality teaching in IL promotes learning skills, increases student commitment to the university community, improves the quality of theses and supports the postgraduate studies, and/or employment of students. In 2016, TUT named IL as an important part of the university's strategy and education development programme, after which IL teaching became integrated into each degree programme. The integration involved updating teaching content. The TUT Library became the first Finnish library to upgrade its IL teaching content according to the ACRL (Association of College & Research Libraries) IL framework [1].

This article briefly introduces the concept of ILcy and the creation and implementation of new IL frameworks in teaching by the TUT Library. We will discuss the different phases of the process, with a special focus on the importance of cooperation between departments in planning new IL teaching. At the end of the article, we will present surveys on IL skills for students and teaching staff members, and their results.

2 Information Literacy

2.1 IL Definition

Before the rise of social media and networks, library organizations in the U.S. and the UK had drawn up definitions of IL. These definitions were similar in many, but not all, respects. Different organizations have adapted these definitions during the years, as the ACRL definition from 2000 [2] included some of the elements of the American Library Association's definition from 1989 [3] such as the extent of information needed, the ability to find the information effectively and efficiently, incorporating new information with existing knowledge, and an understanding of the information environment [4].

ACRL's IL standards and new, updated frameworks are not extensively used in the UK although they are used in several other European countries [5], including Finland. At TUT library, the IL definition based on the ACRL standards was initially adopted, and as the new frames were introduced in 2015, adapting them into the curriculum was a natural process (more on this in section 3.1). In 1999, the UK-based SCONUL (College of Societies, National and University Libraries) developed an IL model that comprises seven competence pillars that were also included in ACRL's definition in the following year. According to the SCONUL definition, an information literate person is able to "construct strategies for locating information" and has "the ability to synthetize and build upon existing information, contributing to the creation of the new knowledge" [6, p.6].

In the SCONUL definition, IL is approached as a development process: a person can gradually develop from novice to expert in each of the seven pillars, that are based on IT and library user skills. These two abilities are not included in ACRL's definitions, but according to Mackey and Jacobson, they can be identified on the background of ACRL's standards, recommended indicators, and outputs [4]. The SCONUL model also addresses the development of literacy in each of the pillars. Only when the skills develop does the level of building upon existing information and creating new information increase. The IL goals of MSCHE (Middle States Commission on Higher Education) [7, p. 11-12] also emphasize the development of students' skills from the start of studies to postgraduate studies. Mackey and Jacobson also point out that in IL discussions, SCONUL makes a difference between learning skills and more advanced skills that prepare individuals for higher education activities and jobs. SCONUL has also developed and expanded on its definitions of the seven pillars recently [4].

2.2 The ACRL Framework for Information Literacy

ACRL's New IL Frames [1]

- Authority Is Constructed and Contextual
- Information Creation as a Process
- Information Has Value
- Research as Inquiry

- Scholarship as Conversation
- Searching as Strategic Exploration

According to Carol Burgess, the development from the 2000 standards to the new IL frames is based on *Threshold Concepts and Transformational Learning* (2010) by Meyer and Land. In the work, the authors defined the theory of threshold concepts, in other words, concepts of learning experiences that open up new perspectives and turn our attention to things we had not noticed before. The new way of understanding, interpreting, or examining the information needed can make a person think and act differently [8].

According to Foasberg, ACRL originally introduced the new IL frames that would replace the standards. This was because the Information Literacy Standards Committee had requested adjusting and updating the standards extensively due to permanent changes in technology, academic communication, and the lifecycle of information. In 2014, the framework preparation working group presented several proposals that were released for comments and discussions [9]. In January 2016, the ACRL Board officially adopted the frames.

As Foasberg states, there is a risk that some libraries will try to use the frames as another standard, measuring expected general skills on the basis of them. Some scholars argue that the standards and frames can be analyzed and combined into a coherent whole. Foasberg notes that while it makes sense to adapt some of the current approaches to the frames, it is important to start by addressing the different philosophies behind the documents and their effects. This is important because the frames are not simply the same standards in a new package, but they offer a way of improving our procedures. Approaches to deploying the frameworks and improving existing pedagogy should be included on the basis of the philosophy behind each document [9].

2.3 Teaching IL in Finland

Finnish universities underwent major changes in the 1990s: information technology transformed the sector, particularly university libraries, and more attention was paid to learning processes and the competence of university graduates. The internet spread fast, and electronic publishing and international cooperation started to grow, which also required libraries to redefine the basis of their operations and their role [10].

Finnish university libraries had offered teaching in the use of libraries decades before these changes. As a result of the transformation of education, the teaching materials and facilities, computers, and IT services used by libraries received more attention. Electronic publishing, catalogues, and services became more common, and libraries started to teach information retrieval and searching skills. Sinikara and Järveläinen [10] point out that these new approaches had one important thing in common: they emphasized the library user's perspective rather than the library's. The new, holistic approach to learning opened up new opportunities to develop libraries and the libraries found their new role as teaching providers [10–11].

The shift of the educational paradigm, the exponential growth of electronic scientific

thinking, and the giant technological leaps were a challenge for university libraries, forcing them to reconsider their teaching concepts. It became clear that the traditional teaching libraries had provided before was not enough. As a response to the new challenges, Finnish university libraries thought that the ACRL IL standard [2] could be the solution. Interest towards SCONUL's definitions was also high in Finland, because SCONUL described the development of IL more clearly than ACRL's standards. However, the Finnish libraries considered ACRL's standards for higher education to be the best solution based on interlibrary cooperation, information sharing, and the setting of shared goals [10].

In the early 2000s, Finland implemented a national programme to develop IL teaching in all universities and universities of applied sciences. University libraries started adapting the goals of IL teaching together, the most important of which was to integrate IL teaching more firmly into university studies. The libraries also wanted to map out the key elements of IL, prepare an IL curriculum, and develop online teaching. In addition to this, university libraries established a collaborative network [12] and launched an interlibrary project [13]. In 2013, Finnish universities of applied sciences and FUN (Finnish University Libraries' Network) published their recommendations on IL for higher education [14].

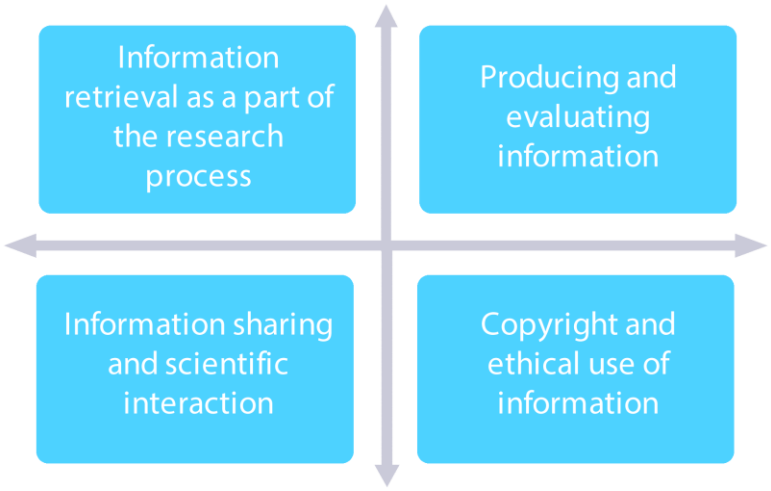
3 Teaching IL in TUT

3.1 Modified IL Frames in TUT Library

Like all Finnish university libraries, TUT Library has used the IL definition that is based on ACRL's IL standards from 2000 [2]. Since fall 2016, IL teaching in TUT has followed the new frames [1] published by ACRL in 2015. Although IL teaching in TUT emphasizes the ACRL definition, the most important skills affecting the IL competence of contemporary university students, as identified in the different definitions of IL, were taken into account in the planning.

The TUT Library embraced the new IL frameworks in 2015. In the introduction to the new frames, the authors wrote that "each library and its partners on campus will need to deploy these frames to best fit their own situation" [1]. As for example Zhang et al. [15] note, IL teaching requires customization and attention to detail in order to take the differences between technical disciplines into consideration. Thus, the TUT Library has also adapted and combined the new IL frames to make them fit teaching in the technical fields, taking into account the philosophy behind them (see for example [9]).

TUT's four IL frames are:



These frames follow the ACRL framework: the ACRL frames Searching as Strategic Exploration and Research as Inquiry have been combined to form a new frame titled *Information retrieval as a part of the research process* that encompasses information retrieval as an iterative process. The frames Information Creation is a Process and Authority is Contextual and Constructed have been substituted with a more general *Producing and evaluating information*, which focuses on the ways information is produced. *Information sharing and scientific interaction* is based on the Scholarship as Conversation –frame, and ACRL's Information Has Value is contained within the *Copyright and ethical use of information* –frame. The aim has been to simplify the ACRL frames and focus on the needs of technical students, which often require a very practical and "hands-on" approach to IL, which is stressed through the frame names.

At TUT library, the frames have been adapted into teaching through a careful process of identifying key ideas and concepts in each frame, and finding out how these ideas and concepts can be integrated into teaching. As with the original framework, the aim is to permanently change the way the students seek, use, produce, and evaluate information. Teaching methods vary from lectures to group work, independent study, and flipped learning. As per our experience, technical students tend to be very confident on their own competencies and therefore the teaching aims at encouraging students to test and try out through a learning-by-doing approach.

In order to gain a sufficient level of IL at university level, the student should master these four frames by the end of their studies. However, learning IL is not a linear process from one frame to another. Instead, the contents of each frame depend on the student's own level (new student, BSc, MSc, researcher). The contents of the frames are taught to students based on how their information needs evolve and change as their studies progress. For example, under the frame "Producing and evaluating information", first-year students learn to recognize different information sources, BSc's learn to evaluate these sources, and MSc students and researchers learn how authorities are formed and

how information should be questioned. Students can also return to concepts they have already learned about within each frame whenever they need to.

3.2 Reframing IL Teaching in the TUT Library

The TUT Library reformed its teaching of information retrieval skills in 2016. Before the reform, the teaching had been less comprehensive and systematic. No uniform teaching that would cover all students was provided for first-year students, and IL teaching was included only in some of the bachelor's degree programmes. In master's studies, IL was taught in one optional course, and its content partly overlapped the content of IL teaching in the bachelor's degree programmes. Furthermore, the library planned the teaching practically independently with little cooperation with departments.

As for example, Wakeman [16] has criticized the approach where IL teaching is perceived as the library's own teaching. Instead, it should be seen as an important and integrated part of the curriculum. In Wakeman's view, detaching IL teaching from the rest of the curriculum can easily lead to not recognizing the lifelong learning skills covered by IL. In this context, the integration of teaching by the TUT Library into all degree programmes must be seen as an important change in the importance of IL teaching throughout studies. Similarly, Saarti [17] points out that one-off teaching in IL is not enough at the university level, but instead IL teaching should be included in all stages of basic teaching. Furthermore, IL teaching should develop and become more advanced as the student's skills improve. Because the technical and scientific disciplines taught in TUT tend to develop fast and require the latest research, it is justified to integrate IL into other teaching discipline-specifically. Students graduating from TUT must be able to search for, use, and apply the latest scientific information from several sources.

In 2016, IL teaching was recognized as an important competence area also by the TUT management. Teaching in information retrieval skills became mandatory for all undergraduate students: first-year students, BSc seminar attendees, and master's students. The purpose of this was to secure equal access to high-quality IL teaching to all students. In their first year, students attend three hours of IL teaching (one-hour lecture and two hours of exercises), in bachelor's studies three hours (one-hour lecture and two hours of exercises), and in master's studies two hours of exercises. Course attendance is mandatory and substitute assignments can only be used in exceptional cases. All the teaching provided by the library was integrated into the existing courses of faculties, and the library stopped providing separate credit bearing courses. However, the TUT Library is still responsible for planning and implementing IL teaching, and the teaching is provided on the library's premises. In other words, the TUT Library has not adopted the "liaison librarian" model where a contact person from the library gives short presentations alongside other tuition.

In spring 2016, the educational information specialist from the TUT Library met teaching staff and academic officers from each teaching subject in order to identify the most suitable courses for IL teaching at each level. The planning emphasized the approach of Zhang et al. [15]: teaching by the library was integrated into the course

content of degree programmes. An important selection criterion was that students had a clear need for information during the course, and the library's information retrieval teaching could help meet that need, ensuring that the students would be motivated. For example, the assignment for first-year students at the Faculty of Engineering Sciences was to design an amusement park ride, and during the library class, the relevance of standrds and patents as information sources was included as a central theme.

The planning of the teaching involved the teaching staff of faculties, while the library was responsible for planning and organizing the teaching. Collaboration between the library and teaching subjects is critical for the success of the new model (see, for example, [18]). The important goal is to build a partnership through collaboration, and as Oakleaf et al. [19] point out, the important aspect of this process is that the library's information specialists are involved in the planning and implementation of teaching as active and equal partners with faculty staff. This new collaboration with teaching subjects enabled taking the differences between TUT disciplines into account in the planning of teaching content. The special materials (such as the printed archives used in architecture studies or the technical standard and patent databases) received more attention in teaching, that responded to discipline-specific needs better.

4 Results

4.1 Self-Assessment by Students

Bachelor's students completed a survey as part of their IL studies in the school year 2016-2017. The survey contained questions on the usefulness, strengths, and weaknesses of the teaching, and the students' wishes for IL teaching. It also included a self-assessment section where students assessed their own IL skills before and after the teaching. One hundred and thirty students in different fields completed the survey.

The teaching received a lot of positive and encouraging feedback. The students' responses emphasized the usefulness of the teaching: many wondered why IL teaching was not provided in the first year. At the moment, IL teaching is offered in the first year, but these students were not aware of it. The most important benefits named by the students were the ability to locate field-specific information sources, form effective search terms, and use search techniques. In other words, the students themselves valued the TUT IL frame *Information retrieval as a part of the research process* as the most useful. As the students are in the process of writing their BSc. thesis, this is to be expected.

In particular, the students gave good feedback on the group exercise that reviewed the databases of the discipline in question. Several responses highlighted the importance of discipline-specific teaching. The students also wanted us to pay more attention to this, because there are notable differences between disciplines in, for example, the types of publications used. Taking the differences between disciplines into account is one of the most important areas of development in the teaching of information retrieval skills, and the library staff and teaching staff members at faculties hold regular meetings to

discuss this.

Feedback on the lecture was mixed. While some found the theoretical background useful, others did not consider the knowledge of scientific publishing procedures to be important at the bachelor's thesis phase. However, this has been identified as a key concept of the *Producing and evaluating information* frame of the TUT model, and as the teaching is further developed, will be subjected to revision in how the issue will be taught.

The students gave high grades to their information retrieval skills, particularly after the IL teaching. On a scale from 1 to 5, the students gave their skills an average grade of 3.0 before the teaching and 4.1 after the teaching. Before the teaching, 30 of the respondents felt like their IL skills were very or fairly poor, but none of the respondents assessed their skills as poor after the teaching. As many as 117 of the respondents assessed their skills as fairly or very good after the teaching, compared to 31 students before the teaching. However, it is wise to consider that self-assessment and its limitations. While ideally self-assessment increases the students' engagement with their learning, it has been claimed that not all students assess their learning on the same scale, and that differences for example in gender may cause variation in self-assessment [20]. Therefore, results gained through self-assessment should always be analyzed with caution.

4.2 Survey for Bachelor's Seminar Teachers and Thesis Supervisors

We also carried out a survey for bachelor's seminar teachers and thesis supervisors and received 12 responses (TUT offers a bachelor's seminar in 15 subjects). The survey was based on the adapted IL frames, and its aim was to find out how the teaching staff members assess the IL skills of the students completing their bachelor's theses. The teaching staff members were asked to evaluate their students on a 3-level frame, ranging the students' skills from bad to very good. Based on the results, the students' skills differed somewhat from the level suggested by their self-assessment.

Overall, the teaching staff members and supervisors evaluated the students' skills as ok or very good on the several areas of the IL frames. In the **Information production and evaluation** frame, over 90 percent used at least some good, reliable sources, and similarly, in the **Information sharing and scientific interaction** frame, over 90 percent could discuss their topic and related literature. However, over 20 percent of the students could not identify scholarship as a conversation and identify different views on their topic, and 15 percent could not bring out relevant themes and views into their discussion as expected by the frame **Information retrieval as a part of the research process.** Finally, in the **Copyright and the ethical use of information** frame, only 1,7 percent of students were unable to use references and mark citations correctly.

While the results of the teacher survey are very encouraging, the teaching staff members did not share the same level of confidence as the students did: the teachers were more cautious in assigning "very good" skills whereas the students themselves were clearly more optimistics about their competence in IL, seeing their skills as very good after attending the IL teaching.

5 Discussion

The TUT Library is deeply invested in IL teaching. The first results reveal that the experiences with the teaching have been clearly positive. The content of the teaching has been adapted to the technical fields, and collaboration with the teaching staff from faculties has been particularly helpful in modifying the content for the different disciplines. Furthermore, collaboration with faculties has increased awareness of the library's activities and highlighted the library's role as an equal partner in the planning of teaching.

The results of the surveys for bachelor's students and teachers reveal that while students find the teaching useful, their teachers and the information specialists at the library still find deficiencies in their information retrieval skills. The results support the hypothesis that students assess their information retrieval skills higher than they actually are and struggle to understand information retrieval skills fully (see, for example, [19]). In the students' view, information retrieval skills only comprise finding the information, and they lack a more comprehensive understanding of how to evaluate and use information. This was evident in the students' responses that concerned practically only the use of databases. Other more extensive themes related to teaching, such as source criticism and using information, were not discussed in the responses.

The information retrieval skills of young students is refleced by the fact that they know how to use the equipment and search for the information, but they have problems assessing the relevance and reliability of the sources. For example, when we have stressed that Wikipedia articles are not a usable source on theses, the students have turned to other sources that are as quick and easy to find. In other words, students are not using only scientific sources, but they might also use white papers that advertise the technical superiority of a particular company's products, referring to these as proven facts in their theses.

Based on our experiences, students in technical fields, in particular, use mainly electronic sources, often neglecting printed material, such as the basic literature and handbooks of their field. The comments by bachelor's seminar teachers support this statement: based on their observations, many students use only advanced pieces of research as sources but fail to understand the topic comprehensively because they have not learned the information covered by the basic literature.

However, these surveys cannot be used for drawing detailed conclusions because of the clear differences in the teaching of information retrieval skills to first-year students before the survey. Furthermore, this was the first survey of its kind, meaning that the results cannot be compared with earlier teaching. However, the trends are positive and better results can be expected from students who have completed all the stages of the information retrieval teaching: first-year, bachelor's, and master's levels.

References

1. American Library Association: Framework for Information Literacy for Higher Education.

ALA, Chicago (2015)
2. American Library Association: Information Literacy Competency Standards for Higher Education. ALA, Chicago (2000)
3. American Library Association: Presidential Committee on Information Literacy. Final Report. ALA, Chicago (1989)
4. Mackey, T., Jacobson, T.: Reframing Information Literacy as a Metaliteracy. College & Research Libraries 72(1), 62-78 (2011)
5. Langley-Palmer, L.: Review of the Book Teaching Information Literacy Reframed, by J. Burkhardt. SCONUL Focus 68, 92 (2017)
6. SCONUL Advisory Committee on Information Literacy. Information Skills in Higher Education: a SCONUL Position Paper. Prepared by the Information Skills Task Force, on behalf of SCONUL (1999)
7. Middle States Commission on Higher Education: Developing Research and Communication Skills: Guidelines for Information Literacy in the Curriculum. MSCHE, Philadelphia (2003)
8. Burgess, C.: Teaching Students, Not Standards: the New ACRL Information Literacy Framework and Treshold Crossings for Instructors. Partnership: the Canadian Journal of Library and Information Practice and Research 10(1), 1-6 (2015)
9. Foasberg, N.: From Standards to Frameworks for IL: How the ACRL Framework Addresses Critiques of the Standards. Libraries and the Academy 15(4), 699-717 (2015)
10. Sinikara, K., Järveläinen, L.: Information Literacy Development in Finland. Library Review 52(7), 333-339 (2003)
11. Campbell, S.: Defining Information Literacy in the 21st Century. In: World Library and Information Congress: 70th IFLA General Conference and Council, paper 059-E, 1-9 (2004)
12. Kokko, M.: Toiminnallisella Tiedonhankinnalla Kytkentöjä Opintoihin. Jyväskylän yliopisto, https://peda.net/id/c67380c86
13. Informaatiolukutaidon Opintosuunnitelma - Yliopistokirjastojen Yhteinen SVY-Hanke 2004-2006, http://www.helsinki.fi/infolukutaito/ILarkisto/IL-OPS_arkisto.html
14. Suositus Suomen Korkeakouluille – Informaatiolukutaito Korkeakouluopinnoissa, http://yliopistokirjastot.fi/wp-content/uploads/2015/06/ILsuositus_FI.pdf
15. Zhang, Q., Goodman, M., Xie, S.: Integrating Library Instruction into the Course Management System for a First-Year Engineering Class: an Evidence-Based Study Measuring the Effectiveness of Blended Learning on Students' Information Literacy Levels. College and Research Libraries 76(7), 934-958 (2015)
16. Wakeman, C.: Information Literacy in the Context of Contemporary Teaching Methods in Higher Education. In: Walton, G., Pope, A. (eds.) Information Literacy: Inflitrating the Agenda, Challenging Minds, pp. 71-84. Oxford, Chandos Publishing (2011)
17. Saarti, J.: Informaatiolukutaito-Tavoitteiden Integroiminen Yliopisto-opetukseen – Kuopion Yliopiston Kokemuksia. In: Nevgi, A. (ed.) Informaatiolukutaito Yliopisto-Opetuksessa, pp. 127-145. Helsinki, Helsinki University Press (2007)
18. Asplund, J., Hakala, E., Sallama, S., Tapio, S.: Integrating Information Literacy Education into the Curriculum at the University of Tampere, Finland. Nordic Journal of Information Literacy in Higher Education 5(1), 3-10 (2013)
19. Oakleaf, M., Millet, M., Kraus, L.: All Together Now: Getting Faculty, Administrators, and Staff Engaged in Information Literacy Assessment. Libraries and the Academy 11(3), 831-852 (2011)
20. González-Betancor, S. M., Bolívar-Cruz, A., Verano-Tacoronte, D.: Self-Assessment Accuracy in Higher Education: The Influence of Gender and Performance of University Students. Active Learning in Higher Education 1-14 (2017)