TEACHING INFORMATION LITERACY IN HIGHER EDUCATION

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TEACHING INFORMATION LITERACY IN HIGHER EDUCATION

Effective Teaching and Active Learning

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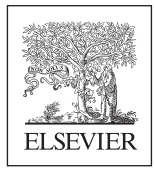

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CHAPTER ONE

The Importance of Being Information Literate

Sometimes when you sit down with a cup of tea after a job well done, you get this nagging feeling that something was not quite right after all, although you may not be able to pinpoint exactly what was missing, or out of place.

It is often feelings like these that create change and sometimes also improvements. Indeed, it was feelings like these, and the thoughts that followed them, that spurred the authors of this book to take a new look at how we teach information literacy (IL) at our institution, and eventually also to want to share those thoughts with our fellow teachers.

1.1 I'LL TELL YOU WHAT WE WANT, WHAT WE REALLY REALLY WANT

This book is an attempt to answer some of the many questions that arise in IL discussions: What do we want our students to learn from our IL sessions? How do we teach IL in a way that makes students see the relevance of it to their own studies and their lives in general?

What we want is for students to develop proper learning strategies and critical thinking skills. We think these are the two most important skills for librarians to teach in today's modern information society. Together they form a firm basis for any kind of learning activity, be it at university or at work. Learning how to learn is like installing electric lights in a house previously lit by candles. It removes some of the obstacles for the acquisition of knowledge, and consequently aids the production of new knowledge. Critical thinking skills are important when analyzing and evaluating information, and thus a necessary tool in ensuring quality in the student's research process. In other words, librarians teaching students

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how to cite sources and evaluate literature is not enough. We want to influence their perception and understanding of the academic world.

In this book, we attempt to provide an answer to the question of how to make information literacy more meaningful for students, and how to help them learn better and become valuable contributors to the academic community. We hope to do this by arguing that teaching IL is much more than just teaching search, source evaluation and referencing. To enable this the traditional scope of IL teaching needs to be broadened.

We like to think of libraries as havens fostering creativity, understanding and deep thinking. But is this reflected in our IL classes? Writing a reference is a skill any machine can master, and many databases do indeed have a function that automatically generates references for you. Searching for research literature is perhaps slightly more complicated, but how much does it challenge the student's perception of how research is made and used to create new knowledge? And is it at all smart to talk about Boolean operators when the crowd in front of you still struggles to grasp what a research article actually is?

Sometimes the functional or practical elements of information literacy takes the focus away from the core of the matter, which in our view is asking why we need to know how to search for quality literature and how to cite the literature we use correctly. We are, of course, not suggesting that most IL teaching concentrates solely on the practical aspects of academic integrity, but rather that many teachers are perhaps too busy to sit down and reflect on why IL is so important to learners of all ages, or perhaps that academia in general (including students) has certain expectations of what a library lecture or course should contain. Nor are we suggesting that IL teachers abandon all the practical elements of IL to please the crowd, or to simplify our courses so nothing new and challenging is presented to the students. Quite the opposite!

By bringing students step by step through increasingly challenging stages, all the time setting goals that makes students stop and think, perhaps even struggle a bit, librarians make their teaching more valued and interesting, since overcoming small challenges can install a feeling of confidence and mastery in the learner. We suggest that to be able to do this the librarian teacher must have a thoughtful and considered view of, not just information literacy, but also of teaching and learning, and of academic literacy, Academic Bildung, academic integrity, and learning strategies.

In our opinion, founding our teaching on these elements might facilitate linking information literacy and the student's discipline specific courses. If an IL course is perceived as a gateway between the student's previous

education and academia, it might not just increase student engagement but also increase IL courses' reputation for being useful to new students, and therefore also an asset for academic institutions and society at large.

1.1.1 Learning how to learn[1]

Most people enter higher education (HE) with the intention of learning something. Still, for many young students, the reasons for entering a university might be of a more "shallow" character; their friends do it, they need qualifications to land their dream job, or they simply do not know what else to do. Whatever the reasons, the fact that they have chosen to take one step up the education ladder also means that they need to be prepared for and welcome an advanced level of reading and learning.

To have a mature approach to learning means understanding that learning is a process, and that it needs steady attention over a certain period to bear fruit. It also implies facing challenges and figuring out how to deal with them without compromising on one's standard of work.

Many students find the experience of not understanding what the lecturer is talking about, or not being able to make head nor tail of the required reading material, particularly stressful and demotivating. However, learning new things implies encountering problems you have not met with before. If you go through your studies without ever facing any difficulties, it probably means you have not learnt much new. "Reading difficult scholarship is challenging. That is the point. If everyone could complete a university degree, they would do so." (Brabazon, 2013, p. 44). We will come back to the topic of desirable difficulties in Chapter 4, Learning Strategies.

Added to the difficult literature, and sometimes new teaching methods, is the tendency in academia to expect students to know more about methods, theories and concepts than they actually do. In primary and, to a certain extent, in secondary education, there is a strong focus on explaining new material thoroughly, and the teacher does her best to make sure that the teaching is adapted to the pupil's age and abilities.

A university professor does not necessarily have this accommodating approach to teaching when she plans her lectures. Rather, she expects students to take it upon themselves to make sure they are academically "fit" to take her class. If a student starts a biology course without the

[1] We acknowledge that this section headline is inspired by the rather brilliant online course, *Learning how to Learn*, created by scholars at the University of California, San Diego, cf. https://www.coursera.org/learn/learning-how-to-learn.

proper grounding, it is up to the student to get this. The biology professor will usually not check whether her students do the preparations needed to follow the lectures and learn from them. A study by Pritchard and Lee concludes that "students seemed to expect more help from faculty than they may actually be receiving at the collegiate level" (Pritchard & Lee, 2011). The same is found in other studies, for instance by Smith and Hopkins who report that for "first-year students it can be a shock coming to terms with independent, student-led learning, rather than the more guided, teacher-led learning experience of A-level study." (Smith & Hopkins, 2005, p. 309).

Being able to reflect on what you learn and connect new knowledge to previous experience or knowledge receives more and more explicit attention in HE research. (Read more about this in Chapter 3, Things We Know About How Learning Happens, and Chapter 4, Learning Strategies.) Thus if we link information literacy closely to awareness of learning, reflection and metacognition become as much parts of IL skills as searching and referencing. Reflecting on our own work and extracting meaning from what we read are both essential to enhance understanding and to grow as human beings through education. This aspect of education is however often lost somewhere between secondary education and the induction course at university, possibly because many students are simply not sufficiently prepared for what is expected of them in higher education.

For many students, thinking deeply about what they have learnt and why, is a novel experience. The shift from being told what to learn, to becoming an independent learner with sufficient self-discipline to regulate their own learning is not always easy for new students to adapt to, and can be experienced as a major challenge in higher education. It might also contribute to some students taking the drastic decision of actually dropping out of their planned education. In a study from Germany, "problems in performance", i.e., finding studies or academic requirements too hard, is the most frequently listed reason for dropping out of university (Heublein, 2014, p. 506).

Seeing that more and more people choose HE, representing a greater variety in motivation and preparedness for their studies, we need to prepare them better on how to learn in academia. Being able to evaluate the information they find ensures that their reading is limited to quality literature that enhances and broadens their existing knowledge. Understanding how to extract meaning from other texts and using them in their own work to create new knowledge not only heightens their

own learning, but can, by creating new research, eventually also contribute to other people's learning. For these reasons, we believe learning needs to be at the forefront of every IL discussion.

1.1.2 The oil in the machinery

"Education is the new oil"[2] is an expression we sometimes hear from educators and politicians. As traditional industries and the need for manual labor decrease, there is a growing, global need for people with higher education. According to Thomas Bailey, in the United States, "growth in productivity increasingly depends on the reach and quality of higher education" (Belfield & Levin, 2008, p. 75). He explains that due to technological advancements and competition from other countries, the American economy to a greater degree than earlier will base the strength of its economy on advanced skills (Ibid., p. 78).

Along with the need for a highly educated work force, more people than ever before choose to enter higher education. Sadly, many struggle to complete their degree, and every student not finishing their degree is costly for society, both because money and time has been lost, but also because society has missed out on potential competence.

Students are more prone to drop out of their studies during their first year at university. An American study revealed that as many as 22% of students did not return for their second year of higher education (Morrow & Ackermann, 2012, p. 483). Similarly, a report from Ireland found that 16% of new students did not progress after the first year (Patterson & Prendeville, 2014, p. 6).

Most HE institutions work hard on their retention strategies to limit the number of students who for various reasons end their studies without a degree or an exam. We believe that some of those dropping out do so because they struggle to adapt to academic life, and are not prepared for the demands of reading, writing, and learning in higher education. A European report on dropout and completion in HE confirms this, listing student support services, like preentry preparation and study skills, as influencing completion rates (European Commission, 2015, p. 20). According to this report, "preparedness of the student for higher education and their competence are

[2] From a TEDx speech by Jim Whitehurst in 2012. https://opensource.com/12/10/education-new-oil-will-drive-information-revolution.

seen as major determinants for study success" (European Commission, 2015, p. 21).

How can the library contribute to increased learning and lower drop-out rates in HE? Focusing on what it means to be part of academia is a way of preparing new students to the expectations they will be met within HE, and how they themselves can prepare for this (often) last part of their educational plan. This would for instance imply training in how to select, read, and extract meaning from academic texts. Another example would be teaching fresh students how to work independently and be able to self-regulate their learning behavior.

In the book, *The Price We Pay: Economic and Social Consequences of Inadequate Education*, Thomas Bailey writes that some students "lack academic skills" and "arrive at college with little idea about what will be expected of them" (Belfield & Levin, 2008, p. 84). One of his solutions to this problem is to strengthen "high school academic preparation" (Ibid.), so that when students arrive at university or college, they are better equipped for academic studies. We believe that can contribute to give students a better understanding of what it means to be part of academia, perhaps enough to take them on to the much "safer" year two and thus help young people finish their degrees. How to accomplish this is the focus of the main body of this book.

As we will return to later, there is an increased focus on information literacy in educational settings, both from university administrations and, to a certain extent, also from faculty. The reason for this is not to give students more to worry about, but because the demand for information skills in society has grown. In addition, the challenges concerning plagiarism has also contributed to a higher realization that students need guidance towards academic integrity and behavior.

In an academic setting, there is a suggestion that increased study and research skills can both improve retention rates and exam results. In other words, IL skills might prove beneficial for HE institutions and society in general. Unfortunately there is not a substantial amount of evidence-based research to support this claim, but some studies have proposed links between IL skills and exam results, most notably the Library Impact Data Project from the University of Huddersfield in the UK, which found "a statistically significant relationship between library resource use and level of degree result" (Stone & Ramsden, 2013, p. 546). Research by Soria, Fransen, and Nackerud (2013) shows similar conclusions. More studies like these are clearly needed, but if these claims hold true, they should be

enough of a motivation factor for both students and academic institutions as a whole to embrace information literacy.

1.1.3 Too much information driving me insane[3]

It is been a long time since we have heard anyone complaining about not being able to find enough information. The opposite is rather more common and we get impatient if we do not get our answers immediately. Whatever a citizen types into his favorite search engine, he will get a long result list. Some of it is probably quite relevant too. The big challenge is identifying the sources with the highest level of quality and relevance.

As IL teachers, this is something we should give some attention. If our search behavior and expectations are connected to speed and immediacy, are we still able to focus on quality and relevance? The complexity of our world of immediate access and the constant flow of information have changed the way we lead our lives. We are now in a position where "there is less a need to focus on retrieving information, but more on filtering, understanding, adapting and communicating it" (Whitworth, 2009, p. 175).

The process of evaluating online texts requires a certain skill in reading and analyzing texts. A student researching a certain topic will almost certainly encounter vast amounts of literature. If this is a beginner student, an even bigger challenge will be to "decipher" some of the more advanced academic writings. To trust a text about something you are not an expert in, you need skills in detecting the text's logic, its argumentation, and the validity of its conclusion. To some students, being advised to evaluate the information they select might therefore seem like an impossible task. Teaching students how to handle masses of information will thus benefit from also teaching them how to read and analyze academic texts, since this will make the filtering process easier for them.

1.1.4 It's not over till it's over: Lifelong learning

The enormous amount of information around us might make it difficult for the average citizen to make well-founded choices when looking for answers. In his book *Information Obesity*, Whitworth writes that "the reliability and credibility of information is challenged in many ways: overt restrictions on access; an inability to discern what is quality information

[3] Chapter heading taken from the song "Too much information" by The Police.

through the data smog; and a lack of critical information skills in the general population" (Ibid., pp. 130–131).

Since information literacy therefore is relevant, not just to people within an educational institution but as a supportive skill for learning in all stages of life, an emphasis on how you learn is very relevant in current IL teaching. In fact, the American Library Association (ALA) stated as early as in 1989 that

> *information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information, and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning, because they can always find the information needed for any task or decision at hand. (American Library Association, 1989).*

This has led The United Nations Educational, Scientific and Cultural Organization (UNESCO) to declare information literacy a "basic human right" and that "information literacy and lifelong learning are the beacons of the Information Society" (UNESCO, 2005). The Alexandria Proclamation establishes a clear relationship between IL and lifelong learning:

> *Information literacy enables people to interpret and make informed judgments as users of information sources, as well as to become producers of information in their own right. Information literate people are able to access information about their health, their environment, their education and work, empowering them to make critical decisions about their lives, e.g. in taking more responsibility for their own health and education. (UNESCO, 2005)*

The information age is characterized by a constantly changing environment for workers, students and all citizens, very often led by new technology, new organizational forms, and new services replacing old ones in society. Most importantly, our age is characterized by access to a seemingly endless stream of facts, marketing, news, fiction, stories, thoughts, and ideas. In other words the need for information literacy does not end on the day of graduation. Rather, IL comprises competencies and skills that transcend education and stretch far out into the work force and into our leisure time. When faced with major decisions, be it political, medical, educational, or even personal, a citizen needs to be able to make up his/her mind based on the right information, and not alternative facts.

If most of the information you relate to comes from sources made by people with likeminded views to yourself, your chance of development or intellectual growth can be reduced. These kinds of echo chambers are reinforced by our modern media habits, where you choose whom or

what to follow on social media, and where Facebook is your major news channel. How will you know you have made the best choice for you and for your society if you have not had access to all options? Development of a plurality of perspectives is part of the academic formation process.

IL is essential in understanding how information is made and how it affects your life. With recent international developments in mind, it is quite clear that we more than ever need to focus on critical evaluation of the information sources we use. Who will lead the way in this quest? Could it be you and other IL interested actors? Learning and forming well grounded decisions are skills deeply relevant, not just to students, but to everyone. Could libraries, both public and academic, take IL to a wider audience, encompassing all age groups and occupations?

Information literacy can assist people when looking for further education, or when preparing for new jobs or attracting financial support for work projects. Further, it can enlighten people in their personal lives, e.g., when it comes to news, health issues or political questions. Many parts of our modern lives are built upon finding the right bits of information at the right moments. When you, for instance, take a choice concerning your child's health, you want it to be an informed choice, based on the best possible advice and not hearsay.

Adaptability is another of many "new" skills that are believed to be essential in the modern work force. Evidence from a European report "shows that employers do not recruit people based only on their formal qualifications (vocational or academic), but also look for other competences that add value to their organization. They prefer flexible workers able to adapt quickly to unforeseen changes" (CEDEFOP, 2010, p. 69).

Information literacy carries with it an element of being able to analyze a given situation to find the best available solution, for instance finding the right information on which to base a decision. An information literate worker is not stuck in earlier training, but has learnt ways of updating her previous knowledge, or at least acknowledging that a change in approach is needed.

Whatever line of employment we look at, most will have changed the last few decades, some quite dramatically. When leaving HE we should be prepared to go through regular "updates" of our skills, like computer programs. This includes staying on top of new developments in a field, managing diverse equipment and new systems, and adapting to new forms of leadership and organizational change. Sometimes an employer will make sure the employee stays informed and ready, other times the employee must take responsibility for her own further education and modernization.

Having learnt valuable information skills will thus make people an asset in the work force, not just because they are able to renew themselves and their skills, but also because they know how to learn what they need to get ahead with a job. No education will ever make us fully prepared for everything that might happen at work. But being flexible and able to adjust when necessary will make sure we stand a good chance of being an attractive employee in a company or an institution.

The modern excess of information has created a strong need for skills that ease our quest for answers or new knowledge. Information literacy has developed hand in hand with technical developments, especially in the domain of computers, which have made communication and transfer of information quick and effortless. This is also why the definition of IL has changed its focus somewhat in the last decades and why we believe IL competence is so much more than just searching, finding, and using information.

1.2 WHAT'S IN IT FOR YOU?

We hope that reading this book will make you look at IL teaching with new eyes. We hope that you will recognize some of our suggestions and perhaps think about others in a new way. And most of all we hope that our thoughts about IL teaching, combined with your previous knowledge and/or experience will make both teaching and learning an even better experience for you and your students.

Our first and foremost aim is to emphasize the need for knowledge about learning processes in IL teaching. This is essential to make more out of the little time librarians often have with students. Knowledge about learning enables us to make use of new teaching methods and also to best take advantage of the many useful digital teaching tools that have appeared on the education stage the last decade.

Secondly, we find it truly important to introduce students, especially new students, to academia in a way that helps develop their academic integrity and critical thinking skills. By contributing to the students' academic formation process the library can play a vital role in supporting society's future knowledge consumers and producers.

The first part of the book (chapters 1–5) considers fields of research that can be related to IL teaching and learning. The second part of the book (chapter 6) takes a more practical focus, and with a basis in chapters

from part one, delineates various ways of teaching IL from a broad perspective on learning.

In Chapter 2, Information Literacy: The What and How, we take a look at the term information literacy, and how it is mainly used today. Part of the book's argument is that IL often is conceived as a rather narrow set of skills, which we want to broaden quite significantly by adding learning strategies and academic formation to the already established qualities of searching, evaluation, critical thinking, and producing new information.

In Chapter 3, Things We Know About How Learning Happens, we provide a selective review of some of the research that has helped us understand how learning happens. We will briefly describe the human cognitive architecture, looking at how both its strengths and limitations affects our ability to learn. In this chapter, we also consider approaches to learning and teaching, motivational aspects of learning, and some of the research on what actually seems to work best in teaching and learning. We believe that as IL teachers, we all benefit from continually working to develop our conceptions of teaching and learning, using the best available evidence from educational research and the learning sciences to do so.

Building on our conception of information literacy and our understanding of learning and teaching, Chapter 4, Learning Strategies, looks at research on learning strategies. If we accept that learning and IL are inextricably entwined, then deepening our understanding of effective and not so effective strategies for learning should allow us to better help our students become lifelong, information literate learners. In this chapter, we also attempt to point out the inherent affinity between effective (deep) learning strategies, and the thoughts and actions of an information literate knowledge seeker.

In Chapter 5, Toward Academic Integrity and Critical Thinking, we connect to the normative and attitudinal side of information literacy, and the values and norms of academic writing and academic production of new knowledge. We deal with academic integrity and its source in research integrity, and look at the role of critical thinking in IL. We also introduce you to the phenomenon of "Academic Bildung." Another term for the same phenomenon is "academic formation," in other words the process of being integrated into academic ways of thinking and learning.

The core of the book is presented in Chapter 6, Teaching It All, where we convert our theoretical reflections into practice. With a student-centered perspective the chapter gives advice on how teachers,

fresh or experienced, can undertake IL course development, or refinement of existing methods and material. Using research and our own teaching experience as the empirical basis, we suggest pedagogical methods which have proven successful in IL teaching and which, moreover, are likely to ease the students' transition to HE, and further, to more advanced levels of study. The chapter consists of a combination of general practical advice, example situations, possible exercises and activities, and tips on how to optimize use of technology in the teaching situation.

Chapter 7, Epilogue, concludes the book, linking the main ideas together, and also emphasizing IL as a discipline that is not static, but in constant change along with developments, both within education and in society in general.

CHAPTER TWO

Information Literacy: The What and How

2.1 INFORMATION LITERACY DEFINED

If you ask students and faculty what information literacy (IL) is, you will probably get very vague answers, if any at all. IL is still not a term that is well integrated in academia's perceptions of teaching and learning, even though many are familiar with the actual skills and competencies. Green exemplifies this in a study where the research habits of doctoral students are examined. She found that "these learners deliberately executed information literacy activities without necessarily labeling them as such" (Green, 2010). When we talk to faculty about IL, they agree that these skills are important, so it is perhaps not that they do not care or know about IL, but rather that they take these skills for granted or believe them to be so deeply ingrained in academic life that an explicit focus on them is not necessary, or they might just use other terms than information literacy.

In this section, we will try to provide some insight into how the concept of information literacy has evolved. We believe that the content of a concept is more important than its name, but through the next few pages we will nevertheless dive into the definition jungle.

2.1.1 What's in a name?

Since its early days in the 1970s, the concept of information literacy and its definition has been widely discussed. As recently as during the last few European Conference on Information Literacy (ECIL) conferences, the definition of IL was a recurrent topic. The question of which definition to use has caused some to claim that the definition in itself has become more of a focus than the actual content of the concept (Owusu-Ansah, 2005). That even librarians still debate what IL actually is, is probably a result of the discipline being fairly new, and is clearly a contributing factor

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to the slight confusion surrounding the term among the rest of academia and the teaching world.

In our view, information literacy translates to the ability to use available information to accommodate your information needs in the best possible manner. This includes knowing where to find relevant information, evaluating its relevance and quality, and using it to suit your purpose, for instance creating new knowledge or enhancing your own or others' understanding of something. The American Library Association defines IL as a skill or an ability to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association, 1989). This has become the leading definition of IL and is still frequently referred to.

Similar, but more detailed, is the definition from the Association of College and Research Libraries (ACRL) web site which, in addition to the ALA skills, also adds "Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally" (American Library Association, 2006).

In 2015 the *Framework for Information Literacy for Higher Education* from the ACRL defines information literacy as "the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning" (American Library Association, 2015).

IL has to a large extent been embraced by librarians, and the teaching of it has been taken up as a key library service, especially by libraries connected to educational institutions, but also public libraries have seen IL as a part of their mission. There is a fairly uniform agreement among librarians that the teaching and promotion of IL is an important service in today's information society. There is a lot of variation in how different libraries implement their IL teaching services, with some focusing more on search and/or referencing skills, while others for instance take a broader perspective and concentrate on academic integrity in general.

As an example of the growth of information literacy, there are now several conferences dedicated exclusively to this topic, in both Europe and the rest of the world.[1] Similarly, the amount of literature published on IL has increased steadily the last decade, as Fig. 2.1 illustrates.

[1] ECIL (European Conference on information Literacy), LILAC (Librarians' Information Literacy Annual Conference), Georgia International Conference on Information Literacy, Creating Knowledge (arranged by NordINFOLIT, a Nordic collaboration forum for information literacy), etc.

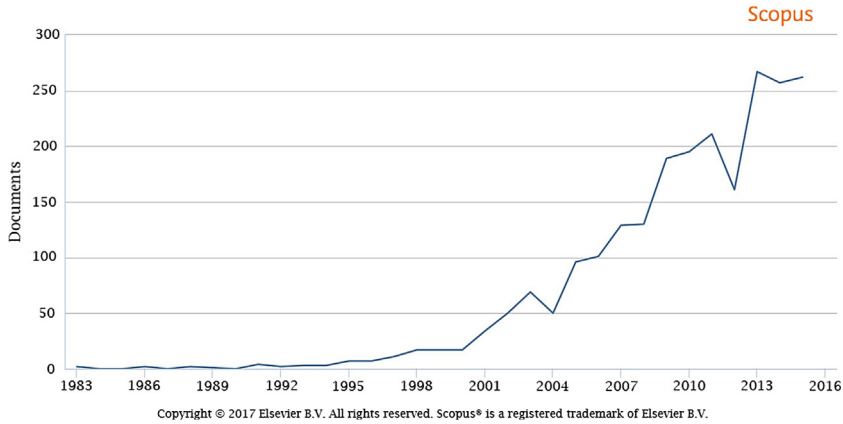

Figure 2.1 Documents in Scopus containing the phrase "information literacy" in their title from 1975 to 2015. Illustration from Scopus.[2]

The ALA definition, and several other definitions, all capture some of the essence of IL. One way to improve the definition, however, could be to more clearly state the connection between learning and information skills. The underlying aim of all IL teaching is to enhance learning in some way or other. In this, we concur with the view of Bruce et al. who write that "The notion of learning lies at the heart of information literacy" (Bruce, Hughes, & Somerville, 2012, p. 524). This must be in the forefront of any IL teacher's mind when planning their classes.

Sometimes the functional or practical elements of information literacy takes the focus away from the core of the matter, which in our view is asking *why* we need to know how to search for quality literature and how to cite the literature we use correctly. The most important purpose of these skills is to improve our learning and formation process, and even if this is in a way already embedded in existing IL definitions, making it more explicit could be helpful, to both teachers, librarians and students. We teach information literacy to help students learn more and learn better and thus get more out of their education. Simultaneously, IL helps students being acquainted with the core values of academia, so they can identify themselves as taking part in the greater enterprise of the production of new knowledge.

2.1.2 Information literacy and its cousin metaliteracy

For us as IL teachers, it is useful to bear in mind that there are many perceptions of what information literacy is. A decade or two ago, it was

[2] Similar figures are found in other databases, like ISI and LISA.

not uncommon for IL to be confused with ICT (Information and Communications Technology) skills. In recent years, other literacies have appeared on the educational horizon. Librarians and educators are now talking about transliteracy, digital literacy, metaliteracy, and media literacy, to mention some of the most frequently used terms.

This branching out from information literacy to other literacies is a healthy development, and a sign that IL as a discipline is maturing. Some of these other literacies are seen as sub-elements of IL, whereas others work as further developments of IL, as argued by Mackey and Jacobson (2011) in relation to metaliteracy.

Mackey and Jacobson's discussion of metaliteracy is interesting because of its focus on metacognition. Asking students to "think about their own thinking" and their own learning is an essential perspective in modern information literacy and in learning in general (Jacobson & Mackey, 2013). Acquiring good and useful learning strategies depends on an active reflection on personal learning in higher education. See Chapter 4, Learning Strategies, for a more thorough discussion of this.

We think these other literacies are useful for an updated definition of IL. We do not, however, believe it necessary to use another term than information literacy. Rather than speculating about which term will be best in order to teach students how to search, read, write and learn, we instead advocate having a clear notion of the philosophy behind our IL teaching. In other words, to make sure we have a clear idea about what we want students to achieve from attending an IL class.

2.1.3 The one definition to rule them all?

With the development in both technology and education the last decade in mind, it is still relevant to ask: What do we mean when we talk about information literacy? Is it time to redefine or expand the concept, or is the American Library Association definition still sufficient? According to Jacobson and Mackey the "information environment has altered so dramatically in the last decade that earlier attempts to codify what it means to be information literate are no longer sufficient" (Jacobson & Mackey, 2013, p. 85).

What is clear to us is the importance of using a broad and generic definition of information literacy to make room for emerging trends in teaching and technology. Some still believe technology is the key element of IL. The digital environment, however, changes faster than anything else in our society. A heavy focus on technological skills therefore seems futile when the tools we learn to use today will be obsolete or replaced in a handful of years.

In our opinion the key element of IL is not how to use technology, but rather, an understanding of how to use information in the best possible way in any given situation. This includes for example being able to connect new information to previous knowledge to learn something, creating new solutions based on available information, or producing new knowledge based on a variety of information sources.

Another point is that focusing on rules and the how-to-do-aspects somehow draws attention away from what is perhaps the very essence of information literacy. Learning how to cite an article or a book seems like a very reasonable task for students. Teaching students what an academic article is and how to read it with a researcher's mind, on the other hand, is far more challenging, but arguably much more important.

In many ways, rules and recipes are much easier to teach and also much easier to understand for the learner than reasons *why* a phenomenon appears in a certain way, or what lies behind an external pattern of events or ideas, in other words processing information is more challenging than just finding and acknowledging it.

Many skills in life are more complex than just learning the rules, and they demand more than just reading the instruction booklet on how to use a certain tool. Consider learning to drive a car, for instance. You can read the handbook, and learn how the engine and all the controls work, but to drive safely involves a lot more than that. When we argue that learning information literacy is more than learning a set of skills, it means also learning to understand how learning takes place, and how to enhance this process. If we use the driving metaphor, learning IL is also learning about other drivers, about road quality, traffic in general, in other words, how to focus and direct your attention to what is relevant for your journey.

When we gather all the different elements of IL that are relevant in an academic context, like knowledge of referencing, searching, evaluating and understanding information, learning strategies, and academic Bildung (see Chapter 5: Toward Academic Integrity and Critical Thinking), the term academic literacy comes to mind. This term is normally used in connection with language learning, but it is not really too out of place to adopt it to information literacy purposes. Academic literacy could possibly be a more attractive term for students and faculty than information literacy, since it in a better way displays what it is: skills that help you become a better student. Many researchers already use the broader perspective of academic literacy, i.e., including an understanding of academic behavior, both related to reading, writing and research habits. McWilliams and Allan explain the term like this: "Academic literacies

include critical thinking, database searching, familiarity with academic conventions such as referencing, use of formal register and the ability to manipulate a range of academic genres, which by definition restrict how meanings can be constructed and conveyed" (McWilliams & Allan, 2014, p. 1).

Will there ever be an ultimate definition of information literacy? As the theories surrounding knowledge and learning develop and change, so will the definitions of IL. We will therefore not dwell further upon this topic. In this book, we consider information literacy to be a fairy broad term that encompasses several other literacies and other related terms, including digital literacy and metaliteracy. It carries with it an understanding that it is relevant for all age groups and many aspects of life, not just the educational one. Even though academic literacy perhaps sounds better to some, it does not have an established use in this connection, and it might exclude someone from a nonacademic context.

Furthermore, we strongly support ALA's inclusion of learning strategies in the IL discussion. The most important aim of becoming information literate is to learn more and better, and to produce new knowledge, whether you are a student, an employee, or just anyone trying to navigate through life. We will develop this theme further in later chapters, and we deal specifically with learning strategies in Chapter 4, Learning Strategies.

The information literate individual manages the constant flow of data in an effective way and knows how to critically evaluate information and use it to create new knowledge. Further, he takes an active approach to learning and reflects on his own cognitive process. Finally, he acknowledges the ethical side of the use of information and is able to relate to the values involved in information literacy.

Teaching information literacy with these aspects in mind, it is our belief that it is easier to reach our audience. Most students are happy to learn how to create a reference list, but they do not relate to it personally and do not connect it to their own learning and their own attitudes. We believe that teaching IL with learning and academic values in mind will help students understand why reflecting on their learning process will get them further than just mechanically following a set of rules to reach your goal.

2.2 CURRENT TEACHING PRACTICES

Information literacy teaching is firmly established in most higher education institutions and is usually placed in the hands of library staff. Much of the library teaching is rooted in a need to train students in using the library

services and databases and has then developed to incorporate citation and referencing techniques and plagiarism issues, and now also learning strategies.

As librarians, we usually serve our institution as a whole, not just single departments. This can give us a different perspective than faculty, who are often immersed in their own discipline and might find it harder to see all the needs that fresh students can have. With our knowledge of information sources, our profession is well equipped to take on the role as information literacy guides. Having said that, many librarians often lack formal training in pedagogy, which faculty more often possesses.

In this section, we will take a quick look at the most common ways of teaching IL. We will also touch upon challenges often met by teacher librarians.

2.2.1 Forms of information literacy teaching

Much IL teaching takes the form of one or two sessions with students. Sometimes these sessions are lectures, sometimes online courses, sometimes practical sessions in a computer lab or with students' own laptops, and sometimes a mix between various teaching forms.

Common for many IL sessions is that it might be one of a few, or even the only one, a student attends throughout his whole course of study. Because of this, most librarians feel the weight of an obligation to make sure they can convey as much information as possible within these short few sessions. Typically, training students in the use of library databases can be seen as a must-do in library instruction. With just a few hours per student group, it seems very difficult to make much room for reflection and discussion, when traditionally, all the aspects of searching for, evaluating and using information must come first. (Read more about the consequences of trying to teach too much in too short a time span in Chapter 3, Things We Know About How Learning Happens.)

It is also very common to include IL courses or sessions early in induction courses, or at the beginning of students' writing assignments. Unfortunately, most librarians do not necessarily meet the students again, and thus do not have a chance to followup topics that were introduced earlier, or assess whether the students were in fact able to process and practice what was taught in the IL sessions.

2.2.2 Challenges of information literacy teaching

Meeting students in such a relatively short period, with none or few opportunities for follow-up, constitutes a major challenge to IL teachers,

in particular when we take into account that learning to become information literate is a process. What we want IL teaching to be, ideally, is simply not possible in a couple of short meetings with the student group. What is also clear is that it is difficult to solve this issue.

Another obstacle is the perception of information literacy as something that is part of academia, but at the same time not part of it. A chemistry professor will often simply teach chemistry and leave the rest to someone else, and a chemistry student will usually concentrate on learning chemistry and not reflect on what it takes to become a good chemistry student, apart from passing the exam. The result of this is very often a fairly low turnout to IL courses, unless they are made compulsory, in which case the participation and enthusiasm among students might be somewhat low.

This perceived gap between IL teaching and the subject-specific teaching reflects a deep challenge in today's IL teaching, and the two parts are often not sufficiently integrated and seen as related factors in student learning. The solution is not necessarily to drill students and faculty in definitions of information literacy, but making sure that aspects of learning strategies and information behavior are incorporated in all levels of higher education. To enable this we believe IL teaching should encompass a stronger emphasis on enabling students to become proficient learners, and that we should strive to make the relationship between learning skills and IL obvious to both faculty and students. And equally importantly, it requires librarians to be well informed about the students' subject-specific courses and to communicate well with faculty.

A third challenge we want to draw attention to is connected to how we define information literacy, and how we in the library sector work with the topic from a pedagogical perspective. As we will expand on in the following, many librarians have little pedagogical education, and their teaching methods are sometimes based on trial and error and/or on emulating colleagues or remembered teachers. This often works very well. Yet, teaching without a firm basis in validated theories and conceptions of teaching and learning leaves us without important guideposts for developing our IL teaching practice.

Many of these challenges might be rooted in the thought that information literacy is "just a library course," i.e., just a bit of information about the library and its many wonderful tools and sources of help for students and faculty. And even when we have librarians who are up to date with the newest teaching methods and developments in academic writing (which we have many of), the library itself might suffer from the enduring image of the

librarian stereotype as a strict and shy, alphabet-loving woman, shushing people and dusting old books. We all know that the library has evolved a long way from that image, but the myth lives on in surprisingly many, not just among students, but among faculty and administrative staff as well, and might affect their perception of the usefulness of a library class.

The possibly greatest challenge, however, is being able to reveal the connection between learning and information literacy in a way that students perceive as useful to their own studies. To make this happen, we need a clear understanding as teachers of why we are teaching IL. A well-founded perspective on the importance of information literacy is necessary to enhance the status of IL classes, but also to further a broader understanding of how IL helps both academic formation and lifelong learning.

2.3 THE TIMES THEY ARE A-CHANGIN'

When looking back the last 20–30 years it seems that IL teachers have done it all—from library instruction to virtual librarians, from searching to citing, optional courses and credit-giving courses, from lectures to problem-based teaching methods. As in most other areas of our society, change is necessary in educational institutions to develop teaching methods better adapted to student needs. Meeting new (and old) challenges for libraries means sticking your head out in the world to find new ways of doing things, improving the old ways of doing things, or simply doing something completely different. In this last part of this chapter, we will look at possibilities for change in IL teaching.

As the world and society around us change, so do we. Even though teaching methods in academia are far from revolutionized, there have been changes, and this should be reflected in the way we teach IL. The typical lecture and seminar teaching methods used for hundreds of years in academia are slowly being supplemented by other ways of supporting learning. The increased use of technology in society means that education can now take place whenever and wherever.

Increased focus on higher education and a changing job market has led to a huge increase in young people seeking an academic education. With such a variation in student demography, new challenges have appeared in higher education. Many students struggle to complete their degree. Some find it hard to adapt to learning the "academic" way, i.e.,

through individual work, self-discipline and an internal motivation to learn. With few guidelines on how to follow the academic path, it is no wonder that some strive to find their way.

What is emerging in current IL teaching is less of a focus on technical skills, and an increased focus on learning. The latter is not exactly new, but is more necessary than ever because of the above-mentioned variations in the student demography, a changing job market, and because of the increased availability of technological devices. We see a "move from providing teaching to support learning" (Virkus, 2003, p. 45).

Virtual learning environments, online tutorials, digital instruction, flipped and blended teaching: These are all elements of modern education. Flexible teaching and learning methods open up for more people taking higher education, regardless of geography, or social or economic background. This has also influenced the way universities teach information literacy. If a part of the student population no longer is present on campus, the IL services need to be offered off-campus as well. A reflection on the differences of teaching face-to-face and online therefore needs to be considered, as we will return to in Chapter 6, Teaching It All.

On a more administrative level, it is almost impossible to talk about library changes without mentioning money. The cuts in library budgets that are experienced almost worldwide, clearly affect services at libraries, and opportunities are limited for librarians who want to take further education, travel to conferences, buy new equipment for online teaching and so on. Even more worrying is the downsizing of staff, not just in libraries but also in the educational sector in general. Can we manage on the same level as today or even increase teaching activities with fewer staff?

Establishing practical and well-functioning routines for IL teaching is important to all educational institutions. Overcoming the obstacles is not always easy and demands perseverance, tact and long-term strategies. Read more about how to deal with IL challenges in Chapter 6, Teaching It All. In the next chapter, however, we will explore important aspects of how learning takes place, and how to accommodate the learning process in the best possible way.

CHAPTER THREE

Things We Know About How Learning Happens

Teaching and learning is hard. If learning was easy, learners would not need teachers, and if teaching was easy, teachers would not need years of training and thoughtful practice to do their jobs well. All teachers, including IL teachers, face tough and lasting challenges trying to help their students learn. Arguably, IL teachers also face, on top of all the other challenges, some that are particular to their trade. Ask a number of them, and you are likely to hear complaints about a lack of teaching time, a lack of understanding and/or respect from other faculty, a lack of genuine interest from students, and a lack of confidence in their own ability to teach (see, e.g., Houtman, 2010; Julien & Genuis, 2011; Wheeler & McKinney, 2015). If these perceptions are accurate, then it seems we IL teachers need all the help we can get.

Ideas, beliefs, and opinions about how people learn and about how best to teach have always been numerous and varied. At the most general level, our own (the authors') perspective on teaching and learning is broadly and moderately constructivist, with a strong streak of cognitivism. We hold the view that meaning and knowledge is constructed by each individual learner in an active sensemaking process, and in interaction with his or her environment, including, importantly, other learners, teachers, and the social milieu in general. This view implies a conception of teaching as an activity that facilitates and supports students' active sensemaking processes and that is geared toward conceptual change.

Also, related to this view, we would like to stress that we see teaching as a relational activity, happening in the space between two or more persons. Teaching is therefore an activity shot through with normativity. It concerns our moral and political orientations, and who we are and want to be as teachers in higher education. Our ways of being teachers are therefore always already value-laden. Critical reflection on our own beliefs and attitudes toward teaching and learning allows us to be teachers with authenticity, while also meeting the needs of the students and

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systemic expectations. By "authenticity" we here mean being true to your own unique beliefs and attitudes, acting as "the person you are." Questions concerning the overall goals of teaching and learning activities in higher education, and the overall goals of information literacy teaching are questions beyond the question of effective teaching and learning. So is the way we personally relate to questions of academic integrity and the "moral code" of academia. Our own answers to these questions are not neutral, and yet they are important for our motivation for teaching. As we argue in Chapter 5, Toward Academic Integrity and Critical Thinking, they are also important for our students, because as teachers we are also models of what it means to be an academic. For our students to develop the independence and personal engagement that we have called Academic Bildung, they need to see it in us, their teachers.

While broad theoretical and normative perspectives are important, it is still the case that at a more specific level of analysis, empirically validated models and methods must be considered one of the most important guideposts for teaching practice, be it teaching in general or IL teaching in particular. And, although the actual teaching itself may be more art than science, there is science in abundance to inform and support our practice. Decades of research in education and psychological science have produced a considerable knowledge base, and it would be remiss not to take advantage of it.

Even if it is possible to teach well without relating much to findings from educational research, we believe most IL teachers would benefit from an evidence-based approach to teaching. Just as learners choose how to go about their learning (see Chapter 4 on learning strategies), teachers choose how to go about their teaching. When planning our IL sessions, we are faced with choices about how to introduce our topic, how to engage our students, how to evaluate and assess what we and the students are doing. Trial and error experience, and our normative conceptions of what learning and teaching should be, are both important influences on those choices. We believe, however, that they should also be informed by the best available research evidence. On this basis, we might label our perspective on teaching and learning an *empirically informed cognitive constructivism*.

What the last few decades of educational research have provided is evidence and reasons to place more of our confidence in some ideas than in others, and probably to dismiss a few altogether. To put it plainly: some ideas are supported by research, and some are not, or at least not to

the same extent. By extension, some specific teaching models, methods or practices are supported by evidence, and some are not.

Perhaps surprisingly, it is not as easy as it should be to isolate useful and reliable sources summarizing the research base on learning and teaching for the working IL teacher and presenting it in a manner that easily lends itself to application. It is not that they are not there, but more that they easily drown in a mass of voices stating their opinions, whether these are supported by research or not. In fact, a number of unsupported ideas are strongly held beliefs, and often expressed by so many that they have almost become a kind of educational urban legends or myths (see, e.g., De Bruyckere, Kirschner, & Hulshof, 2015; Kirschner & van Merriënboer, 2013).

This chapter provides a selective review of the research base in educational and psychological science that we believe are relevant and useful to teachers involved in helping students become information literate. The chapter has two main parts. First, we take a look in some detail at three big ideas about how we learn: (1) Our information processing capabilities are limited. (2) We can adopt different approaches to learning (and to teaching). (3) Our motivation to learn is influenced by our conceptions of ability, and by our experience of autonomy, competence, and relatedness.

In the second, shorter part of the chapter, we will look at some findings from educational research about what actually works: (1) active, collaborative learning versus traditional teacher-centered approaches; (2) two-way feedback as a key to better teaching and learning; and (3) using a variety of teaching methods.

3.1 LIMITS OF HUMAN INFORMATION PROCESSING

Imagine being a student again. Your teacher is well into her exposition. She is quite good, even brilliant, you suspect, but you find the topic only vaguely interesting to begin with. Also, she is moving forward at a brisk pace and some of the ideas are unfamiliar to you. You find yourself wishing you could stop her from time to time and ask her to help you make sure you get what she is getting at. But you don't want to inconvenience the other students, and anyway, before you even have a chance to form a coherent question in your own mind, she has moved on. After working hard to concentrate for some time, you eventually find your

thoughts wandering. Occasionally you pull yourself in again, but now your grasp on her train of thought is even weaker than it was just a few minutes earlier. Finally, she pauses and looks expectantly at you and your fellow students. "Was that clear to everyone?", she asks. Hesitantly, trying to look intelligently thoughtful, you nod.

Although perhaps a bit tendentious, this scenario should be roughly recognizable to many students, as something that occasionally happens. It illustrates some of the universal limits on human information processing that make both teaching and learning hard. First, our working memory—the processes that support our holding on to and manipulating information we are working with at any given time—is strictly limited in both duration and capacity, particularly when information is unfamiliar. Secondly, our attention, acting as the gatekeeper to working memory, is easily derailed, thus allowing irrelevant information to occupy the limited working memory capacity that is so vital for the learning we are trying to do.

In this section, we will introduce a model of the human information processing architecture and some of the findings that support it. The model provides a simple framework for understanding and working around our most basic cognitive limitations. This is potentially very useful to (IL) teachers, because it provides a basis on which to evaluate whether or not our teaching accommodates the workings of our cognitive systems.

Fig. 3.1 depicts a simplified model of the human information processing apparatus, often referred to as our cognitive architecture. The model has been around for decades, and because of its early dominance, it came to be called "the modal model" (see Atkinson & Shiffrin, 1968; Mayer, 2011, p. 34, for an older and a more modern version of this basic architecture). Despite various refinements over the years, the basic model is still largely valid. And while it may not be literally true in every respect—e.g., its various boxes may not map neatly and one-to-one onto functional neuroanatomy—and while a lot of nuances and provisions are lost in such a simple display, it is still a very useful way to summarize many powerful ideas about human cognition.

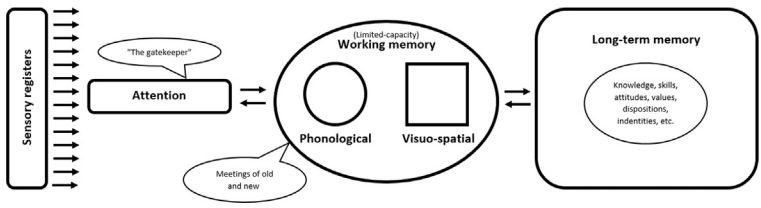

Figure 3.1 A simplified model of the human information processing apparatus.

We will introduce each component of the model in turn, but let us start with a brief overview, going from left to right. Information in our environment manifests itself mechanically (touch, hearing), electromagnetically (vision), or chemically (taste and smell), and thereby affects our sensory apparatus. Our various sensory receptors are numerous, and the amount of information they register is staggering. The average human retina, for instance, contains around 100 million photoreceptors (Baker, 2012). In Fig. 3.1, our senses are abstracted and bundled into the concept of sensory registers. Only a very tiny part of the information that affects our sensory organs is processed or even retained for more than a fraction of a second. The processes that select information for further processing—i.e., the processes that determine what is allowed to proceed to our working memory—are collectively called attention. It is useful to think of attention as analogous to a filter or a sieve, or, if you will, the gatekeeper to our limited capacity working memory.

Working memory is where the really interesting stuff happens. This is where information from our senses meets and interacts with what we already carry along with us as part of our long-term memories. As we will see in Section 3.1.5, these interactions are very important for learning. Working memory is itself composed of various subprocesses, some of which we will describe briefly in Section 3.1.4. These too have very specific implications for teaching and learning.

At the far right of our model is long-term memory. Long-term memory is not a simple, unitary store of information, but an abstraction encompassing a number of different types of memory and the processes underlying them. For our purposes, it is useful to think of long-term memory as everything we know and remember, consciously or unconsciously. It includes conceptual and factual knowledge, our implicit and explicit theories of how the world works, our autobiographical memories, our attitudes, values, skills, and dispositions. As such, the single most important goal of teaching and learning is in fact to modify our long-term memory. At the same time, this long-term memory that we want to change is itself a very powerful influence on whether, what, and how we are able to learn (see Section 3.1.5).

3.1.1 Attentional selectivity and control

Our experience of the world seems to us complete, accurate, and stable. This is largely an illusion. Our attentional processes filter out all but a tiny fraction of all the information available in our sensory registers.

A particularly striking demonstration of this principle became widely known after a seminal research paper by Simons and Chabris (1999) on what has come to be known as "inattentional blindness." These researchers asked their participants to watch videos showing members of two basketball teams, each passing a ball to other members of their teams. The participants were instructed to carefully count the number of passes within one of the teams. Midway through these videos, an unexpected event occurred. A tall woman with an umbrella, or a shorter woman dressed in a gorilla suit, entered the field and walked out again. Across various conditions, only about half of the participants noticed this unexpected event, despite its close spatial proximity to, even at times visually overlapping with, the basketball players.

The core phenomenon here is this: we tend not to notice—and thus we are unable to process—anything that our attention is not fully focused on. This was established already during the nineteen-fifties and -sixties, in a number of different experimental paradigms (Dosher & Lu, 2010; Folk, 2010), investigating both visual and auditory attention.

Attentional selectivity is universal and all-pervasive. We tend not to notice it, however, and thus we are generally unaware of how it affects us. In a teaching and learning context, attentional selectivity will matter. If the learner's attention is not properly focused on what is important to the learning itself, little or no processing will occur, and little or no learning will be the end result (Sweller, Ayres, & Kalyuga, 2011).

Given this, it seems important to know something about how our attentional focus is controlled and directed. Two basic principles are at work in attentional control: bottom-up processes and top-down processes. Attentional focus is partly controlled from the bottom up by events in our environment. Certain stimuli will serve to pull attentional focus away from whatever it is currently directed at. A loud, unexpected noise in a quiet room, for instance, will simply demand attention. In such circumstances, a shift of attentional focus—an orienting response—is almost reflexive. But less extreme deviations from background stimuli will tend to attract attentional focus too. Someone entering or exiting a room or an auditorium, even discretely, will rarely be completely ignored. A tiny flashing light on your smart phone, or a small notification pop-up in the corner of your laptop screen, will tend to tug at the beam of your attentional spotlight, sometimes successfully persuading you to abandon your current goals.

The implications of this in a teaching and learning context are relatively banal, but important none the less. If we surround ourselves with stimuli

irrelevant to our current learning tasks, our attentional focus will tend to jump around, allowing irrelevant information to occupy limited working memory capacity. This in turn reduces the amount of germane, learning-focused processing, and will serve to undermine our efforts to learn.

But if our attentional control is so fickle and easily derailed by random stimuli bottom up, why then do the participants in Simon and Chabris' experiments not notice the umbrella lady or the gorilla? As stimuli go, they are both unexpected, and certainly out of place. There are two related explanations. First, Simon and Chabris cleverly manipulated the unexpected events to visually blend in to the background stimuli. The gorilla suit, for instance, is black, and the unattended basketball team members wear black t-shirts. More interestingly, their participants' attention is strongly influenced by top down control factors. They have clear instructions, a very clear goal (count the passes in the white team), and most of them are probably highly motivated ("I'm *so* gonna get this right!").

Again, deriving implications for teaching and learning is relatively straightforward. Clear, specific goals and instructions help focus attention from the top down, allowing us to ignore irrelevant stimuli, even when they are otherwise quite noticeable. This again prevents our limited working memory from becoming overburdened, leaving that capacity for processing that leads to learning.

Clear goals may have several other advantages, too. For instance, not all distractions are external stimuli; quite often, we allow ourselves to become distracted by internal stimuli. They may be bodily sensations or emotions, or they may be thoughts concerning goals related to other aspects of our lives not directly related to what we are trying to learn.

In fact, there is a substantial research base in education science supporting communication of clear goals and success criteria for learning tasks. John Hattie of *Visible Learning* fame (Hattie, 2009), when summarizing the conclusions of his mega synthesis, lists providing "clear learning intentions and criteria for success" (Hattie, 2011, p. 134) as one of three main claims for higher education (for more on lessons to be learned from the Visible learning synthesis, see Section 3.4.1).

3.1.2 Limits on sustained, focused attention

Besides the selectivity and the tendency to be derailed by irrelevant stimuli, our attentional apparatus suffers from another limitation. Maintaining focused attention over time is hard mental work, and it almost seems as if

our attention tires after having been directed at the same stimuli for a while. Whatever may be the root cause, we do suffer occasional attentional lapses over time. In ergonomics, this phenomenon is known as the "vigilance decrement" (e.g., Smit, Eling, & Coenen, 2004).

While controlled studies of this phenomenon in realistic teaching and learning situations are surprisingly few and far between (see Wilson & Korn, 2007), there is some evidence that attention lapses during lectures. An early observational study found inattention at the very start of a lecture, followed by a period of relatively high attentiveness, and then lapses of attention tending to occur after about 10–18 minutes into the lecture. Also, lapses of attention became more frequent further into the session (Johnstone & Percival, 1976). A more recent study found lapses of attention arising after just a few (2–3 and 5–6) minutes, and replicated a pattern of shorter intervals between lapses as time goes by (Bunce, Flens, & Neiles, 2010), although in this study, lecture segments were relatively short (10–12 minutes).

A more interesting result from the study by Bunce et al. is that the frequency of attentional lapses decreased markedly during session segments using student-centered pedagogies facilitated by clickers (a type of student response system—see Section 4.3.3) compared to lecture-based segments. More interesting still, lapses of attention were less frequent in lecture segments *following* the clicker segments compared to lecture segments leading up to clicker segments (Bunce et al., 2010). It seems then that attentional lapses are more likely to be reported during lecture segments than during segments of student activity, and that bouts of meaningful student activity can somehow refresh students' ability to maintain attentional focus immediately afterwards.

Similar results have been obtained in studies of mind wandering during online, video-recorded lectures. Two studies estimated mind wandering to occur as often as from around 35 to around 52 percent of the time, and both studies found this proportion to be higher towards the end of the lectures (Risko, Anderson, Sarwal, Engelhardt, & Kingstone, 2012; Szpunar, Khan, & Schacter, 2013). Notably, in the study by Risko et al. (2012), mind wandering was associated with reduced note taking and poorer retention. Echoing the results from live lectures by Bunce et al. (2010), Szpunar, Khan et al. (2013) found markedly less mind wandering when online, video-recorded lectures were interspersed with test questions throughout.

It seems safe to conclude, then, that teaching by lecturing is likely to induce attentional lapses and mind wandering, both during live teaching

and in online, recorded teaching. Lapses are more likely the longer the lecturing segment lasts. On the bright side, it also seems that we can partially avert lapses by mixing in student-centered, learning-focused activity, such as clicker quizzes or test questions.

Why is this important to IL teachers, or to teachers in general? In their review of the research on attention lapses and mind wandering, Szpunar, Moulton, and Schacter (2013) argue that "mind wandering is particularly relevant to education, because learning depends critically on attention in ways that other activities do not" (p. 5). Recall that earlier (in Section 3.1) we described attention as the gatekeeper to our working memory; as the processes that determine what information is selected for further processing. To the extent that our attention is directed at something that is irrelevant to our learning goals, be it external stimuli or the encounters of our own mind wanderings, we are prevented from engaging in the processing that generates learning. Let us now consider working memory, the very component of our cognitive architecture where that processing actually happens.

3.1.3 Working hard with working memory

Working memory, sometimes called short-term memory, refers to the processes that allow us to hold on to and manipulate information we are currently aware of and working on. When following a conversation or a presentation, or when reading, our working memories retain what was just previously said or read and relates it to incoming information, allowing us to group together words and concepts to form larger, meaningful chunks. When solving a problem, we use our working memory to hold information about the current problem state, our next possible solution step and its consequences, and to relate these to the new possibilities they open up and to the intended solution.

Our working memory is severely limited in both capacity (the amount of information it can hold) and duration. Cognitive psychology pioneer George Miller (1956) famously estimated short-term memory capacity at around 7 pieces of information. This is reasonably accurate for some tasks, such as simply holding on to uncomplicated information (e.g., digits), but it is an overestimate for more complex information and for tasks that require relating bits of information to each other. Modern consensus gauges the central capacity limit of human working memory at about three to five pieces of information (Cowan, 2010).

To get a feel for these limitations, consider a common working memory capacity measure, the digit span task. In this task, the test administrator reads a sequence of digits, and the task of the person being tested is to repeat the same digits back in the correct sequence immediately afterwards. The test starts with 2 or 3 digits, increasing stepwise until the person being tested starts to fail, at which point an estimate of individual capacity is established.

Below this paragraph is a sequence of digits. Read it once, then close the book or cover your reading tablet, and try to repeat the correct numbers in the correct sequence. Go on, try it!

2 8 0 6 1 9 8 4 2 6 1 7

That was a sequence of 12 digits. Even under ideal circumstances, this far exceeds the normal limits of our working memory. Unless you cheated (or cleverly spotted a pattern—more on that soon), you would not have been able to retain all those digits and repeat them correctly after closing your book cover.

The mental strain involved in trying to retain too much information is almost like a physical sensation, and a vaguely unpleasant one at that. When reading the sequence of digits from left to right, our central storage limit is reached around the fourth to seventh digit. Reading subsequent digits, we feel the first few ones start to slip away from us. It is as if each new digit rudely shoves an old one out to make room for itself, despite our best efforts to hold on to them all.

As teachers, we are in constant danger of overburdening our students' working memories in a similar fashion. And because IL teachers are often allowed only one or two sessions with each student group, that danger looms even larger for us. As we saw in Chapter 2, Information Literacy: The What and How, we often feel tempted, or compelled, to squeeze a lot of information into each session. There is so much students need to know, after all. The nature of working memory implies we should make an effort to resist that urge and focus our energies only on the most central concepts and skills.

While we argue in this book in favor of using student-centered, collaborative, activity based teaching (see Chapter 6, Teaching It All), there are still occasions when a teacher needs to provide information or instructions. If we try to serve up too much, or if we serve it up too quickly, students are likely to be unable to hold on to it long enough to process it properly, thus reducing their chances of transferring it to more permanent long-term storage.

3.1.4 Two modes of processing in working memory

Before considering the role of long-term memory in teaching and learning, we should briefly consider another feature of working memory.

During the 1970s, scientists studying working memory had participants perform more than one demanding task requiring its use (see, e.g., Baddeley, 2012, for a historical account). Given our limited capacity, this of course, is usually very hard to do. Researchers noticed, however, that dual task performance was reasonably good if the two tasks required different types of processing. Performing a phonological task (e.g., recalling digit sequences of varying length) together with a visuospatial task (judging the relative spatial location of two letters) led to only a modest performance reduction. On the other hand, performing two tasks relying on the same type of processing (e.g., attempting to recall digit sequences of varying length while repeating a simple word aloud—both dependent on phonological processing), caused more severe performance reduction. This led to the proposal that working memory is a multi-component system capable of somewhat independent processing of verbal/phonological information and visual/spatial information, respectively.

This means that an overburdened working memory, easy enough to inflict on students in the first place, is even more likely to occur if we present information such that different sources require processing of the same type. For instance, if we present verbal information visually while simultaneously presenting verbal information auditorily, students will need to process both using the verbal/phonological subcomponent of working memory. Interference is very likely, resulting in suboptimal processing of both the visual and auditory verbal information. This is what happens when presenters use slides with plenty of text while talking at the same time. Students will attempt to process both messages using the same working memory subsystem (the phonological), but they are likely to fail.

This empirically derived theoretical distinction between phonological and visuospatial subcomponents of working memory forms part of the basis for developments in the science of multimedia instruction; the promotion of understanding and learning using both pictures and words (Mayer, 2009). Generally, multimedia instruction more effectively promotes learning (both retention and problem solving transfer) than instruction relying exclusively on verbal or pictorial mediation. One reason is that utilizing both subsystems of our working memory leads to a de facto capacity increase, allowing more resources to be devoted to integration and active sense making. Another is that building coherent mental models

of to-be-learned material is easier when it can rely on both verbal and spatial mental representations. However, the effectiveness of multimedia instruction is dependent on certain boundary conditions. Importantly, verbal and visuospatial information need to be integrated, i.e., presented together; spatially if words are printed, and temporally if they are narrated.

Being aware of this important property of our working memories can help us carefully consider how to coordinate visual–spatial and verbal information in expository teaching and when designing our own educational materials and resources. This in turn helps us avoid overburdening our students' limited processing capacities, preventing confusion and promoting understanding.

3.1.5 Prior knowledge and long-term learning

There are, though, other, possibly even more powerful ways, in which we can indirectly strengthen our inherently limited working memories. Consider our 12-digit sequence from Section 3.1.3 again. While central working memory capacity is only about 4 items, there are usually features present in any given situation that will affect how much we are able to hold on to or process (Cowan, 2010). When asked to repeat a string of numbers, for instance, we may be able to rehearse some of them before our capacity limit is reached, or, more relevant to teaching and learning, we may be able to process the information by grouping or organizing it; by imposing on it some sort of structure. In fact, in any group of people challenged to repeat a 12-digit sequence, always a handful is actually quite successful. When asked how they managed to retain all the digits, their answer is invariably along the lines of "I grouped them into three sets of four" or "I thought I saw a day–month–year pattern in the first 8 digits."

And in fact, there are patterns in the particular 12-digit sequence we tried to remember above. The first four digits are indeed in a day–month format, and June 28th is an important date in western history (the signing of the Versailles treaty in 1919). The next four digits are both a year and the title of a famous novel. The last four digits is the world record for running 10,000 m on a track. If we had hinted at what sort of patterns were hiding in that number sequence, would you have been able to remember it more easily? You most certainly would.

Why do hints like that help us? Note that recognizing or imposing patterns on new information depends on our long-term store of

knowledge. If we had not learned how to keep track of time using calendars and clocks, and if we had not learned what sort of expressions of time would fit a given type of time keeping, these concepts would not be available to us as organizational devices, and we would not be able to hold on to as many digits. So, our little 12-digit experiment not only demonstrates the limits of working memory, it also exemplifies another very important general principle. Prior knowledge exerts strong influences on what and how much we are able to retain, process, and learn (see, e.g., Ambrose, Bridges, DiPietro, Lovett, & Morman, 2010; Hattie & Yates, 2014, for other expositions of this idea).

In fact, one of the most striking contrasts between novices and experts is the remarkable differences in the amount of information they are able to temporarily retain and process. This was first studied in chess players (Chase & Simon, 1973). Experienced players are capable of remembering board positions much more accurately than novices. This difference between experts and novices is much smaller, however, if board positions are random rather than meaningful (in the sense that they could have occurred during a game of chess). Hence, it is not that experts have larger working memory capacities per se. What they do have is a well-established and rich store of domain relevant long-term memories—in the case of chess, of strategically meaningful positions. This allows them to recognize, interpret, label, and chunk or subsume together into larger units what is actually a lot of complex information. In other words, our working memories can utilize existing long-term memories to make sense of, hold on to, and allow much more efficient processing of the information we are attending to. This strong dependence of efficient information processing on the availability of relevant long-term memories has led experts on expertise to label the phenomenon a "long-term working memory" (Ericsson & Kintsch, 1995).

This phenomenon—being able to virtually expand working memory capacity by finding patterns or ways to organize new information—has important implications for teaching. We will return to them in Chapter 6, Teaching It All, but let us first expand upon them a little bit here.

We mentioned above that piling on too much information in too little time is likely to cause working memory overflow. The digit span example provides us with another reason to remind ourselves to slow down. In order to find meaningful patterns in new information, we need time (and capacity) to try to fit it to concepts from our long-term memory.

A careful consideration of how we segment our teaching sessions, making sure we occasionally assign some time for thought, will allow our students the breathing space they need to relate our message to prior knowledge.

Apart from portioning and pacing information and instructions when teaching, what else can we do to ease the pattern-finding processing of students when introducing them to new ideas and procedures? We can provide pointers as to what sort of organizational conceptual devices might be appropriate. This core idea was recognized early and is the basis of the concept of "advance organizers" (Ausubel, 1960). Providing advance organizers involves indicating concepts that can subsume new information. Usually, this means activating relevant prior knowledge, thus increasing the amount of information that can be held and manipulated in working memory, leading to increased probability of long-term retention. For instance, when introducing Boolean operators, then using familiar concepts from basic set theory may help some learners make sense of their role in database searching. For medically trained learners versed in the concepts of sensitivity and specificity as they relate to screening, conceptualizing a systematic search as a mass screening of a population of literature in order to identify the possibly "afflicted" individuals (i.e., the potentially relevant sources) can be a helpful metaphor. But advance organizers need not be metaphors to be effective. A simple classification scheme or story-like structure for a sequence of events can provide all the help learners need to chunk unfamiliar material.

This fascinating power of established long-term memories to aid working memory in the processing of new information we attend to highlights the reciprocal nature of the interplay of comprehension and knowledge, of understanding and memory. In the next section, we will see that understanding something is an important precondition for learning, and that trying to understand something for one self is probably a better approach to learning something for the long run than a rote learning approach geared toward reproduction. But while this is true, it is also the case that knowing something is an important precondition for understanding. We all make sense of new information only by applying facts, concepts, and schemas already stored in our long-term memory. This is important to keep in mind lest we, in our eagerness to promote understanding and higher order thinking, forget the value of actually remembering stuff. Noel Entwistle, one of the foremost advocates of teaching for understanding, reminds us of this: "In other words, memorizing often plays a supportive role in building up initial understanding, but also later on, ensuring that understanding is firmly lodged in the memory" (Entwistle, 2009, p. 32).

3.2 APPROACHES TO LEARNING

Individual differences in intelligence, cognitive capacity, and prior knowledge will likely influence the dynamics of any classroom. But apart from teaching in ways that help students use relevant prior knowledge and allow them opportunities to find their own patterns in the material we want them to learn, there may not be much that IL teachers can do to directly alter individual, cognitive preconditions for learning in the few, short sessions we usually are allowed to teach (but see Section 3.3.1 on motivation and mindsets).

A possible exception relates to individual variation in how students take on or approach a learning task. The most important, early research base for this idea was laid down in the 1970s. In a series of seminal studies, Marton and Säljö (1976a, 1976b) asked students to read various texts, knowing that they would be asked questions about them afterwards. The researchers then analyzed both what students actually remembered, as well as their answers to questions concerning how they went about reading and learning the content of the texts.

This work resulted in descriptions of two different characteristic ways in which one can go about learning something, now known as "approaches" to learning (Entwistle, Hanley, & Hounsell, 1979). Students adopting a *surface level approach* to a learning task tend to have a conception of learning geared towards reproduction of the material itself. They are more likely to adopt a rote learning strategy, and to try to predict what specific details from the text they will be asked to recall. In the words of the original authors, they tend to focus on the "sign" rather than on what is "signified" (Marton & Säljö, 1976a, p. 7). A surface approach to learning is also more likely to be associated with extrinsic motivation, a low sense of autonomy, and a fear of failure (Entwistle et al., 1979).

Students adopting a *deep level approach*, on the other hand, tend to conceive of learning as a matter of comprehending the intentional content of the learning material. They focus on trying to understand what is the author's (or teacher's) main message or conclusion, and what are the most important premises leading to that conclusion. They will try to relate ideas to each other and to use evidence (McCune & Entwistle, 2011, p. 303). Students adopting a deep level approach are more likely to be intrinsically motivated, and to take personal control over what and how they learn, i.e., they are less "syllabus bound" (Entwistle et al., 1979, p. 376).

Considering these descriptions of the learning approaches, we can perhaps discern something of their complex nature. They seem to encompass both students' intentions and motivations, as well as their choice of learning strategy (cf. Entwistle, 2009). We will take a closer look at some useful concepts for thinking about student motivation to learn in Section 3.3 and in Section 5.3. Learning strategies are thoroughly reviewed in Chapter 4, Learning Strategies.

3.2.1 Consequences of learning approaches

Looking at the portrayal of the two learning approaches above, most IL teachers will immediately feel an affinity to the second one—the deep approach. After all, adeptly digging for evidence, critically appraising it, and relating it to the core ideas of an argument is arguably at the very heart of information literate activity.

In their original studies, Marton et al. noted two important differences in the kind and quality of learning resulting from the two approaches (Marton & Säljö, 1976a, 1976b). First and foremost, there was a correspondence between the approach students adopted and the content they typically remembered. That is, the two approaches led to retention of different information. Students adopting a deep level learning approach did indeed tend to remember more of the authors' intended meaning, producing "conclusion oriented" answers, supported by relevant detail. Their summaries were more precise and displayed a fundamental understanding. Surface level studiers on the other hand tended to produce answers that were low on information, sometimes just restating the probe question, and occasionally providing rather exact recall of parts of the material they had studied.

Marton and Säljö also noted, however, that the two learning approaches seemed to be associated with different time courses of learning. Surface level studiers tended to remember a number of propositions from the studied material immediately after study, but had trouble remembering much at all on a delayed test 45 days later. Long-term retention (i.e., durable learning) was much better for propositions expressing the more fundamental content of the learning material. Interestingly, deep level learners also remembered long term more of the sort of detail that surface learners were able to remember only for the short term.

It seems, then, that students adopting a deep level approach to a learning task will be more likely to learn what are in fact the most important

aspects of the materials they are working with, and also more of the supporting detail. Focusing on the main ideas or conclusions provides a frame that gives meaning to details, making them easier to remember over time. It is almost as if, in adopting a deep learning approach, students generate their own advance organizers or subsuming concepts (see Section 3.1.5), and can reap the benefits this entails for working memory processing and long-term memory encoding.

Going beyond the original findings of a different (and arguably better) quality of learning resulting from a deep level approach, several studies have examined the association between learning approaches and academic achievement as measured by exam results and grade point averages. This research seems to confirm what one would expect from the above descriptions of the learning approaches. Quite a number of studies have found a link such that a deeper approach is associated with better performance and/or that reliance on a surface approach is associated with poorer performance (e.g., Dennehy, 2014; Diseth, 2007; May, Chung, Elliott, & Fisher, 2012; Reid, Duvall, & Evans, 2007; Salamonson et al., 2013).

Some of the results from these studies are particularly noteworthy. In the study by Reid et al. (2007), the authors went to great lengths to plan and implement a medical education course designed to encourage a deep approach and prevent a surface approach. They formulated learning objectives with this in mind, and they carefully aligned teaching methods, assessment, and objectives in order to achieve this. (For more on the importance of alignment, see Section 6.2.1.) Measuring both learning approaches and achievement on three separate assessment types in several cohorts worth of students, they were able to test a considerable number of correlations. As expected, a deep approach more often correlated positively with achievement, while a surface approach tended to correlate negatively. However, while Reid and colleagues had expected to find this pattern for in-course essay assignments, specifically designed to draw out higher level thinking, and perhaps not so much for the MCQ (multiple-choice questions) exams, which are often considered tests of mere factual recall, they found exactly the opposite. That is, a deep approach was associated with better performance on the MCQ exam, but not on the essay exam. This is a reminder that we should be very careful not to assume that MCQs cannot measure advanced thinking, or that essay questions always do. In other words, there is no straightforwardly predictable correspondence between the kind of assessment used and the kind of learning approach that pays off. Perhaps then, using a variety of assessment

methods is just as important as using a variety of teaching methods (see Section 3.4.1 on variety of teaching methods).

Another particularly interesting finding is from the study by May et al. (2012). These researchers found what is arguably one of the clearest associations between learning approaches and learning outcomes, as measured by an exam. The most remarkable bit is that they measured learning with a high stakes, multi-component clinical performance examination (again we are dealing with medical students), measuring complex knowledge applied in realistic settings, yielding scores on dimensions such as overall patient satisfaction, physical examination, information sharing, and physician–patient interaction. Most studies on learning approaches typically assess performance on more conventional verbal, usually written, examinations or learning measures. This study by May et al. allows us to be optimistic about the "real life" value of learning resulting from a deep approach to studying.

We have seen that the way in which we approach a learning task is likely to influence the amount, quality, and durability of our learning. Taking the deep level approach—an approach that seems well aligned with the ultimate goals of information literacy—tends to yield the better results, also reflected in exam results and grade point averages.

Still, a caveat is in order here. While most studies find an association between learning approaches and academic performance in the expected directions, others do so only for some of the correlations tested (Davidson, 2002; Reid et al., 2007), and in general, correlations tend to be small to moderate, rather than strong.

Why is this so? Why are the associations between learning approaches and measures of academic achievement not even stronger and clearer? After all, it seems to make perfect sense, perhaps especially to us IL teachers, that a deep approach should lead to better learning. Disregarding less interesting explanations that may apply to any and all failed attempts to relate grades and exam scores to anything at all (e.g., sampling error and the less than perfect reliability of grading and scoring schemes), one possible explanation suggests itself: a lack of alignment between stated goals, teaching methods, and assessments of student achievement.

Even if we have the very best intentions to support student understanding, and even if some students are inclined toward a deep level approach, deep learning may become invisible if assessments are mostly geared toward reproducing factual, descriptive knowledge. This in turn may quickly lead students to conclude that maintaining a deep approach,

supported by IL, is just not paying off over the long run. For IL teachers, who may not be directly involved in designing assessments, this may become a particular instructional challenge. If we cannot show students where and how IL and deep learning become visible to the assessors of student performance, and how it is reflected in assessment scores or grades, we may not be able to motivate students to become information literate, even if we otherwise design our IL teaching to the highest standards. This suggests that working with teaching staff in the disciplines and departments to influence assessment design should be a priority.

Nevertheless, despite this caution, it still seems that a student's approach to learning tasks and materials is likely to influence what she learns, the quality and durability of her learning, and her performance on assessments designed to measure that learning. Given this, we should turn to the question of whether and how we can influence student learning approaches.

3.2.2 Determinants of learning approaches

At the beginning of this chapter we briefly characterized our own view of teaching and learning as broadly constructivist, with a conception of teaching as an activity supportive of students' self-directed learning, and a conception of learning as conceptual change brought about by active sense making. While these ideas hopefully make sense from a number of perspectives, they are not based solely on intuition or the teachings of great thinkers of the past. Nor were they introduced simply as an organizational aid or conceptual crutch to help you make sense of what we are trying to argue in this book. Most importantly, they were introduced because we believe that the conceptions we hold about teaching and learning really matter.

Research attempting to measure teachers' conceptions or approaches to teaching seems to confirm this belief. Simplifying somewhat, conceptions of teaching can be construed as anchored in the extremes of a dimension from a teacher-centered focus on transmitting information on the one end, to a student-centered focus on conceptual change on the other (see, e.g., Postareff & Lindblom-Ylänne, 2008; Trigwell, Prosser, & Waterhouse, 1999). In a teacher-centered approach to teaching, the emphasis is on what the teacher does to convey facts and skills to students. Students' prior knowledge is considered relatively unimportant and their role in the teaching-learning process need not be active. In a student-centered

approach, on the other hand, the emphasis is on what the student does to learn, and on how the teacher can help them change their conceptions. Students' prior knowledge is considered important, and in order for change to occur, students need to actively make sense of what is to-be-learned.

From our review of the human cognitive architecture, we already have every reason to believe that students' prior knowledge, and whether and how it can influence their processing, is important for their learning. Holding this idea, along with the other components of a student-centered approach to teaching, may be advantageous for our students. Findings from some very interesting studies indicate that the conceptions of, or approaches to, teaching that teachers hold are indeed in turn related to the learning approaches students tend to adopt.

Gow and Kember (1993) and Kember and Gow (1994) identified two orientations to teaching, roughly parallel to the teacher-centered and student-centered conceptions outlined above. They called them the knowledge transmission orientation and the learning facilitation orientation. They then measured correlations between orientations to teaching aggregated on a departmental level and the approaches to learning generally adopted by students in these various departments. Notably, they found evidence of change in student approaches to learning over the course of their student careers, such that in departments where a knowledge transmission orientation dominated, students' use of a deep level learning approach declined substantially over time.

Trigwell et al. (1999) found similar results at the level of individual teachers after surveying students and teachers in 48 first year higher education classes. They found that in classes where teachers adopted a teacher-centered, information-transmission approach to teaching, students reported adopting more surface approaches to learning. In classes where teachers were less teacher-centered in their approach, students tended to adopt less surface level and more deep level approaches.

This is evidence that conceptions of teaching matter. Hence, there is every reason for us IL teachers to seriously consider our own ideas about teaching and learning, and what our role as IL teachers is and should be. In the words of educational researcher John Hattie: "It is less what teachers do in their teaching, but more how they think about their role. It is their mind frames, or ways of thinking about teaching and learning, that are most critical" (Hattie, 2015, p. 81).

But teachers' orientations are not the only influences on student approaches to learning. The research literature on learning approaches is rife with studies investigating a number of different factors and how they

relate to learning approaches (see Baeten, Kyndt, Struyven, & Dochy, 2010, for a review). Most of these factors originate in a student perspective, and most have to do with the learning environment or, perhaps more accurately, with the learning environment as the student perceives it.

We all have some trouble accurately gauging the quality of our own learning. One example of this is the well-known Dunning–Kruger effect. This is a general tendency to overestimate our own competence, and it reveals itself in academic learning situations, as well as on other arenas (see, e.g., Dunning, Johnson, Ehrlinger, & Kruger, 2002; Kruger & Dunning, 1999). It is particularly pronounced when actual competence is low, hence we are more likely to overlook gaps in our knowledge when being exposed to unfamiliar ideas in a learning situation. This phenomenon helps explain why students often choose study strategies that provide cognitive ease, but are perhaps not the most effective (see Section 4.2). It may also explain why students sometimes voice resistance to student-centered teaching geared toward active learning.

Given this, it may seem paradoxical that students' perceptions of their learning environment are related to their learning approach, and hence to the quality of their learning. However, there need be no contradiction here. While students' may misjudge their own mastery, they are more likely to adopt a deep learning approach if they judge the quality of their teachers, and the teaching they do, to be high. Quality teaching in this context is, in the words of Paul Ramsden (2003), "teaching which is perceived to combine certain human qualities with explanatory skills..." (p. 73–74). Some of these aspects are teaching that involves providing feedback, being sensitive to student difficulties, displaying an interest in what students have to say, and enabling them to see the relevance of the subject matter.

Two particular aspects of perceived learning environment deserve special mention: (1) workload and (2) assessment. We have already mentioned assessment as a possible explanation for the sometime invisibility of the advantages of a deep level approach (see Section 3.2.1), and we have suggested that if assessments are perceived to require mostly simple reproduction of factual knowledge, then this may put students off a deep learning approach. However, studies that have looked for changes in student approaches to learning as a consequence of the adoption of assessment methods considered innovative and learner-centered, have disappointingly found shifts toward more surface level approaches (see Baeten et al., 2010, p. 247). Again, this highlights the complex relationships between assessment and learning approaches; there is no simple match of assessment type and the quality of learning. Perhaps the best we can strive for is

assessment of IL concepts and skills that are congruent with the high-level goals of IL, with our own conceptions of teaching and learning, and that match the variety of teaching methods we employ (cf. Section 3.4.1).

Perceived workload has turned up repeatedly in research on the determinants of learning approaches. Results are generally quite clear. To the extent that students feel demands are excessive, they tend to adopt more surface approaches and less deep approaches to learning. Perhaps the mechanism is a need to find short cuts in order to cope (Kember, 2004). A detail of particular interest to IL practitioners is the finding that perceived information overload in an online course was associated with lower scores on deep approach and higher scores on surface approach measures (Svirko & Mellanby, 2008). This result seems to provide further support for the conclusions we arrived at in Section 3.1.3, i.e., that we should be careful to resist the natural urge of the IL teacher to pour piles of information into our IL sessions.

3.2.3 Encouraging deeper learning

Based on what we now know about approaches to learning and teaching, it may be possible to suggest one or two implications for IL teaching practice. First, our own ideas about what learning is and what teaching should be, do seem to influence our students' approaches to learning. Hence, continually working to develop and refine our own conceptions of teaching and learning is likely to be a sound investment. Having said this, we should add that a certain type of conception, one that perhaps inclines us toward adopting teaching methods that allow and stimulate students to think deeply about what they are trying to learn, seems superior. Second, striving for and demonstrating quality in our teaching is likely to support a deep learning approach in our students. This striving probably involves keeping an eye on the alignment between learning goals, teaching approaches, and assessments. We will return to these themes in Chapter 6, Teaching It All.

3.3 MOTIVATION TO LEARN

We have seen that a conception of teaching as an activity supporting conceptual change through active sense making may benefit our

students. This result is derivable both from what we know of the interplay of long-term memory, information processing, understanding and learning, and of course, from the research on student approaches to learning.

But there is another domain related to learning in which the concepts we carry with us exert an influence we probably should keep in mind as IL teachers: motivational processes. And one set of concepts that seem particularly important for motivation to learn are our self-concepts and the properties we think we possess or not, such as competence and ability.

3.3.1 Motivational patterns and mindsets

In research on motivation for learning, we commonly distinguish between two different motivational patterns, sometimes called a learning goal orientation and a performance goal orientation (see, e.g., Dweck, 1986). Students with a learning goal orientation engage in studying behavior and learning tasks with the primary aim of attaining mastery and increasing their competence. These students tend to hold a view of ability or intelligence as something malleable, something that can be tended and grown; what motivational scientist Carol Dweck describes as a "growth mindset." This motivational pattern is usually adaptive. It is associated with choosing challenging tasks, with tolerance or even enjoyment of effort, and with persistence in the face of difficulties.

To students with a performance goal orientation, on the other hand, increasing mastery and competence is less important than gaining favorable, and avoiding unfavorable, evaluations of their competence. They tend to hold an entity view of intelligence or ability, i.e., seeing intelligence as something fixed. These students can apply themselves vigorously to tasks if they believe they have high ability and are likely to succeed. They may, however, experience the need to exert effort as threatening, perhaps because they see it as a sign of low ability. Hence, this motivational pattern is often maladaptive. It is associated with avoiding challenges and with more easily giving up in the face of difficulties.

The implications of this research seem to be that we should, if at all possible, try to teach in a manner that supports a growth mindset and a learning goal orientation. What might this involve in an IL teaching context? First, we should probably strive to espouse a conception of IL competencies as something that can be acquired through learning and practice, and that mastery of IL skills is not dependent on any inherent personal qualities. Such a conception seems self-evident to most IL

teachers, but may not be so to the student who tends to operate under a performance goal orientation.

An interesting twist here arises from the fact that IL teachers frequently observe that many of the students they teach are overconfident. Several studies confirm this observation (e.g., Gross & Latham, 2012; Nierenberg & Fjeldbu, 2015). They may consider themselves expert searchers, be confident they can avoid plagiarism, and perceive their skills at critical source evaluation to be more than good enough, all while having large gaps in their actual knowledge and skills. These students are exhibiting symptoms of the Dunning–Kruger effect mentioned earlier. Hence, it is often an IL teacher's unhappy predicament to crank them down a notch or two. This is risky. If a student's first experience of IL instruction is one of defeat and frustration, she may attempt to ignore her knowledge gaps and avoid the effort required to seal them, especially if she tends to adopt a performance goal orientation.

Still, providing opportunities for students to confront their own, sometimes failed, attempts to master what they are trying to learn is probably necessary. And sometimes students need to come to the realization that they are not as competent at something as they imagined themselves to be. When setting up these situations, there are, besides conveying the conviction that mastery of IL skills is not dependent on any inherent personal ability, a couple of things we can do to discourage an entity view of IL mastery, and to encourage a growth mindset. First, avoid praising students' intelligence. While successes should be celebrated, explicit judgements of being «clever» or «smart» or similar, are likely to encourage an entity view of competencies and a performance goal orientation. Second, we should look for opportunities to help students attribute their successes and failures to effort, or a lack thereof. For instance, when demonstrating in students an error of judgement with regard to what constitutes plagiarism, this moment of defeat can turn into an opportunity to learn, not only what constitutes plagiarism, but that a targeted effort to practice good judgement is necessary to build competence and that it can lead to success. Providing an opportunity to apply what has been learned from an erroneous response to one exercise to another, similar instance, can make those small moments of defeat pay off as subsequent success, while at the same time allowing us to point to the preceding effort and frustration as the immediate cause of successful mastery.

Another theoretical framework from the science of motivation that meshes well with most IL teachers' views of IL and its role in academic

life is self-determination theory. In brief, this theory holds that personal growth and well-being are promoted to the extent that satisfaction of three basic psychological needs—autonomy, competence, and relatedness—is supported by the environment. We will explore these ideas further in Chapter 5, Toward Academic Integrity and Critical Thinking.

3.4 WHAT WORKS

So far in this chapter, we have reviewed theories and research findings from cognitive and educational psychology, and from educational research on teaching and learning. This has provided us with a source of meaningful, research-based concepts and ideas to draw on and to guide us when thinking about, planning and implementing our IL teaching. Some of the evidence we have looked at seem to have (sometimes direct, often more indirect) implications for how we can and should go about our teaching, and we have tried to point out what these implications might be. Hopefully, this helps guide us toward more effective IL teaching practice.

There is, however, another type of evidence that, in our opinion, should be factored into any IL teacher's work with professional development and teaching, and that is evidence about what actually works in teaching and learning. Of course, this is not at all straightforward, and most of the evidence on the effectiveness of various teaching interventions are in no way neutral or disconnected from theories or conceptions about learning. Still, studies comparing the effectiveness of one teaching method or approach to another, under somewhat controlled conditions, provide very important corrections (or confirmations) to the ideas that guide our thinking and practice. What "should" work, i.e., what seems implied by more or less validated conceptions and theories, is not always borne out this type of evidence. A case in point is the popular notion that we should match our teaching methods to the various "learning styles" (e.g., visual vs. auditory, etc.) of our students. There is, however, no evidence to support this theory (Pashler, McDaniel, Rohrer, & Bjork, 2008; Rohrer & Pashler, 2012; Willingham, Hughes, & Dobolyi, 2015).

3.4.1 Lessons from the Visible Learning synthesis

One of the most impressive efforts to summarize research on what works best in teaching and learning has been led by the New Zeeland

educational researcher John Hattie. His approach has been to attempt to synthesize findings from meta-analyses (currently more than 1200; Hattie, 2015) of studies on the influences on student achievement. From this exceedingly rich and complex material, we think there are important lessons to be learned.

At the highest level of abstraction, the main lesson from Hattie's (2009, 2011, 2015) synthesis is that the key to effective teaching is making student learning visible. Hattie (2011) identifies three themes he believes should form the premises on which to develop teaching that promotes visible learning.

First, teachers should communicate clear learning intentions and criteria for success. In other words, teachers should clearly describe what students are supposed to learn, and what it looks like when this learning has been attained. Earlier in this chapter (see Section 3.1.1), we saw that clear, specific learning goals make perfect sense from an information processing perspective. They help focus attention from the top down, allowing us to ignore irrelevant stimuli, both external and internal, leaving precious working memory capacity for processing that leads to learning. Importantly, clear learning goals form the basis on which both students and teachers can evaluate the effectiveness of the teaching, and they should guide the teacher's choice of instructional content and technique. Last, but not least, the learning goals should guide the assessment of student learning. Learning goals should be challenging (Hattie, 2011), and provide a proper balance between deep and surface learning (Hattie, 2015). In Section 6.2.1, we take a closer look at the specifics of formulating learning outcomes and providing alignment between outcomes, teaching methods, and assessment.

Clear learning intentions and success criteria comprise a necessary condition for the second of the three themes: seeking feedback about the effectiveness of our teaching and providing feedback to students about the effectiveness of their learning. The primary function of feedback is to decrease the distance between students' current mastery and the stated learning intentions (the learning outcome statements) of the session or course. Feedback interventions, while evincing some of the largest effects sizes in the academic achievement literature, are also characterized by the largest variability. It seems, then, that providing feedback is easy to get wrong, but very effective when done right. Providing feedback in the form of reward, punishment, or praise is not likely to be effective. Rather, effective feedback ensues when both students and teacher look

for answers to what Hattie (2011) calls the major feedback questions: Where am I going? How am I doing? Where to next? We will return to the topic of evaluation of teaching effectiveness and the provision of feedback from assessments in Section 6.4.

The third foundational theme for visible learning is using a variety of teaching methods that emphasize student perspectives, and that support their development as self-regulated learners. This involves teaching in ways that help students obtain control over the cognitive processes involved in learning, i.e., that help them develop active, metacognitive learning strategies. This visible learning theme matches one of the major premises of this book. That the scope of IL teaching in higher education should include learning strategies. Given its centrality to our message, we devote an entire chapter (see Chapter 4, Learning Strategies) to learning strategies in an IL perspective.

3.4.2 Active and collaborative learning improves student achievement

In Section 3.2.2, we saw that when teachers conceive of learning as a process of conceptual change that requires students to be active, to interact and discuss, then students are more likely to report using a deep level approach to learning (Trigwell et al., 1999). While we may not know exactly the mechanisms involved, one likely causal path is via the use of teaching methods that foster active learning. Active learning can be loosely defined as any instructional method "... that engages students in the learning process (...)" and that "requires students to do meaningful learning activities and think about what they are doing" (Prince, 2004, s. 223). Probably, teachers with this conception of learning are more likely to adopt interactive teaching styles.

And indeed, one of the clearest and most important findings to emerge from research on teaching and learning over the last few decades is that more and better learning is attained when the learner is somehow actively engaged in the learning process itself (see, e.g., Freeman et al., 2014; Prince, 2004). The meta-analysis by Freeman et al. summarized the results of more than 150 studies comparing some form of active learning instructional technique to lecture-based teaching control conditions. The results are compelling, with substantial average gains in examination scores and grades, as well as large reductions in failure rates (students in lecturing classes were 1.5 times more likely to fail than students in active learning classes). From a cognitive perspective, these results should not be

surprising. We know that the limitations of both attention and working memory create problems when students try to focus on and absorb information in a passive, receptive mode, such as they may experience in a traditional lecture. And we know the benefits of taking the time to relate to-be-learned information to established prior knowledge.

One particular variety of active learning, in which students work together in groups, sometimes called collaborative learning, is worth special mention. A meta-analysis of 168 studies comparing the effects of cooperative learning (a type of collaborative learning) to those of individual or competitive learning on academic achievement in university or adult students found substantial average gains in favor of collaborative learning teaching methods (Johnson, Johnson, & Smith, 2014). The studies were drawn from a number of different disciplines, and used a variety of achievement measures, capturing both lower level and higher level cognitive processes. Importantly, Johnson et al. analyses indicate that cooperative learning positively influences other valuable educational objectives besides those of academic achievement. One such is the quality of interpersonal relationships, measured as interpersonal attraction, group loyalty, social cohesiveness, and trust. These authors also argue convincingly that it is through collaborative learning that students develop into members of an academic community.

Several other systematic reviews strengthen our confidence that structured learning activities in an inherently social setting (e.g., collaborative, cooperative, small-group, and team-based learning) usually contribute positively to student learning and achievement (Burgess, McGregor, & Mellis, 2014; Pai, Sears, & Maeda, 2015; Tomcho & Foels, 2012).

We argue in this book that the scope of IL teaching should widen to include learning strategies and values, and to place more emphasis on IL as an integral part of learning how to learn. Adopting collaborative learning may provide one of the best avenues of approach to achieve that goal, by very elegantly and implicitly supporting the process without the need to preach the morality of academia in a teacher-tells-and-students-absorb style. The active thinking required and allowed in well-structured cooperative learning groups may also supply an environment that naturally plays to the strengths of the human psyche, while minimizing the impact of our cognitive limitations (Kirschner, Paas, & Kirschner, 2009). We will return to the practicalities of implementing active and collaborative learning in IL teaching in Chapter 6, Teaching It All.

CHAPTER FOUR

Learning Strategies

According to his colleagues at Carnegie Mellon University, cognitive science pioneer Herbert Simon was fond of saying that "learning results from what the student does and thinks, and only from what the student does and thinks" (quoted in Ambrose et al., 2010, p. 1).

If Simon was right, then one obvious implication is that as teachers, we should take a keen interest in what our students do, not only when they are in our immediate proximity, but also when they are working by themselves or in groups outside of the classroom.

In this chapter, we will review the research on learning strategies and explore how it can contribute to an IL teacher's repertoire of teaching tools.

4.1 STUDENT LEARNING STRATEGIES—WHAT IS EFFECTIVE?

A crack team of learning strategy researchers led by John Dunlosky recently provided a broad and thorough review assessing the utility, i.e., the effectiveness and applicability, of 10 different learning strategies based on extant research (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013). The findings and conclusions are enlightening for anyone working with teaching and learning.

Among the strategies with lower utility, we find *highlighting* or underlining text, *rereading* material, and *summarizing* material. If we were to provide a common, descriptive label for these techniques, we might venture to call them passive techniques. It is quite possible to perform them all without really engaging deeply and actively with the ideas dealt with in the study materials. Highlighting, for instance, induces little or no processing over and above simply reading, particularly when a relatively large proportion of text is marked. Rereading text, whether previously highlighted or not, may induce feelings of recognition, and thus contribute to overconfident judgements of learning. And again, it requires little

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or no active processing. Summarizing a text may seem like a more active technique, but in fact, evidence for its effectiveness is relatively sparse and varied (Dunlosky et al., 2013, p. 15). This last conclusion is somewhat tempered by findings that indicate that the quality of the summaries is related to learning as measured by a test (e.g., Bednall & Kehoe, 2011).

In contrast, the techniques Dunlosky and colleagues classified as being of moderate utility seem intuitively to be more cognitively demanding. They include elaborative interrogation and self-explanation. *Elaborative interrogation* is the process of trying to explain why a particular fact (or concept or rule) is valid or true. As the label implies, this is likely to induce some amount of elaborative processing, of deep thinking. Consider a student studying the factors leading to volcanic eruptions. She comes across some new information concerning the role of magma buoyancy. Asking herself why magma buoyancy increases the likelihood of an eruption, exemplifies the use of elaborative interrogation. To answer, she needs to make a connection between this fact and previous knowledge, or recently learned related facts or concepts. Furthermore, in formulating an explanation, the new information needs to be embedded in a logical manner in the semantic context that these other, related facts or concepts constitute.

Self-explanation is very similar to elaborative interrogation, but is usually defined as explaining to oneself the steps of a problem-solving procedure, or how new information is related to what is already known. The core feature that distinguishes self-explanation from elaborative interrogation is that self-explanation involves an element of introspection, of observing and commenting on one's own thought processes during learning or problem solving. If our geology student was to ask herself what the processes of volcanic eruptions remind her of, and whether this analogy would be helpful or confusing, she would be engaging in self-explanation.

Interestingly, the two learning strategies deemed to have the highest utility by Dunlosky et al. (2013) are perhaps neither obviously passive and shallow, nor do they intuitively seem conducive to deep or elaborative processing. They are *practice testing* or self-testing and *distributed practice*. Practice testing is quite simply to take a test where the primary purpose is not to document performance, but to support learning—to practice recalling to-be-learned material or to practice performing procedures. These tests can be small or comprehensive, supplied by the teacher or composed by the students themselves, in multiple-choice format, as free recall, problem-solving practice, etc. Evidence for the superior effectiveness of practice testing relative to more passive restudy is strong and

abundant (Karpicke & Blunt, 2011; Larsen, Butler, & Roediger III, 2008; McDaniel, Agarwal, Huelser, McDermott, & Roediger III, 2011; McDermott, Agarwal, D'Antonio, Roediger III, & McDaniel, 2014; Roediger III, Agarwal, McDaniel, & McDermott, 2011). A recent meta-analysis of studies of the test effect confirms this, finding substantial average learning gains from studies comparing retrieval practice to other forms of study (Rowland, 2014).

Distributed practice is best defined by contrasting it with *massed practice*. In massed practice, the same topic or procedure is studied and restudied numerous times in a relatively short span of time. The unprepared student cramming for an imminent exam exemplifies massed practice. Massed practice is effective in that it will allow the learner to quickly reach a satisfactory level of performance. This technique therefore may indeed save the day, and let the unprepared student pass her upcoming exam. Coupled with the fact that intense, massed repetition tends to produce feelings of mastery and cognitive ease, it is perhaps not so strange that this technique is a popular choice in the busy student's toolbox. Unfortunately, learning resulting from massed practice is usually relatively transient and temporary.

Distributed practice or spaced practice is simply distributing study and restudy over time. Instead of spending all the study time on a topic in one (or very few) sessions, distributed practice is characterized by many short sessions with time spent on other topics or activities in between. In combination with practice testing, distributed practice is a very powerful learning technique. There is evidence that this combination, often called *successive relearning*, is effective also for classroom use (Dunlosky & Rawson, 2015; Rawson, Dunlosky, & Sciartelli, 2013; more on this later).

Why would distributed practice testing lead to just as good, or even better (Karpicke & Blunt, 2011), learning than techniques that seem intuitively to be a better match with the idea of a deep approach to learning as outlined in Chapter 3, Things We Know About How Learning Happens? While practicing retrieval from memory may *seem* like mere rote learning (i.e., mindless or unthinking memorization), there is evidence that it does in fact provide deeper learning (Carpenter, 2012; Karpicke, 2012; Zaromb & Roediger, 2010). For instance, the very act of attempting to retrieve a particular idea or concept may force us to trace various associative pathways to it, thereby strengthening its connections to previous knowledge and relevant contexts (Rawson, Vaughn, & Carpenter, 2015). Furthermore, when struggling to recall, which we are more likely to do

when retrieval practice is spaced, we are forced to actively process the semantic and contextual cues available to us, in the hope that they may lead us to and help us retrieve from memory what we are trying to recall. Thus, when practice is distributed, the effects of practice testing become more pronounced. Yet another benefit of practice testing is that it generates feedback that can inform our own judgments of learning, allowing better metacognitive control and regulation of our learning activities.

So, in terms of learning strategies, then, the ideal student is someone who (1) schedules her sessions of study to ensure proper spacing, (2) thinks deeply on selected topics by asking herself questions prompting elaborative processing and self-explanation, (3) tests her own ability to recall, apply, and explain what she is trying to master.

4.2 HOW STUDENTS REALLY STUDY

To what extent does students' study behavior conform to this ideal? Do they actually employ effective learning strategies? When students spend time on their own, studying to learn, and preparing for exams, do they use distributed practice testing or elaboration?

Most higher education teachers have some idea of how their students spend their study time when left to their own devices, and may suspect that it is not always spent to the best effect. Occasionally, for instance, we happen to see the inside of a student's textbook. These are usually abundantly highlighted in a variety of colors, indicating that this technique is one of the more popular ones, despite not being very effective. Similarly, near to the end of term exams, we usually see signs of slightly panicky massed practice, another technique that brings little durable learning.

Research into student study behavior is somewhat sparse, and not entirely clear in its implications (for a review, see R. A. Bjork, Dunlosky, & Kornell, 2013). Yet, to some extent, it does confirm that the less effective strategies are popular, and that students tend not to be very well aware of which strategies will actually help them learn. A study by Gurung, Weidert, and Jeske (2010) found that students reported using highlighting and rereading, and that the extent to which they engaged in these behaviors was negatively related to their exam performance. In another study, McCabe (2011) asked students to predict which one of each of six pairs of learning strategies, where one half were evidence

based (e.g., practice testing) and the other not (e.g., rereading), would yield a better performance in an exam. Most students consistently chose the least effective, not evidence-based, strategy for all but one of the six scenario pairs, indicating little awareness of what sort of study behavior leads to better learning. These findings have later been replicated (Morehead, Rhodes, & DeLozier, 2015).

Morehead et al. (2015) investigated both students' and teachers' knowledge about learning strategies and study behavior. They found that the teachers in their sample were only marginally more knowledgeable about learning strategies than students. Interestingly, although both students and teachers thought that testing was an effective study strategy, they endorsed it primarily as a monitoring tool, disregarding its considerable direct effects on learning. Surprisingly, teachers were much more likely (91%) to endorse the learning styles myth than their students (58%). Another particularly remarkable finding from this study is that while 79% of teachers reported discussing learning strategies in class, only 36% of students reported using strategies derived from classroom instruction. Thus, it seems, either the teachers are over-reporting, or the students tend to disregard or not realize that their teachers are trying to influence the way they study.

In summary, it seems fair to conclude that most students are not very knowledgeable about what study behaviors are most likely to help them learn. Nor, as a consequence (we may surmise), do they use their time as effectively as they could.

Why is this? Recall from Chapter 3, Things We Know About How Learning Happens, that people tend to have some difficulty monitoring their own learning, often convincing themselves that they have learned when in fact they have not. This forms an important basis for understanding why students waste time highlighting and rereading. At the same time, it is an important source of ideas to help them adopt more appropriate learning strategies. The cognitive ease (c.f. Kahneman, 2011) or fluency experienced when using the strategies we have labeled as passive, like highlighting or rereading, or even cramming using massed practice, can cause illusions of remembering and learning. In contrast, the difficulties experienced when using spaced practice, elaboration, and self-explanation are often interpreted as signs that learning is not happening as smoothly as it should, which may lead students to avoid these strategies. This is unfortunate. The struggles associated with these types of strategies and the cognitive restructuring they seem to entail are exactly what has been termed

desirable difficulties; they slow the apparent rate of learning, but they increase long-term retention and transfer (E. L. Bjork & Bjork, 2011).

4.3 USING LEARNING STRATEGIES IN IL TEACHING

In our opinion, information literacy as a discipline affords particular advantages to stimulate the adoption of effective learning strategies. We hope to show, in the remainder of this chapter, that the pattern of cognitions resulting from applying effective learning strategies overlap with, and play important roles in, executing and practicing the skills of information literacy.

Marrying learning strategies to information literacy teaching can thus have multiple benefits. We can help our students become better learners in general, while simultaneously improving our IL instruction. In this section, we suggest four approaches that IL teachers may consider adopting to advance toward both of these very laudable goals: (1) sharing knowledge of learning strategies; (2) modeling and scaffolding effective learning strategies; (3) harnessing the power of successive relearning for classroom use; and (4) adopting teaching models and methods that are likely to support deep learning approaches.

4.3.1 Sharing knowledge of effective learning strategies

We have seen that higher education teachers cannot assume that students, nor colleagues or collaborators in the discipline-based departments, know which are the most effective learning behaviors. And although it is possible, in theory, that students might just happen upon an effective learning strategy, without any conscious consideration, perhaps through imitating classroom activities, it seems fair to assume that they would be more likely to adopt them if they knew what they were and why they work. Thus a first step in guiding our students toward effective study behavior would probably be to spend classroom time, or online time and space, going over the topic of learning strategies.

How can we do this? In an ideal world, we would be able to schedule a session or two, fully devoted to discussing learning strategies. Sadly, this rarely happens in real life, and for us IL teachers, who cannot normally wheel and deal with teaching schedules at our own discretion, the best

option is likely to interweave the topic into our IL sessions. To do this effectively, and without taking too much time away from the core IL concepts, we propose two strategies: (1) providing suitable materials and learning support for learning strategies online. This would allow us to bring up the topic in face-to-face sessions, without having to go into all of the details. (2) Helping students make the conceptual connections between practicing and executing IL skills and competencies on the one hand, and learning strategies on the other, by discussing the benefits that developing these mutually reinforcing types of habits is likely to confer on the motivated student.

The techniques and strategies for using online support for face-to-face teaching are dealt with in Chapter 6, Teaching It All. In this section, we simply point out and exemplify some of the relevant conceptual connections as opportunities to introduce evidence-based learning strategies to students in an IL context.

4.3.1.1 Distributed practice and the cycles of the research process

Discussing the dynamics of the research process, e.g., the back and forth between developing a research question and finding, selecting and reading sources, provides an excellent opportunity to bring up how students can plan and schedule their own learning activities in order to stimulate spaced rather than massed practice. If a student repeatedly returns to the sources on her chosen topic over time, there is a gradual, cyclical build-up of understanding of the knowledge contained in them and how it relates to a particular question. This process is very similar to, and probably involves some of the same cognitive processes as, the gradual consolidation of to-be-learned concepts and facts, when practiced in a distributed manner. The well-documented and unequivocal benefits of spaced practice would be well worth spending a few minutes of class time on under any circumstances. When coupled with IL in the manner suggested here, they are likely to be even greater. It may help students understand the nature of the research process and the role that learning plays in it. This in turn may help them plan and implement their work accordingly, while at the same time orienting them towards more effective study behavior, applicable to any learning situation.

4.3.1.2 Desirable difficulties and handling information confusion

Another opportunity to connect IL and learning strategies can be found when students struggle to make sense of their sources. Students tend to

experience a dip in confidence after having made their initial forays into the literature looking for sources to help them solve a problem or answer a question (see Kuhlthau, 2004, chaps. 3–5 or Kuhlthau, Maniotes, & Caspari, 2015, chap. 4). Some students may require substantial support to navigate through this phase, and most will benefit from being forewarned and prepared for it. Thus giving them a heads up is probably a good idea. It may forestall feelings of being overwhelmed and prevent them from responding with disengagement and procrastination. An excellent way to do this is to introduce the concept of desirable difficulties. Struggling to piece together and make sense of bits of information in hard-to-read sources is much easier to endure, when you know that your struggles are a sign of learning and cognitive restructuring, and that this is necessary in order to build an understanding of your sources that will allow you to use them creatively to answer your research question. Likewise, being aware of the fact that illusions of learning and competence are dangerous side effects of the cognitive ease and fluency experienced when your expectations are met and your preconceptions remain unchallenged can help make that hard phase easier. This represents another opportunity to kill two birds with one stone, by combining discussion of IL concepts and learning techniques.

4.3.1.3 Interrogative questioning as a focus for IL practice

Perhaps more importantly, there is a clear family resemblance between the elaborative learning strategies and the practice of information literacy. The very acts of performing information literacy skills—searching for and retrieving sources, skimming, evaluating, selecting, then reading deeply, and gradually integrating concepts and information in order to answer an important question—overlap considerably with the behaviors and mental processes involved in elaborative interrogation and self-explanation.

Recall from Section 4.1 that elaborative interrogation involves generating an explanation for why something is valid or true. When simply studying a textbook to learn basic concepts and facts, this mostly involves tapping into long-term memories of related content and using the clues provided by the textbook itself. If no satisfactory explanations are forthcoming for a particularly important concept, a maturely self-regulating and information literate student might just attempt to seek out clues from other relevant sources. Unfortunately, this probably does not happen all that often, though, and it is much less likely to happen with beginner students without any established IL habits, unfamiliar with their institution's library services.

However, for assignments and projects involving extensive research and independent argument based on sources, there is really no way to avoid coming to grips with questions about the validity of claims. They are inherently a part of this type of work, and dealing with them successfully is the key to a good assignment grade. Herein lies a nugget of pure synergistic gold.

Many students find the increased demands for independent argument in higher education a real challenge. In fact, in our experience, even just approaching an understanding of what it actually means to argue consistently towards a conclusion is hard for many. A symptom of this is the common beginner's mistake of writing descriptive, expository texts that lack direction and are not really going anywhere—merely providing information on a topic. The mediating mechanism here is often a failure to develop their research questions properly. We call this phenomenon "being caught in the topic trap."

For many, the simple question "why is this true?" can act as a wonderfully focusing mental aid that guides them toward developing their own arguments. It is appropriate to ask this question at many levels and almost at any stage of the research and writing process. With a nudge from an IL teacher, the student can pose this question to (1) the conclusion of her work, (2) the main premises of the same work, and (3) the results and conclusions of the sources used in her work.

The conclusion of a research paper should be based on sound arguments developed throughout the text. This seems trivial and obvious to most teachers in higher education, but this perception is probably a consequence of the curse of knowledge. For a beginning student, it may not be at all obvious. Asking the "why is this true?" question (hereafter referred to as "the question") about their own conclusion can be helpful here. It allows students to see what elements of their own text contribute to answering their research question and supporting their conclusion. By implication, they can more easily identify those elements that are superfluous and play no part in developing their argument.

Asking the same question of the various elements of a text that constitute the premises of the main argument has similar but distinct effects. At this level, the question is likely to lead to the need for support from a relevant source. Premises are often assumptions or assertions about how the world works, and answers to the question are likely to be reports or summaries of scientific evidence relating to it. Thus posing the question in these contexts leads the student to look for relevant sources and apply

them with a specific aim: developing her argument. This is exactly the sort of thing that can lead her out of the topic trap.

At this level, the question has another distinct advantage, particularly in the early stages of the research/writing process. It can help students develop their research question. Research questions posed by students are often initially difficult to come to grips with. Sometimes they are seemingly simple but at the same time too broad, sometimes much too complex. If prompted, students can often state some vague ideas about what the main elements of their argument are, and often in the form of an assumption about how the world works. This is a great opportunity to point out appropriate use of sources—"you'd need to support this claim, somehow"—and to suggest they pose the question. When attempting to answer the question in these situations, students often discover hidden layers of complexity in what they assumed was a valid premise. This sometimes leads them to abandon their original research question for a more specific and focused one, built on what used to be a premise. In other words, posing the question helps students through, what is for some, the hardest part of the research/writing process: shaping and sharpening their initial interest and topic into a focused and answerable research question.

The question is also applicable even further down. We can ask it of the findings and conclusions of the sources used to support our claims and develop our arguments. Often, the best way to answer the question at this level is to find and study other sources dealing with the same issues. Again, this is likely to help students build a rich, interconnected network of facts, concepts, hypotheses, and theories that allows them to tackle their own research question in the best possible way, while gaining a lot of knowledge in the process.

In Section 4.1, we saw that the science of learning strategies suggests that a habit of asking "why is this true?" (and similar questions), and trying to come up with an explanation, is likely to help us learn. Here we have argued that the very same question can act as a guide when trying to build support for our premises and conclusions in a line of argument—which, of course, is a process that in itself involves learning.

4.3.1.4 Explaining to apply our selves

We previously described self-explanation as similar to elaborative interrogation, but with an element of introspection—of observing and commenting on our own thought processes. If what is to be learned is

somehow procedural, say computing a confidence interval, then self-explanation simply means explaining to oneself the steps involved. If what is to be learned is more in the line of declarative knowledge, a set of facts or concepts, perhaps, then self-explanation could involve thinking about what comes to mind when studying or rehearsing said concepts. As in "this idea here of _____, reminds me of _____."

While the application of elaborative interrogation to the process of research and source evaluation typically involved in larger student assignments is intuitive and seems natural, the possible role of self-explanation may be a bit harder to spot. Still, we think it may have some advantages, and thus, are prepared to make a few suggestions.

First, consider a couple of minor twists to the elaborative interrogation question ("Why is this true?"), e.g., "Do I trust the conclusions of this research report?" or "If I want to argue that [. . .], what would make me confident that my readers will agree with me?" These questions are slightly more complex than the simple elaborative interrogation question, but in a particular manner: they focus our attention on our own thought processes, and the thought processes of our readers. Thus, these kinds of questions invite metacognition—thinking about thinking. This can sometimes help us see aspects of our own work, such as flaws in our reasoning, that we otherwise would not spot, and can provide new impetus if we are somehow stuck. It has the added advantage of switching focus a little bit, away from the mere logical and formal qualities of our argument, and onto our emotions and intuitions. This can infuse the sometimes hard and dry work of developing a tight, well-supported argument structure with a bit more life and engagement.

Second, and related to the previous point: asking questions to stimulate self-explanation is likely to help the processing and encoding of new information. Remember from Chapter 3, Things We Know About How Learning Happens, that a very important factor in learning is the influence of prior knowledge—of whether or not we can usefully and appropriately connect new information to the concepts and cognitive structures we already carry in our long-term memories. An important consequence of this principle for teaching, to be explored more fully in Chapter 6, Teaching It All, is that helping students activate prior, relevant knowledge, will help them learn new material. Now, a particularly well-established and often relevant concept is our concept of self. Prompting self-explanation helps activate this concept and hence make sense of what we are trying to learn. Personal relevance can be a powerful driver of

understanding and learning, and questions that tend to induce self-explanation, like those above, are doubly useful. They can help students spot areas of improvement in their work with sources to support their argument, probably in part because it helps them make sense of, encode and internalize the information in their sources. Again, finding an opportunity to point out the relationship between this particular learning technique, and the work involved in a student project requiring IL skills, is relatively easy and need not take much time.

Third, when the actual steps involved in various behaviors that constitute information literate studying are unfamiliar, then using self-explanation (or even better: other-explanation—see the section on collaborative learning in Chapter 6, Teaching It All), is an excellent way to consolidate them and establish them as building blocks of more elaborate procedural schemas. For instance, an important component skill is to learn how to enter complete and correctly formatted references in a reference list. The steps involved may be obscure to the beginner student, and they frequently misstep, jumping straight into trying to enter the reference before having established which reference type they are dealing with, and which reference style (and style guide) to use. Clearly outlining the steps and then encouraging students to explain the process to themselves or to fellow students is a great use of the self-explanation technique. This provides an excellent opportunity to introduce self-explanation as an effective learning strategy in general and to scaffold its application to learning IL skills.

4.3.1.5 Interlude

In this section, we have argued that there are important family resemblances between effective, evidence-based learning strategies and the processes and behaviors involved in practicing information literacy skills. We have pointed out some of them here, and we are confident our readers will notice others for themselves. An awareness of these resemblances is likely to be useful to information literacy teachers if we let it influence our teaching.

First, it allows us to share knowledge of effective learning strategies with our students, as we have tried to show in this section. This alone is important, because that knowledge can significantly boost their learning in general, and they are not likely to come across it anywhere else. An intended and probable side effect of sharing our awareness of the similarities we have

looked at here is that this may help our students see that IL is essentially about learning—that it leads to learning and that it depends on learning.

Apart from this, these family resemblances also provide opportunities to help students attain beneficial learning behavior habits, through modeling and scaffolding effective learning strategies in an IL setting. In the next section, we will take a closer look at these opportunities.

4.3.2 Modeling and scaffolding effective learning strategies

While we argue in this book that we should work towards minimizing expository, teacher-centered instruction, it is still necessary from time to time to explain concepts and demonstrate procedures. These occasions, as explained in the previous section, are excellent opportunities to point out the family resemblances between IL skills and learning strategies. They are also valuable opportunities to model the application of evidence-based learning strategies in an IL setting.

Consider an IL teacher, whose lesson plan for the day includes a mini-lecture on the idea of subject headings (i.e., controlled search vocabularies) as a tool for searching in a reference database. She introduces her topic by proclaiming the ultimate usefulness of subject headings—they help us search more efficiently; at the same time more thoroughly and precisely than if they were not available to us. Next, she details how indexers use the headings to "tag" documents in the database. They apply a heading to *all* the documents dealing with a particular subject, even if different authors in this field use a variety of terms for that very same subject. They also *don't* use a heading on a document, even if it mentions the subject, if in fact it is not primarily about that subject. Being a good lecturer, she exemplifies this exposition with an example or two. Next, and on this firm basis, she can then connect back to her initial statement by pointing out the advantages that accrue to the end user of the subject heading supported database. She might say something like "And because the headings assemble all the documents on this subject using just one label, we won't have to find and list all of the different terms; we can simply search via that heading. What's more, using a subject heading, we won't have to deal with all the irrelevant hits we normally get from documents that use the term in their abstract or something, but that aren't really about it. That is how subject headings help us search more thoroughly and more precisely at the same time."

As a piece of explanatory lecturing, this is excellent stuff. Now, consider a slight adjustment to this scenario. Imagine that this IL teacher

refrains from explicitly stating the propositions quoted at the end of the last paragraph, and instead says something like this: "Let's see if we understand this right. Given what we now know about how indexers apply the subject headings to documents, what is it about this that helps us—the end users—make better searches?"

How is this different? Well, instead of immediately serving up the logical connections between the ways indexing with subject headings work and the conclusion she began her exposition with, the teacher now prompts herself with an interrogation question, thus modeling an effective learning strategy. Through this pausing-for-thought maneuver, she also allows her students to take a breath and elaborate on the information she has provided. This helps prevent working memory overload and allows students a chance to more deeply process the information and connect it with prior knowledge.

If she is teaching in a live and face-to-face setting, she now has an excellent opportunity to engage students in an activity and guide them through it. But even if she is simply recording her lecture (more on this in Chapter 6, Teaching It All), she can invite her students to engage with this question on their own. This is, in effect, what open education pioneer and video lecturer *par excellence*, Salman Kahn of the Kahn Academy, does when he so often says "I encourage you to pause this video and try this on your own. . ." The prompt is strangely compelling, and while many students probably will not take the time to follow it, some, to their betterment, undoubtedly will.

Let us look at another couple of examples, both tied to a very prominent challenge for many students: navigating the borderlands between building on the work of others and committing plagiarism. The idea of building your own work on that of others through expert use of sources can, on the face of it, seem to contradict injunctions to avoid plagiarism. The solution offered to students trying to come to grips with this problem is usually a more or less sophisticated version of "use your own voice" or "in your own words." This answer, while broadly correct, of course, is unsatisfactory to most students. They simply cannot unpack it. "What do you mean, 'use my own voice'?!"

An important prerequisite for students to find their own voice in amongst all the clamor and confusion of those of all of their sources is to understand and know their sources well enough. This, of course, involves learning. First, it involves reading, both broadly and deeply, and reading to identify the main message and major points of relevance to the

students' own research question. This, however, is just a first step, and not nearly enough. If these bits of knowledge are not successfully encoded and consolidated in the student's long-term memory, she will not be able to use them for creative thinking, problem solving, and writing, and she will have to consult her sources directly to be able to give even a basic account of what they contain. This is an area of great potential for the application of evidence-based learning strategies.

We can support students through the first step, i.e., reading for meaning to extract the main message and argument of an important source, by helping them use a note-taking technique that naturally lends itself to the application of elaborative interrogation, self-explanation, and practice testing. The technique is that of taking double notes (Dysthe, Hertzberg, & Hoel, 2010) and is a simpler variant of the Cornell note-taking method. Briefly, it involves dividing a note-taking medium into two sections, preferably a right- and left-hand side. While reading, the students enter key words and phrases from the studied source on one side. Encouraging them to only note down the most important concepts and ideas, and to express them as succinctly as possible without copying the exact wording used in the source is important here. The other column is used for spontaneous questions and comments that come to mind while noting important ideas. If students are familiar with how to formulate questions for elaborative interrogation and self-explanation, they can use the second column for this. Notes organized in this fashion can then be used for self-testing if the questions are thoughtfully crafted to cue retrieval practice of the key ideas in the source. This helps students consolidate memory of the ideas contained in the source. Both the note-taking technique itself and the use of notes for practice testing can be modeled in class or online. A bit of helpful feedback on the students' own attempts to use double notes for deep learning in order to come to grips with their sources can provide important encouragement and support. If successful, this can develop into a very solid foundational understanding of the sources and make it considerably easier to find that "own" voice.

The next step toward being able to make concise summaries of the relevant points and conclusions they use from their sources in their own work is to practice finding their own words. This is another area where scaffolding the use of evidence-based learning strategies has a role. If students are reasonably well prepared—for instance having studied their source, using the note-taking technique outlined earlier, and a bit of self-testing, they could now attempt to explain the main points of their source to a fellow

student. This turns self-explanation into other-explanation and works well as a classroom activity. Instructions might be to put away the relevant source, spend a couple of minutes explaining the main points to a fellow student, having the fellow student repeat it back and ask for clarification, and finally writing down an explanation. As teachers, we can support this process by listening in to student conversations, offering advice and encouragement.

The examples offered in this section are just that—examples. There are probably endless ways to apply the findings of the science of learning strategies for classroom use, and we are confident the reader will see possibilities for their own teaching. We would like to add, though, that while many teaching techniques and classroom activities are de facto applications of effective learning strategies, there is likely to be an added benefit of making the connection clear to our students. Given the intriguing results of Morehead et al. (2015), that students seem to be unaware of their teachers' attempts to influence how they study, it seems like a good idea to be rather explicit about it.

4.3.3 Harnessing the power of spaced practice testing

We saw in Section 4.1 that successive relearning—the combination of practice testing and distributed repetition—is a very powerful learning strategy. We also saw that most students (and teachers) are likely to be unaware of the considerable potential of this technique. In Section 4.3.1, we pointed out a number of similarities between the thought processes and component tasks involved in practicing IL, and a few phenomena and effective learning strategies from the learning strategies literature. Practice testing was not one of them. This is simply because, unlike elaborative interrogation or self-explanation, it bears little *direct* resemblance to anything we do while locating, selecting, and using sources for a research task.

While not obviously IL-related, practice testing is a technique that lends itself easily to classroom implementation, whatever the subject. There are numerous ways to go about this, and in this section, we make a couple of suggestions and provide some pointers.

First, consider using a student response system (SRS). An SRS consists of a receiver unit operated by the teacher and a number of response units operated by the students. The receiver unit is usually just a regular classroom computer, sometimes with dedicated software, but more often these

days just running a browser-based app. Some SRSs use dedicated hardware for response units (clickers), but nowadays students mostly use their own devices—either smart phones or laptops. The teacher presents the students with a question, using any medium, sometimes the browser-based app provides for this, and the students answer using their devices. The teacher can then opt to display the answer distribution, and at some point also the correct answer. With an SRS it is relatively easy to quiz students on core concepts, thus in effect implementing practice testing in the classroom.

While most IL skills are best learned by practicing and applying principles in a realistic research/writing setting, it is sometimes useful to quickly refresh prerequisite knowledge without going through a full blown research process. Quizzing is good for this, and with an SRS it is possible to cover a fair amount of material in just a few minutes. If a group of students are seen over more than one session, a brief quiz on the concepts practiced in the previous session is a good way to start the next one. Such quizzes help activate prior knowledge, thus preparing for what comes ahead. Simultaneously they help provide effective repetition through successive relearning.

Of course, more recently covered concepts can be quizzed too. Instead of the teacher summing up—which for the students would be analogous to passive restudy—a few practice test questions at the end of a session will help consolidate main points dealt with in that same session a lot better. To maximize the effects of spaced repetition, it is a good idea to also include some items from earlier sessions, in order to provide multiple opportunities for relearning.

It is worth emphasizing that it is important at some point to provide proper feedback about not only what is the right answer to quiz questions, but also *why* the right answer is correct and the wrong ones are not. Contrary to popular belief, though, it may not be important that the feedback is immediate.

While using an SRS is usually convenient and most student groups are well equipped with devices, there are many other ways to implement practice testing in a classroom setting. We saw in Chapter 3, Things We Know About How Learning Happens, that studies comparing the learning outcomes of traditional, lecture-based teaching with some form of active learning teaching model tend to favor the latter by a considerable margin. In Chapter 6, Teaching It All, we will look at several ways in which active learning methods can be applied in the IL classroom. Some

of these are already de facto implementations of practice testing, and with the right structure and an eye on repetition and proper feedback, most such activities can be.

4.3.4 Teaching for engagement and deeper learning

Using the right learning strategies while studying in effect amounts to taking a deep approach to learning—to seeking the meaning beyond the surface of the studied information. We have argued in this chapter that we can guide students toward deeper learning by sharing research-based knowledge of effective learning strategies, by being aware of the many similarities between the processes involved in practicing IL skills and those involved in using learning strategies, and by modeling and scaffolding the use of these strategies in an IL setting. This is likely to benefit student learning in general, and their adoption of IL skills in particular.

Guiding students toward deeper learning is, however, also a matter of creating a learning environment that fosters this approach. We saw in Chapter 3, Things We Know About How Learning Happens, that approaches to learning are not stable personality traits, but influenced by a number of factors, some of which are intimately connected to how we teach. Thus teaching to foster deep learning is likely to encourage the adoption of effective learning strategies, particularly if students are familiar with which strategies tend to work and which don't. In Chapter 6, Teaching It All, we discuss approaches to teaching that are likely to influence student approaches to learning.

CHAPTER FIVE

Toward Academic Integrity and Critical Thinking

5.1 INTRODUCTION

What are the learning outcomes we want students to achieve when we teach information literacy? We want them to have skills in finding, evaluating, and citing sources, we want them to learn how to write in accordance with academic standards, to have acquired strategies for their own learning, to be familiar with digital tools that will be helpful in the process, to have developed academic attitudes and an ability to act according to norms, and we want them to understand why all of this is important, and we ultimately want them take a reflected stand against bad academic conduct.

Naturally, we believe in the importance of being information literate. On the one hand, it is important for the individual student, for being able to take informed academic decisions, and for achievement of intended learning outcomes in their disciplinary and professional courses in higher education. On the other hand, it is important for the future production of new knowledge, and thus for both work and society at large, that students upon graduation have the academic skills and attitudes that are required. On a general basis, it is also vital that citizens know how scientific knowledge is reliably produced, that they know how to take a critical stance on the validity and reliability of information.

This chapter deals with the normative and attitudinal side of information literacy, and thus with the values and norms that we want students to consider taking to their hearts. We want students to know the formal and informal rules and regulations for production of academic knowledge, and for academic writing in particular. We want them to develop familiarity with different kinds of situations that we deem crucial in order to understand how and when to apply the rules. Together, the knowledge of general rules and the ability to understand the normative complexity of

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particular situations will be the basis for the kind of judgment students need in order to develop academic integrity.

However, being familiar with the rules and being able to "read" the normativity of situations are in itself no guarantee for good academic conduct. Students need to be emotionally involved and motivated in order to act according to their own good judgment. We believe that knowledge of the core values and knowledge of the reasons for the rules, the regulations, and the norms of academia are important for being motivated. Seeing yourself as part of a larger whole and as a participant of the enterprise of producing new knowledge makes a difference. This is why we believe in communicating the normative basis of information literacy to the students, and it is also why we believe in initiating them into the practices of the academic community. Offering instruction with the aim of acquisition of *skills* in information literacy courses and programs is important, but not in itself sufficient.

Also, approaching the normative basis of information literacy through a focus on misconduct and dishonesty, thus making the topic carry negative and punitive implications may not be productive. Rather, when dealing with plagiarism, for instance, a negative and moral stand can be a "distractor from dealing with plagiarism as a teaching and learning issue" (Carroll, 2009, p. 121). In order to approach the normative basis of information literacy in an educative, preventative, and positive manner, we need to look at the value base and the practices where these values have emerged.

What is then the normative basis for information literacy? From where do the core values of information literacy and good conduct in academia come? The set of attitudes and values and competences that we find in successful research communities is a particularly important source. Research integrity thus is a vital source of academic integrity. However, the way towards academic integrity as well as research integrity goes through a formation process, and in higher education we call this process "Academic Bildung" (Solberg & Hansen, 2015). German enlightenment thinking, in particular Immanuel Kant (1724–1824) and Wilhelm von Humboldt (1767–1835), has had great cultural influence on the conception of Academic Bildung in the Scandinavian university tradition. The concept of Bildung itself stems from the German enlightenment, and it does not presently have a direct English counterpart. However, the contents of the concepts "education," "formation," and "edification" come close to the content of the concept of Bildung. Before we go further into

the normativity of academic integrity, we take a look at the particular formation processes that are desired in academia.

5.2 ACADEMIC BILDUNG—THE FORMATION PROCESSES OF ACADEMIA

The concept of Bildung generally describes a personal development process, more precisely a reciprocal process of formation where the individual meets the world actively. This means that the individual takes part in forming the world, as well as being formed by it, and this makes the process different from the process of socialization. The context of the notion of *Academic* Bildung is the practice of research in academia, and the notion points at a set of values that has arisen in this practice over time. Academic Bildung involves a strive for autonomy as well as a strive for authenticity (Solberg & Hansen, 2015).

Autonomy means self-rule (*auto*—self, *nomos*—law), as opposed to heteronomy (other-rule, *hetero*—other, different, *nomos*—law) and it points to a specific form of independence where the individual makes judgments and decisions on the basis of his or her best knowledge and his or her own core values. In the context of higher education, autonomy is connected to both skills in critical thinking, as well as a will to exercise critical thinking. The critical attitude that is expected of the university graduate presupposes a basis in disciplinary or professional knowledge and general competence.

Authenticity means in this connection to be true to your own personality or values, and being faithful to your own internal rather than external ideas (*auto*—self, *hentes*—doing, being). It is connected to ethical dimensions of self-formation, to existential and being-oriented reflection. In the context of higher education, authenticity is about the identity-formation and the meaning-making processes that are specific for higher education, and it points to exercise of the subjectivity and personality of the individual.

Thus independence and personal engagement are the character traits connected to Academic Bildung. Without these traits of the individual, it is hard to imagine academic integrity. However, the ability to act with integrity is dependent upon the ability to make reasonable, rational, or good judgments. Good judgment does not come out of the blue. When

we deem someone to have acted from good judgment we take it that they have acted from nonarbitrary decisions. This means that good judgment demands justification (Fossheim and Ingierd, 2015, p. 10). Giving reasons for actions, and the habit of asking for reasons, is a central virtue in critical thinking (Opdal, 2008). Consequently, development of good judgment and development of critical thinking are related processes, in the sense that both will be involved in decision making. Discussing and choosing between different alternatives for action for, e.g., avoiding plagiarism, is an example of a process where both forms of competence are involved.

5.3 ACADEMIC INTEGRITY—THE MORAL CODE OF ACADEMIA

5.3.1 Academic integrity: From individual virtue, to institutional policy, and back again?

The International Center for Academic Integrity defines academic integrity as a commitment, "even in the face of adversity," to five fundamental values: *honesty*, *trust*, *fairness*, *respect*, *responsibility* (ICAI, 2014, p. 16). *Courage* to act on these five values is a sixth value. This is a positive approach, in the sense that it does not address the subject mainly by identifying and prohibiting behaviors that run counter to the principles of integrity. In the publication "The fundamental values of academic integrity," ICAI maintains that the six values are related to ethical decision making, and they encourage institutions of higher education to spell out how they can be translated into action. The first value, *honesty* is seen to be academic communities' advancement of "the quest for truth and knowledge through intellectual and personal honesty in learning, teaching, research, and service" (ICAI, 2014, p. 18). Secondly, climates of *trust* are said to "encourage and support the free exchange of ideas which in turn allows scholarly inquiry to reach its fullest potential" (ICAI, 2014, p. 20). This means that collaboration, information-sharing, and circulation of new ideas are enabled "without fear that our work will be stolen, our careers stunted, or our reputations diminished" (ICAI, 2014, p. 20). The third value, *fairness*, is said to consist in "predictability, transparency, and clear, reasonable expectations" (ICAI, 2014, p. 22). Fourthly, *respect* for community members and for the diverse and sometimes contradictory

opinions they express is said to be vital for success of scholarly communities. The fifth value *responsibility* is connected to personal accountability and to "the willingness of individuals and groups to lead by example, uphold mutually agreed-upon standards, and take action when they encounter wrongdoing" (ICAI, 2014, p. 26). Translating the values "from talking points into action—standing up for them in the face of pressure and adversity—requires determination, commitment, and courage," and thus the sixth value, *courage*, differs from the other values. *Courage* is seen as a "capacity to act in accordance with one's values despite fear" (ICAI, 2014, p. 28).

This approach of the ICAI is a fairly late development of the concept of academic integrity, and it is characteristic of the late 20th century. More fundamentally, academic integrity is the "moral code" of academia. Today this moral code will often be spelled out in the form of official ethical policies, or more practically oriented guidelines, differing between countries, and also somewhat between the higher education institutions within a given country. If asking for the percentage of the professors and students knowing these guidelines, or even having heard of them, we fear that the results would be disappointing. The policies are unfortunately all too often bureaucratic devices with less function and effect on an individual and local department level than intended.

Historically, this development with official institutional policies and little individual knowledge and appreciation of them is a table turned. During the late 18th century the so-called southern honor code focused, according to Tricia Gallant, on duty, pride, power, and self-esteem (Gallant, 2008). This means that academic integrity historically was a question of individual virtue. And it was, first and foremost, a question for the students, not so much for faculty members. The institutional policies of today often have guidelines for both students and faculty, albeit different guidelines. In some countries, the policies on a national level are policies of research integrity, thus directed at the faculty, while the policies on an institutional level are directed at students, dealing with academic integrity. Anyhow, the ethical and moral questions of higher education have been institutionalized, either on a national or institutional level, or both. The six fundamental values of the ICAI can perhaps be seen as a return to the individual virtue ethical stance. They are easily transformed into individual virtues, but the phenomenon of academic integrity is no longer seen as only a question of the morals of each student. Academic integrity is recognized as a social phenomenon and

should be seen as a responsibility for all levels of higher education, from the national to the institutional, as well as the departmental level.

5.3.2 The value base of academic integrity: Research integrity

What is the point of upholding the importance of academic integrity? What is at stake? The answers to these questions have differed during history, varying with the different historical situations and with the varying stakeholders. Here we would like to draw attention to two different, though connected points. First, dealing with academic integrity is about the quality of student learning and formation. Second, it is about the production of original, reliable, and valid knowledge. The connection is that todays' students are the future producers of new knowledge. And we argue that the source of academic integrity is the practice of research and the idea of research integrity.

What is then today's received approach of research integrity? The Singapore Statement on Research Integrity was developed in 2010 as "the first international effort to encourage the development of unified policies, guidelines, and codes of conduct, with the long-range goal of fostering greater integrity in research worldwide" (Singapore Statement on Research Integrity, 2010). It was developed by 340 individuals from 51 countries who participated in the 2nd World Conference on Research Integrity, and it is thus meant to be "a global guide to the responsible conduct of research." It has been widely recognized within the science community, though it does not represent an official policy for any country or organization. The statement has as its preamble that the value and benefit of research are dependent on the integrity of research. It contains 4 principles and 14 responsibilities. The principles are:

Honesty in all aspects of research

Accountability in the conduct of research

Professional courtesy and fairness in working with others

Good stewardship of research on behalf of others (Singapore Statement on Research Integrity, 2010).

The responsibilities listed are somewhat more detailed and specific advice on how to deal with different common situations in research practice. To exemplify, responsibility number 4 concerns research records:

> *Researchers should keep clear, accurate records of all research in ways that will allow verification and replication of their work by others.*
>
> ***(Singapore Statement on Research Integrity, 2010)***

Responsibility number 11 concerns reporting irresponsible research practices:

> *Researchers should report to the appropriate authorities any suspected research misconduct, including fabrication, falsification or plagiarism, and other irresponsible research practices that undermine the trustworthiness of research, such as carelessness, improperly listing authors, failing to report conflicting data, or the use of misleading analytical methods.*
>
> ***(Singapore Statement on Research Integrity, 2010)***

The combination of general principles and specific advice related to common specific conditions and situations is a valuable approach, and more useful as guidance than only listed principles or values. This combination of generality and particularity points towards the understanding of good judgment that we have adhered to in the introduction to this chapter.

In general, we see that there are efforts made, on many levels and by many kinds of stakeholders, to foster academic integrity and research integrity in higher education. The challenges for the exercise of personal and community integrity in our times are many. Developments that in particular make for a challenging landscape are the technological development, the economic pressures on the sector, the models for research funding, the development of marketing and management models in the sector, and the commercialization of research (Kjelstadli, 2010). In the end, the question of academic integrity is about the learning and the acquisition of knowledge, skills, competence, and attitudes of the students, and ultimately about the value and benefits of science and research, for our global society. If the academic integrity of our present and future researchers is lacking, the gain from learning and research processes will lessen.

5.4 AN EMPIRICAL BASIS FOR RELATING TO NORMS AND VALUES IN INFORMATION LITERACY TEACHING

The character trait of academic integrity, as well as the trait of Academic Bildung, implies a person's ability to resist temptations for quick personal gains at the expense of other researchers, the research community and society at large. This means that both traits point at regulative ideals rather than necessarily pointing at descriptions of actual conduct in the everyday life of academia.

Teachers and supervisors are vital in the formation processes of the students in higher education. It is first and foremost they who are the visible and legitimate academic authorities for the students, as it is they who most frequently interact with the students. However, if we, as teachers of information literacy, whether we are disciplinary teachers or library teachers, avoid digging into the value base of academic research, we may not reach the hearts and souls of our students. And the students may ultimately be unable to see themselves in the bigger picture of the strive for a better world through the production of new knowledge. We believe that students knowing the reasons why they follow academic conventions will be more motivated students. We believe that knowing that your personal conduct is directly related to an overall better good is motivating for most of us. This is also empirically validated in motivation theory, in particular in Self-Determination Theory (SDT) as it is developed by social psychologists Edward L. Deci and Richard M. Ryan and colleagues. This theory works in the interplay between the extrinsic forces acting on persons and the intrinsic motives and needs inherent in human nature.

Intrinsic motivation is generally thought to give spontaneous and self-determined behavior, where something is done because it, in itself, is seen as interesting, challenging, entertaining, or generally rewarding. Extrinsically motivated action is generally thought of as action done in spite of inner resistance, and it is seen as action done because it leads to a specific desirable result, for instance a reward, or freedom from punishment. If there are no external forces working on the agent, extrinsically motivated action can be done because it is considered a duty. Deci and Ryan have pointed out that extrinsically motivated action also can be exercised on the basis of free will, exactly because of acceptance and understanding of the value of the duties they are expected to conduct. As educators, it is important for us to know how we can stimulate and advance extrinsic motivation in students. Much of what they need to do in order to learn and acquire the knowledge, skills, and competences we intend as their learning outcomes is neither always fun nor interesting in itself.

The overall theory of self-determination contains a Basic Psychological Needs Theory (BPNT), where three specific evolved psychological needs are identified: autonomy, competence, and relatedness. The theory applies to the intrinsically, as well as the extrinsically motivated. The need for competence implies that we seek to control the outcome of our actions and experience mastery. In short, it is the need to

master. The need for relatedness is the universal want to interact, be connected to, and experience caring for others. In short, it is the need for belonging. The need for autonomy is the universal urge to be causal agents of your own life and act in harmony with your integrated self. In short, it is the need for independence.

> *Conditions supporting the individual's experience of autonomy, competence, and relatedness are argued to foster the most volitional and high quality forms of motivation and engagement for activities, including enhanced performance, persistence, and creativity. In addition SDT proposes that the degree to which any of these three psychological needs is unsupported or thwarted within a social context will have a robust detrimental impact on wellness in that setting.*
>
> ***(Ryan & Deci, 2017)***

We see this validated approach as an empirical and descriptive counterpart of the normative pedagogical–philosophical theory of Academic Bildung. In this connection, that is, teaching the value base of academia and the historical and present reasons for it, it is first and foremost the psychological need of relatedness that is relevant. Relatedness, here understood as being connected to others in the strive for a better world, through production of new knowledge, is validated as a motivational effect. Whether we rely on descriptive or normative theory in this question, the following applies. In order for students to feel relatedness, someone, and preferably legitimate academic authorities, has to show students this bigger personal and societal context. We believe that students who are getting the bigger picture, who are able to see their own role as students at a university and as future producers of knowledge, also have a better potential for being responsible learners. However, the two other evolved psychological needs, autonomy and competence, are still vital to count in when we are teaching information literacy, as we shall see in Chapter 6, Teaching It All.

Thus we have here given an argument for the benefits of teaching academic values to students, and thus making them familiar with the academic moral code—academic integrity—as part of our teaching of information literacy. But why do we also need to focus on Academic Bildung and critical thinking? What difference can it make? The concept of academic integrity does not connote to the process that needs to lie behind any acquisition of such norms. As teachers of information literacy in higher education, we should take an active and reflected part in the formation processes of the students, and seek to contribute with our input and our facilitation of the learning process. In Chapter 6, Teaching

It All, we explain and give examples of how we think teaching and learning should proceed in order to accommodate development of Academic Bildung, critical thinking, as well as academic integrity.

5.5 CRITICAL THINKING—A GOAL OF ACADEMIC FORMATION PROCESSES

We have said that development of good judgment and development of critical thinking are, and should be, related processes. Before we take a closer look at two different phases in the progress of students' relation to higher education that are relevant for their development of academic integrity, we need to take a look at critical thinking. Critical thinking is an educational ideal, an ideal we want students to strive towards and to rise towards. It is of particular importance in research-based higher education, and it might indeed be considered one of the overall goals of higher education as it commonly is regarded as a tool of the researcher. Critical thinking is furthermore a notion that describes an activity; it is something that individual persons do. Critical thinking is also a particular set of skills, something that can be taught and learned, and something that we like to regard as a habit of the academic mind. It does not necessarily follow, however, that acquired skills of a person turn into habits.

Thus persons who are critical thinkers must also have an inclination towards using the skills, in order for them to turn into habits. When this has happened, critical thinking becomes almost like a personality trait. What we have said about critical thinking thus far can, however, be regarded as controversial, albeit different parts of it in different camps. In a report from the American Philosophical Association, called "Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction," critical thinking is defined in the following way:

> *We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based.*
>
> ***(Facione, 1990, p. 3)***

Still, in spite of efforts to consensus, there are many different conceptions of critical thinking around, and we have chosen to look closer into one of them, Harvey Siegel's reasons conception (Siegel, 1988). The basis

for this is that this conception of critical thinking is, as is the APA report, connected to goals of formal education, and also that it rhymes well with the kind of general competence that we can see across the disciplines in higher education. On this conception:

> *A critical thinker is one who appreciates and accepts the importance, and convicting force, of reasons. When assessing claims, making judgments, evaluating procedures, or contemplating alternative actions, the critical thinker seeks reasons on which to base her assessments, judgments, and actions.*
>
> ***(Siegel, 1988, p. 33)***

Reasons, and the act of seeking out valid and justified reasons, thus play the central part here. This conception admits that all critical thinking must have subject-specific content but proposes that "Skills such as identifying assumptions, tracing relationships between premises and conclusion, identifying standard fallacies, and so on do not require the identification of specific subject matters. . ." (Siegel, 1988, p. 20). This means that critical thinking involves subject-specific as well as subject-neutral principles in the assessment of reasons. The subject-neutral principles are in general the principles of formal or informal logic. When we teach students with the goal of helping them become critical thinkers, the skills intended as learning outcomes thus need to be developed both in relation to specific subject matters and on a general logical basis.

When we value critical thinking as of specific importance in higher education, and ultimately, in the production of new knowledge, it is according to Siegel because it is related to values "such as truth, intellectual honesty, and justice to evidence" (Siegel, 1988, p. 9). This means that critical thinking on the reasons conception is a normative enterprise. It should be noted that critical thinking also can be studied on more descriptive terms, in the sense that we research into the manifestations of critical thinking in the actual thinking of specific persons. In cognitive psychology, a descriptive approach will be more common, while a normative approach as ours will be more common in educational philosophy. In our normative approach, the critical thinker is a person who has "rational passions," a person who has developed a critical attitude (Siegel, 1988, p. 40–41). This means that the emotional and attitudinal dimensions of critical thinking are a vital part of our conception.

How can we then go about teaching critical thinking in a way that fosters both reasoning skills and a critical attitude? How must we teach in order to initiate the students into one of the constituting practices of the academic life? We come back to these questions in Chapter 6, Teaching It All.

5.6 DEVELOPING ACADEMIC INTEGRITY AND CRITICAL THINKING

Let us ask you three questions: Do you believe that students in your university typically pick up academic values through lectures, seminars, supervision, writing tasks, and assignments? Do you experience that students in your university on a regular basis learn how to recognize credibility in the work of others? Is it your impression that students are familiar with critical thinking as an expected outcome of their higher education? If your answer to one or more of these questions tends towards a "no": How can we then start supporting students in familiarizing themselves with the value base and standards of credibility? How can we facilitate their development of skills and attitudes in critical thinking, so as to acquire and maintain good academic conduct in their own work?

We believe that teacher led and collaborative learning activities can play an important part. This is so, partly due to "relatedness" being a basic human need (SDT), partly due to the effect that discourse and dialog with peers and academic authorities can have on development of Academic Bildung, critical thinking, and rationality. Such an approach can be quite demanding on the teacher and on the facilitation of the students' learning activities. We argue that it requires time, knowledge of the values, knowledge of what has brought these values about, knowledge of the specific rules and regulations at the local institution, that it requires facilitation of dialog and discussion of the values related to specific relevant and typical situations where decisions are up. Ideally, this should all also be related to the students' writing and other learning activities in the specific disciplines, not just something that goes on in library courses. It is anyhow all about teaching so that students learn to make ethically sound and thoughtful decisions in their work, and it is about leading them into good academic practice.

CHAPTER SIX

Teaching It All

All we have to decide is what to do with the time that is given us.
(Tolkien, 1991 [1954], p. 64)

6.1 WHAT HAVE WE LEARNT IN SCHOOL TODAY?

Some of the advice we commonly give students is "stop reading, start writing—stop talking, start doing." Now, dear readers, we do not want you to stop reading just yet, but it is time to put into practice all we know about teaching and learning, information literacy, and academic formation, which the previous five chapters have been leading up to. We have discussed *what* the students are supposed to learn through our IL teaching, *why* they should be introduced to the themes we have proposed, as well as some of the scientific and psychological bases for learning and teaching. The purpose of this chapter, thus representing the practical core of our book, is to illustrate how to we can make our information literacy teaching as good as possible. To do this, we lean on our own experience as well as work from colleagues around the world, in addition to the research that is the foundation of the first part of our book.

We have deliberately chosen to end our journey with a more practical chapter. We often read brilliant books and articles about library science-related topics, but the big challenge is to transform the theoretical content into relevant and manageable practices in our own everyday work. Thus, after reading the next pages, we hope you have some new ideas and insights with which to enrich your information literacy teaching.

6.1.1 Introduction

Teaching information literacy in higher education has many aspects to it, and in this chapter, we have decided to focus on the topics considered most important in our own development as IL teachers. We hope you find

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something useful here, too. This chapter is divided into three main sections, which in a way represent the three main stages of teaching, i.e., preparation, implementation, and assessment and evaluation. We also consider relevant external factors, such as the level of study, the size of the student group (and the institution itself), the amount of time allocated to IL teaching, and the level of integration into study programs.

First, preparing your information literacy teaching is more than coming up with good examples or explanations why plagiarism is negative for learning. It includes knowing your student group, i.e., their discipline and level of study, and also what your institution thinks about information literacy. More precisely, do the institutional strategic documents include rules or regulations that support information literacy? Do the learning outcomes for the session you teach comply with the learning outcomes of the overarching study program? And finally, is the faculty aware of what your library can offer and how you can contribute to the students' overall course of study?

Second, implementing your teaching goals implies understanding how you can engage your students in the little time you have available. There are many teaching methods available to enhance student motivation, important for both satisfaction and performance, which in turn might make the lectures feel more interesting and instructive, and the active learning sessions more time-efficient. Presently, various forms of technologies gain ground in higher education, e.g., student response systems, videos, and MOOCs (Massive Online Open Courses). These are readily adoptable for IL teaching.

Finally, assessing information literacy learning constitutes a challenge. We usually meet with the students only once, and further, we are rarely involved in their end of term exams. To get feedback on, and thereby know how to improve, the quality of our teaching, we should prepare course evaluation, both by students and our peers. Also, and more importantly, we should encourage in-course formative assessment, and last, but not least, long-term collaboration with faculty whereby learning outcomes connected with information literacy are integrated into the discipline-specific student work.

6.1.2 Administrative guidelines, or how to avoid starting at scratch

Have you ever been to IKEA and arrived home with a flat-packed new desk and set about to assemble it without bothering to even cast a

glance at the instruction booklet? Or, and this is quite common, briefly looked at the instructions, found them confusing, and gone ahead without them, perhaps not having a 100% feeling of mastery over what you are doing? We are quite sure you have, or at least that you know someone who has. The result might of course be very good, but it also might end up a slight disaster. Luckily, in the latter case, acknowledging that you should have read and understood the instructions properly and thereby done things more efficiently, might influence the selection of strategy on how to proceed next time you come home from IKEA.

Reading administrative documents about teaching and learning can be a bit like this, and in the rush of things, it is probably not first on your list, either. However, taking the time to study institutional strategies, qualification frameworks and learning objectives properly might in fact facilitate the development, and improve the relevance, of your IL teaching.

Most countries have established a national framework for education, and for us IL teachers, knowing the implications of these frameworks for our teaching may prove golden in meetings with faculty and study administration, where integration of information literacy into study programs is on the table. In this book, we will not discuss the many individual national frameworks of qualifications, but rather use the overarching framework for the European Higher Education Area (EHEA, cf. Bologna Working Group, 2005) as point of reference. Although much is common across frameworks, we strongly advise you, after reading this book, to google the framework(s) that are relevant to *your* work.

When examining these frameworks, look for outcomes related to your institution's library services. Also, setting aside some time each term to study learning outcomes for the local study programs in which you are involved is fruitful, first and foremost because it facilitates setting learning outcomes for your own teaching, and thereby placing information literacy into a larger context. There is an oft-quoted citation from the famous (and fictional) Doctor Who, saying "A librarian who spends time writing well-formed learning outcomes might save the world from the Daleks".[1] We advise you to be that librarian.

[1] Sorry, we just made up that quotation.

6.2 PREPARATION

In this section, we first develop on how we might proceed when it comes to planning the learning outcomes of our teaching. The second part is devoted to the diversity of the modern student population and how we can best meet the various needs that occur across the course of study. Our IL teaching is however nothing without participants, and therefore, we end this section with some advice on how to make our IL teaching visible and attractive, both among students, faculty, and administration.

6.2.1 Constructive alignment, learning outcomes and objectives

To succeed in our teaching, in the sense of achieving good learning for the students, we need to think through how we arrange our teaching and the learning environment. Much of the didactic arrangements can normally be chosen by us, while some of the conditions for our teaching are out of our control. The conditions we are bound by when planning lessons and learning are framework factors such as time and place of the lesson, the preconditions of the teacher and the students, the learning goal or the intended learning outcome, whether teaching and learning methods are in accordance with the assessment method, and whether the content is tailored to the intended learning outcomes and to the students present in the lesson.

We generally recommend starting the planning of the teaching by setting the intended learning outcome of the lesson, e.g., "the students know and are able to identify the evaluation criterion 'objectivity' in source evaluation." Next, thinking through what contents and learning activities this require, e.g., providing information and examples why this criterion is important, and challenge the students to evaluate a small variety of different sources, in class (or prior to the session), with this criterion in mind. Finally, we recommend finding forms of assessment that are relevant for determining whether the students have reached the intended learning outcomes, e.g., evaluate the students' findings in class, or examine the list of references in their discipline-specific term paper. This way of planning teaching, where we start with the intended results of the students' learning processes, and align teaching and assessment to the intended outcomes, is called *constructive alignment* (Biggs, 1999). The term constructive alignment itself points to a constructivist understanding of

learning and to the alignment between intended outcome, teaching/learning activities, and assessment tasks (Biggs & Tang, 2011, p. 52). Constructive alignment is part of an outcomes-based approach to education, as opposed to an input-based approach. In the traditional input-based education, the focus lies on the resources that students have at their disposal and, in particular, on the curriculum and the content. In the currently internationally favored output-based education, the focus rather lies on the knowledge, skills, and competences that the students have acquired as a result of the teaching and learning. In this sense, output-based education has been a part of the focus-shift from teaching to learning, a shift sometimes characterized as a paradigm-shift (Barr & Tagg, 1995).

What, then, is a learning outcome? The term *outcome* could point to the subjective experience of the student of a teaching and learning process, as well as the more objectively measurable learning results. We will do well to keep both interpretations in mind, as both are important factors in education. However, in connection with constructive alignment, it is the meaning pointing to (more or less) objectively measurable learning results that is involved.

There are different categories of learning outcomes: knowledge, skills, and competences being the ones chosen in the European Qualifications Framework (EQF) (Bologna Working Group, 2005). Another learning outcome that is particularly relevant in connection with information literacy, is attitudes. We have argued in Chapter 5, Toward Academic Integrity and Critical Thinking, that information literacy teaching should inspire discussion of, and perhaps also acquisition of, certain norms and conventions. We can here remind ourselves of the ever-growing, international challenge of plagiarism, which in part points to a certain level of failure in our teaching, and in higher education in general, regarding acquisition of values such as accountability, honesty, and respect. In connection with constructive alignment, there is also a third meaning of the notion "learning outcome" that is of vital importance, besides the meaning "the objectively and externally measurable learning result of a learning process." An *intended* learning outcome, as planned and anticipated by the teacher, is the same as the planned-for learning goal. (However, we can note that the two notions, "learning outcome" and "learning goal," usually are considered part of different vocabularies, belonging to the two above-mentioned different approaches to teaching and education, where "learning goal" belongs to an input-based approach to education.)

An intended learning outcome is then a possible result of an intended learning trajectory of a student, as planned by a teacher.

Intended learning outcomes are to be described in learning outcome statements, and these have a preferred specific form. An outcome statement must contain a learning activity that students need to perform in order to achieve the outcome. The statement thus needs a verb like "describe," "explain," "apply," or the like, and an object (the content), e.g., "The student will be able to *explain* different solutions to a philosophical problem and *analyze* their strengths and weaknesses." The contents given here can be more or less specific, depending on the intended outcome. However, we argue that particular competencies and skills should be the goal of information literacy teaching, rather than specific contents. In line with this, we recommend that the content is being described in relatively open categories, like in the example above, e.g., "explain the legal and ethical use of information resources" and "use basic principles to evaluate the relevance and quality of an information resource" (competencies), "cite sources in line with academic conventions," and "retrieve literature from the library collections" (skills).[2]

Educational learning objectives and learning outcomes come in many forms and at different levels of complexity and specificity. These levels are described in a diversity of taxonomies, Bloom's revised taxonomy being one of the most commonly used (see Bloom et al., 1956; Krathwohl, 2002; Krathwohl, Bloom, & Masia, 1973). This taxonomy comprises three models used to classify learning outcomes in cognitive, affective, and sensory domains. For the purpose of teaching and learning in information literacy, the cognitive and affective domains are the relevant ones, and we give a quick overview of them both here.

The cognitive domain consists of six different levels of cognitive complexity (horizontally presented in Table 6.1). The taxonomy is cumulative, and this means that mastery of one level is considered a condition for mastery of the next, more complex level. In this way, *remember* is the least complex, while *create* is the most complex. When it comes to the knowledge objectives (vertically presented in Table 6.1), there is an increasing degree of abstraction, from factual knowledge as the least abstract, and metacognitive knowledge as the most abstract.

[2] The examples are inspired by learning outcomes presented at Carson-Newman University (http://www.cn.edu/undergraduate/resources/library/library-services/faculty-services/information-literacy-objectives-and-learning-outcomes) and at UiT The Arctic University of Norway (https://uit.no/utdanning/emner/emne?p_document_id = 461268).

Table 6.1 Bloom's revised taxonomy

The Knowledge Dimension	The Cognitive Process Dimension: Remember	Understand	Apply	Analyze	Evaluate	Create
Factual knowledge						
Conceptual knowledge						
Procedural knowledge						
Metacognitive knowledge						

Source: Krathwohl, 2002, p. 216

The verbs of the cognitive process dimension have the following meanings:

- Remember: Retrieving relevant knowledge from long-term memory
- Understand: Determining the meaning of instructional messages, including oral, written, and graphic communication
- Apply: Carrying out or using a procedure in a given situation
- Analyze: Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose
- Evaluate: Making judgments based on criteria and standards
- Create: Putting elements together to form a novel, coherent whole or make an original product.

(Krathwohl, 2002, p. 215)

The concepts of the knowledge dimension have the following meanings:

- Factual: The basic elements students must know to be acquainted with a discipline or solve problems in it.
- Conceptual: The interrelationships among the basic elements within a larger structure that enable them to function together.
- Procedural: How to do something, methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.
- Metacognitive: Knowledge of cognition in general, as well as awareness and knowledge of one's own cognition.

(Krathwohl, 2002, p. 214)

We would like to stress that intended learning outcomes aimed at memorizing and reproducing are no less valuable than higher order ones. Indeed, as we saw in Section 3.1.5, remembering is an important

precondition for understanding and higher order processing. If we have a particular interest in higher order thinking, this is connected to our students' development of a critical and evaluative attitude. Retrieval of relevant knowledge from long-term memory is, together with, e.g., abilities to analyze, also a basis for being able to create something new. To promote higher order thinking is thus to promote both the critically appraising and the personal and creative side of learning, and what one might call the academic formation, or Academic Bildung (Solberg & Hansen, 2015; see also Chapter 5, Toward Academic Integrity and Critical Thinking), thus the kind of learning and education that it is particularly important to cultivate in higher education.

As a means to understand the students' (lack of) engagement in IL teaching sessions, to understand the cyclic process the student is actually going through when working, and thereby to evaluate and improve the effectiveness of IL teaching, Keene, Colvin, and Sissons (2010) reviewed the various stages involved in the problem-solving information seeking process in light of Bloom's taxonomy of cognitive skills. They split the task into four stages, i.e., identification of information need, location and evaluation of information, review of information, and problem solution (see Fig. 6.1). When going into detail into the various activities involved in each stage, they revealed that both low-level and high-level cognitive skills were required, on *every* stage. This observation entailed a proposition whereby teachers should be aware of which cognitive skills are employed at the different moments of acquiring information literacy, and based on this, deliver instruction and activities proven effective for the given stage (for detailed examples, see Keene et al., 2010).

However, it is not only the cognitive domain that is relevant for reaching intended learning outcomes in information literacy. IL is, after all, a normative field. Turning to the affective domain, Bloom's second model should be considered relevant for information literacy teaching. It consists of the following five levels:

- Receiving Phenomena: Awareness, willingness to hear, selected attention.
- Responds to Phenomena: Active participation on the part of the learners. Attend and react to a particular phenomenon. Learning outcomes may emphasize compliance in responding, willingness to respond, or satisfaction in responding (motivation).
- Valuing: The worth or value a person attaches to a particular object, phenomenon, or behavior. This ranges from simple acceptance to the more complex state of commitment. Valuing is based on the

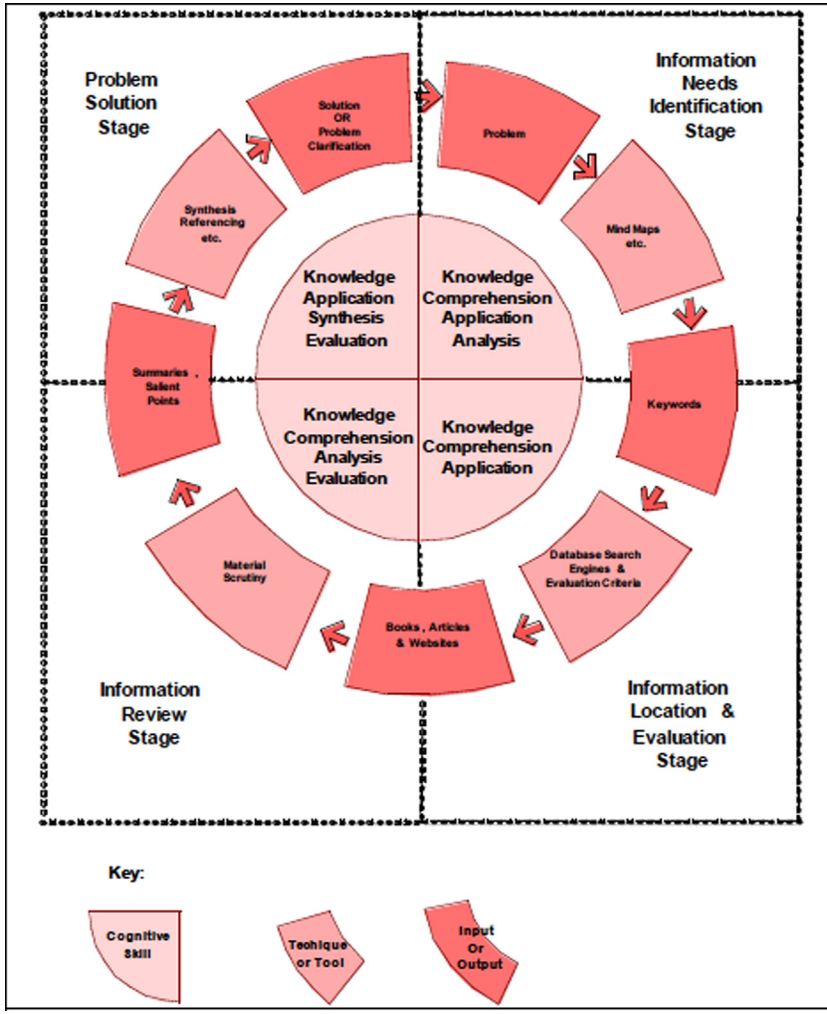

Figure 6.1 Colvin–Keene model. *From Keene et al., 2010, p. 7.*

internalization of a set of specified values, while clues to these values are expressed in the learner's overt behavior and are often identifiable.

- Organization: Organizes values into priorities by contrasting different values, resolving conflicts between them, and creating a unique value system. The emphasis is on comparing, relating, and synthesizing values.
- Internalizes Values (characterization): Has a value system that controls their behavior. The behavior is pervasive, consistent, predictable, and

> most important characteristic of the learner. Instructional objectives are concerned with the student's general patterns of adjustment (personal, social, emotional).
>
> ***(Krathwohl et al., 1973; definitions and keywords from Clark, 2015)***

This list of the meanings of the notions on each of the levels of the affective domain may make us realize that without stating intended affective learning outcomes, we really have little control over the value acquisition and thus the formation of the students.

After having specified the learning outcomes of our teaching session(s), we must create the learning environment where the learning activities can be performed. The learning activities help students construct their own learning, i.e., learning by what they do. Assessment will then be about how well the students achieve the intended outcomes, and in an aligned design, we use assessment tasks that address the same verbs as did the learning outcome statement.

The advantage of constructive alignment as an approach to teaching is the consistency throughout the learning experience for the student. When intended learning outcomes, learning activities and assessment are all driving the learning processes in the same direction, the teaching is likely to be more effective. "All components in the system address the same agenda and support each other. The students are entrapped in this web of consistency, optimizing the likelihood that they will engage the appropriate learning activities. . ." (Biggs & Tang, 2011, p. 54).

However, critics have argued that an outcome-based approach to education, and constructive alignment in particular, easily can become a straightjacket for teaching and learning (Andersen, 2010; Imsen, 2009; McKernan, 2010). Predefined outcomes can hinder the free and autonomous development of both teacher and student, and it could turn teaching and learning into instrumental and strategic processes rather than possibilities for academic and personal growth. We argue that goals of learning processes in research institutions should be open for continuous negotiation between systemic and societal expectations, teacher and student (cf. discussion in Prøitz, 2014). Further, in our interactions we should also be open for the unexpected, for that which we have not planned, and could not plan. This is perhaps particularly important to be prepared for in more dialog-favored teaching settings, where the heterogeneity and individualities within the student group are more easily exposed, through facilitated interaction with peers and teacher. For

instance, a session on academic integrity for PhD students, where intended focus is on the advantages of correct source use for learning, might easily evolve into a discussion on where to draw the lines for correct versus incorrect use of sources, and whereby discipline-specific differences are revealed.

In sum, when working with constructive alignment, we must keep in mind that the intended outcomes are preliminary, that they should be open to negotiation and that we therefore should keep the contents as open as possible. Intended learning outcomes should serve as guidelines and starting points for teaching and learning processes, so that we know what we deviate from when we do.

6.2.2 Dealing with the variety of students

Libraries in higher education have two main user groups, i.e., students and faculty. When it comes to the first group, it might feel natural to us to focus on the young students fresh out of high school, who meet the world of academia for the first time. However, as indicated throughout this book, the acquisition of information literacy does not stop here, but is a continuous process that students are dealing with until the day they are conferred their doctorate. In addition, there is the growing group of adult students embarking on continuing and further education, who typically have years of professional experience on their CV, and who now need to reacquaint themselves with the basics of information literacy.

In this section, we discuss how to best meet the variety of student groups in the information literacy setting. If experience varies from one group to another, internal motivation constitutes a second differentiating factor. Therefore, to provide teaching that meets the needs and expectations of our students, we must identify with them and understand the given situation in which they find themselves.

6.2.2.1 From BA to PhD: refined motivation, stricter demands

Let us set the stage by identifying some external expectations. As mentioned in the previous sections, higher education is divided into cycles or levels, identified through a variety of expected learning outcomes. These often embrace both personal and academic development, acquisition of knowledge and training of skills (see Bologna Working Group, 2005; for the overarching European Qualifications Framework). Further, many national frameworks state competencies and skills directly relating to information

literacy, and if we strive to comply with these when developing our IL teaching, we support the institution's effort to produce qualified candidates. Moreover, we can better identify and pronounce the scope of the library's responsibility in the student's education, which, in turn, might promote discussion with faculty and ease integration of IL into study programs.

Let us use the UK Quality Code for Higher Education (Quality Assurance Agency for Higher Education, 2014) as a concrete example. Students having completed a BA with honors (level 6 on the FHEQ) are expected to have the ability to monitor their own learning. They are further expected to use scholarly literature in their work, and this with a critical approach. Moving to a MA level, students should not only have a systematic understanding of a certain field of study, but moreover, they are expected to have acquired a conceptual understanding that allows them to approach existing research findings and methodologies through critical evaluation. Finally, students having completed a PhD should understand a large body of research within the field and have employed this to develop new knowledge. Taken together, the development that students are expected to demonstrate throughout the course of study involves not only a gradually broader and more complex understanding of the field, and more autonomous work methods, but also a greater ability to transform input into new output.

Acquisition and use of knowledge on all levels of study is facilitated by the acquisition of academic integrity and critical thinking, and a set of general skills to work in accordance with these concepts. The Norwegian Qualifications Framework (Ministry of Education and Research, 2012), which is based on the European model and serves as frame for all courses in higher education in Norway, states qualifications that fall under these categories, see Table 6.2.

These expected qualifications are what we teachers must relate to, and for all student groups to see the immediate relevance of the IL teaching for their working process, we need to understand their current situation: Where are they, where are they headed, and what do they need? They are on different points in the process of acquiring knowledge, and as they go along, IL competencies and skills mature. While it is stated in many institutions' regulations that we should offer IL teaching to fresh students, this is not necessarily the case for students on higher levels. And further, if faculty takes it for granted that putting academic values into action simply emerges through studying, we as librarians should take it as our responsibility to meet with the students at turning points in their course of study and thereby ease the transition from one level to another.

Students in the first cycle are in most cases very young, around 19–20 years, though with a proportion of older first-time entrants that varies from country to country (OECD, 2014). Poor retention rates and high levels of plagiarism cases have contributed to more extensive focus in later years on the transition from upper secondary school to university, with particular attention to student learning, student engagement, and student identity (for references, see Christie, Tett, Cree, & McCune, 2016, for

Table 6.2 Qualifications linked to information literacy, categories *Skills* and *General knowledge*, extracted from the Norwegian Qualifications Framework for Higher Education[a]

	Skills	General knowledge
First cycle	The candidate can find, evaluate and refer to information and scholarly subject matter and present it in a manner that sheds light on the problem The candidate masters relevant scholarly tools, techniques and forms of communication	The candidate has insight into relevant academic and professional ethical issues The candidate can plan and carry out varied assignments and projects over time, alone or as part of a group, and in accordance with ethical requirements and principles
Second cycle	The candidate can analyze and deal critically with various sources of information and use them to structure and formulate scholarly arguments The candidate can carry out an independent, limited research or development project under supervision and in accordance with applicable norms for research ethics	The candidate can analyze relevant academic, professional and research ethical problems
Third cycle	The candidate can handle complex academic issues and challenge established knowledge and practice in the field	The candidate can identify new relevant ethical issues and carry out his/her research with scholarly integrity The candidate can communicate research and development work through recognized Norwegian and international channels

[a]English translation of qualifications retrieved from https://www.regjeringen.no/globalassets/upload/kd/vedlegg/internasjonalt/nqr_higher_education.pdf.
Source: Kunnskapsdepartementet, 2011, version of April 2014.

challenges, fears, and expectations linked to the transition; see, e.g., De Clercq, Galand & Frenay, 2017; Lødding & Aamodt, 2015; Shanley & Johnston, 2008). As IL teachers, we face the challenge of meeting with the students very briefly, and one major task is to make the few teaching sessions relevant to the student. Here, we need to draw on their previous knowledge and simultaneously prepare them for the studies to come. Using everyday situations where source evaluation is critical might serve as an introduction to information literacy. All people google, and many sadly google rather uncritically important issues relating to health and economy, or they do not google but take tabloid reportages to contain valid information. One way of introducing the challenge of source use to students is to present them with a wide—and for them relevant—theme, e.g., "youth and stress," and let them search without any instructions. This exercise has at least two benefits: first, you can monitor their intuitive way of searching and use this in the subsequent discussion, and second, the students themselves become aware of their own search strategy. With this exercise in mind, the students are likely to be more prepared/receptive for evaluating various types of sources (scholarly vs non-scholarly).

Example Exercise

Select an everyday theme relevant for the group in question, e.g., *burnout*. Perform a basic Google search that you know will list sources of variable validity, e.g., an official webpage, a magazine article, and a commercial self-help webpage. Let the students evaluate the sources in buzz groups and thereafter invite them to detail the elements having guided their judgment. You may want to guide the students in the discussion by indicating appropriate evaluation criteria (presentation of content, author, accessibility, citations, etc.). If the teaching session conditions are such that students are less willing to contribute orally, group responses can be mediated via an Audience response system that authorizes qualitative output from the students, e.g., Padlet. If the student group is too large, you may want to use a survey tool, such as Kahoot, although this prevents students from providing free-text responses.

Having evaluated a variety of sources with information relevant for their everyday life, and having further tested it on different scholarly sources, BA students should now understand one major reason for being critical in their handling of sources, i.e., sources vary when it comes to

quality and relevance. Still, to acquire a critical behavior that will guide their development as good academics, students may benefit from a discussion on the very purpose of academia, and their role in it. Understanding the driving forces of a healthy academic society, they may come to realize that they are now part of something bigger, and for their contribution to matter in a positive way, they need to work in accordance with academic values. However, new to the academic society, fresh students have their heads and days filled with discipline-specific information, practical matters, and social integration/navigation. Further, a self-report snapshot study from the United Kingdom (Hughes & Smail, 2015) reveals that academic performance is in fact subject to less concern among first-year students than aspects linked to the social, personal, and organizational part of their study life.

Thus, there is in general little time devoted to reflect around more existential questions, and we believe that library staff, who already teach students the skills needed to act in accordance with academic values, should take partial responsibility for raising awareness around the latter among students. Importantly, however, asking direct questions targeting the individual students' role in academia in class is not necessarily very fruitful. As previously indicated, students vary as to how much they have reflected around their new situation, and many may have a hard time formulating a representative answer on the fly. Further, these questions are rather personal and might not be something students want to discuss with new classmates in a large auditorium. But there are alternatives. We might want to present these questions to the students prior to a face-to-face teaching session, and follow up in class with a teacher-led reflection around the basics of academia, its purpose, the advantages and pitfalls for us working or studying there, and finally, what is expected from all its participants. Academia as an entity might in some cases turn out too wide to grasp for the student group in question, and thereby "irrelevant" at the given point in time, and in these cases, we recommend to focus first and foremost on the students themselves. To link the reflection to their own situation, the teacher might for instance present numbers on retention rates or cases of plagiarism for the given institution or country, compare requirements in upper secondary school and higher education, and place the students' study discipline in a societal context. This discussion, which does not require, but welcomes, contributions from the students, might help them more clearly formulate in their own head their new situation, and where they want to be headed.

Example Exercise

Prior to a face-to-face teaching session, provide the student with an exercise that will help him identify his motivation(s) for having embarked on the given course of study. The purpose is threefold: to provide the student with a self-articulated driving force he can lean on in difficult times; to make the student develop confidence in the meeting with other opinions and ways of action; to help the student learn better (motivation is important for engagement). This exercise uses the Academic Motivation Scale (Vallerand et al., 1992) as starting point, which was developed to identify the importance of intrinsic versus extrinsic motivation versus amotivation. It was originally developed for research purposes, but it provides a comprehensive list of statements from which the teacher can select those he sees relevant for his students to evaluate. It is important, though, that the selected statements together represent different types of motivation. The teacher might further want to use the revised categorization of the statements presented by Smith, Davy, and Rosenberg (2012). The list of statements the student needs to react to must be accompanied by instructions not only as to how to answer but also how to react to the results that emerge from the student's responses. (We want to make the student more motivated, not the contrary because of "negative" results.)

Having understood the point of being information literate, and having identified their own motivation for being in higher education, then comes the challenge of applying their gradually acquired knowledge. One subject that illustrates the complexity of the field is the art of citing sources in an academic text. First, we would recommend not to provide students with reference management tools in the first year of study. If students, in the rush of things, select the apparently shortest way, this often means using tools without understanding what these do and do not do. We want students to learn the structure of citations and the formatting of given citation styles, and if they have not learned these, they will have a hard time discovering errors occasionally generated by the software. More importantly here, though, and as mentioned in Chapter 5, Toward Academic Integrity and Critical Thinking, being familiar with the rules and being able to "read" situations is in itself no guarantee for good academic conduct. The students need to be motivated, guided by knowledge of core values and the reasons for their existence, in order to act in accordance with their own good judgment. This points towards using cases in teaching of information literacy. And it points towards

dialog, discussion, and the opportunity to try out and use their own voice related to issues of good academic conduct and academic integrity. And to thinking about and practice the decision making they will be challenged by in common concrete situations. Situations where they will be tried, and where they will need their courage and ability to resistance in order to make the good and right decisions.

The exercise "Where do you draw the line," which Carroll (2002, p. 42) developed on the basis of an exercise in Swales and Feak (1994), has proven to engage and challenge all students, from BA level to PhD. In this exercise, the students are presented with six scenarios, where the two extremes present cases of correct source use and clear plagiarism, respectively. The students are asked to find the borderline, i.e., between which two scenarios the line goes between correct versus incorrect source use. While this exercise illustrates the trickiness of citing sources, it also incites a lot of discussion and disagreement which the teacher in turn can use to make the students see which elements go into the evaluation of source use. A newer version (Carroll, p.c.), which has been refined, with permission, for an open online course in information literacy (iKomp, 2016) provides the students with more detailed, easy to relate to, scenarios:

Example Exercise

("you" = the student given the exercise)

Mary is writing a student paper about the financial crisis in 2008–2009. You will be given six different ways that she uses sources, see the list of statements 1–6 below. Statement number 1 shows incorrect source use, because Mary copies directly from a source without putting in any in-text citation. Statement number 6 is correct source use, because Mary has put in an in-text citation, she has listed the source in her reference list, and, through the formatting, she clearly shows which part of her text has been taken from the source. But what about the four other statements?

Your task is to decide between which two statements the borderline goes for correct source usage (Table 6.3).

As mentioned, this exercise—and the problem of citing sources in general—is relevant also for higher levels of education, i.e., MA and PhD. So, let us now turn our attention to the latter group (for MA students, see Section 6.2.2.2). The PhD students find themselves in the end phase of their academic education, where they are expected to carry out

Table 6.3 Where do you draw the line?

1 Mary found a paragraph in a text on the Internet. She copied and pasted the paragraph directly into her own text, without changing anything and without showing that it was written by somebody else

2 Mary found a paragraph on a website. She copied and pasted the paragraph into her own text, and made a couple of changes to it (here highlighted in bold). The original text was:

> . . . this **means** that the average **decline** was . . .

Mary changed this to:

> . . . this **shows** that the average **reduction** was . . .

Otherwise, Mary let the contents of the extracted paragraph remain the same as she had found it on the website. She wrote the title and address to the website in her reference list

3 Mary found an article (Tyrell, 1999) on the Internet and pasted a complete paragraph into her own text. She removed a couple of sentences from the middle of the paragraph and also changed the order of three sentences Mary wrote **(Tyrell, 1999)** at the end of the copied paragraph and put all the information about Tyrell's article in her reference list

4 Mary pasted 10 short sentences into her text from three different Internet sources. Each sentence was made up of 10−15 words. Mary used her own words between each of the copied sentences and changed the order of some of them, so that her text was understandable. Mary put all three Internet sources into her reference list

5 Mary read five different articles about the stock market in Norway. She made a summary of the main points for each article, which altogether resulted in about four sentences. Mary's summary was very much shorter than the original texts. When she reproduced these main points from the five articles, she did it in the following way:

While White (2013, p. 12) claims that conscious speculators are on the whole mainly responsible for controlling stock fluctuations, Pinkman (2014, p. 34) shows that random buying of shares gives approximately the same result. Goodman (2005) and Schrader (2016), in their studies of the Greek and the French stock market, respectively, problematise the continuing governmental stock exchange speculation, and refer to Fring's (1999) sensational analysis of economic movements in Europe during the 1980s.

Mary listed the five articles in her reference list.

6 Mary found an article (Underhill, 2000) on the Internet. She wanted to quote Underhill's definition of the term *communication* and pasted it therefore into her text. The definition was somewhat long, more than four lines of text. She put the original text in a block format (uniform left and right margins), with 1 cm indentation on each side. She inserted spaces above and below the quotation and reduced the font size. Directly after the quotation she wrote **(Underhill, 2000, p. 192)**. Mary listed the source in her reference list.

Source: Activity taken from iKomp.no, adapted from Carroll (p.c.), originally based on Swales and Feak (1994).

independent research and find their own voice as full-fledged scholars. However, despite the many years they have spent in the academic society, we still see cases of incorrect source use also within this advanced student group. This might indicate that their information literacy competencies and skills are not fully developed. The observed problems might reside in the limited time they have at their disposal, combined with high external and internal pressure, or merely be an effect of their home institution (including the academic library) not having identified how to best support this group of students.

The challenge we as academic librarians face is identification of our role in the doctoral education and a decision on how to best meet the students' needs. A recent survey from the United Kingdom indicates that for the students to want to receive library support, it must be (perceived as) highly relevant, sufficiently advanced, and of immediate use (Education for Change, 2012; cf. also Fleming-May & Yuro, 2009). Also, we should plan our PhD teaching sessions while having in mind the students' academic experience. Although they might not have received advanced information literacy training, this does not mean they are naïve when it comes to use of sources, literature search and criticism, and the overarching purpose of it all (cf. Green, 2010). Further, having expertise on academic integrity as well as publication-related issues, we should integrate into our teaching the fact that PhD students need to balance the two roles as "good scientist" and "good academic," where the latter focuses more on production and publication of science as a career-building process (Carter, 2015). Finally, we should be aware of (and if needed, improve) our competences and skills, and present these with confidence in the meeting with PhD students. The students are heavily influenced by their supervisors (Education for Change, 2012), but in our experience, the latter group is not necessarily 100% up to date when it comes to the many facets of modern information literacy, and/or they consider information literacy not to be a vital theme for discussion in the PhD student/supervisor relation. Thus for the PhD students to consider us competent dialog partners, and, in turn, for them to take their information literacy knowledge into discussion with their supervisors, we need to convincingly present the relevance of our expertise for their doctoral education.

As mentioned, the PhD students need to see the relevance and immediate utility of the library offer. They often want hands-on information, directly applicable to writing. However, to make them use the tools

in the best way, in the same way as for BA students, they need to understand the *whys* behind it. At this level of education, however, we are convinced the students benefit from a discussion on the very purpose of science, including their motivation(s) for doing a PhD. This discussion, again, benefits from a multidisciplinary student group, where differences and similarities are revealed, and where we more easily can identify the core of academic practice. Having this discussion as a background in our teaching sessions, the PhD students more easily leave "their bubble" and more easily see how their hands-on decisions when it comes to searching and citing reflect their development as good members of the academic community. Searching, for instance, is of course not only a question about searching. As researchers, we search to strengthen our argumentation, to position our research in a context and refine our research questions, and to develop a confident researcher identity (cf. Garson, 2016). Next to this, PhD students should be aware of potential challenges that might complicate searching and its output: these might be of a (1) linguistic nature, e.g., difficulties understanding the genre or cultural discourse of literature, (2) methodological nature, e.g., difficulties with scoping and interpretation and synthesis of content, (3) conceptual nature, e.g., difficulties relating cited literature to your own work, and (4) ontological nature, e.g., difficulties having confidence in yourself as a reviewer of the literature (Chen, Wang, & Lee, 2016). Citing, in turn, is not only a question about citing and entering your references correctly. If we abstract away from the obvious problem of direct copying or plagiarism (see Ison, 2012, who reports that 60% of the dissertations in his study ($n = 100$) included uncited material to some degree), we see in our classes that the PhD students, having started to publish, engage in discussions related to questionable research methods such as ghost writing, patchwriting, and self-plagiarism, including duplicate publishing, copyright infringement, salami slicing, and text recycling (Roig, 2013; Howard, 2015).

With these overarching, as well as personal and technical challenges and questions, how do we proceed in our teaching? PhD support in libraries is quite new, though experience is steadily rising among our colleagues around the world. We believe developing teaching material for these students is vital, for several reasons. First, PhD dissertations are considered scholarly material at the same level as journal articles. Second, constituting the highest degree of academic attainment and being a major personal investment, bad use of sources can ultimately revoke a student's PhD. Third, PhD students are the next generation faculty, who will

function as guides and academic role models for fresh students. Fourth and finally, PhD students experience a unique degree of stress and isolation in their work (cf. Fleming-May & Yuro, 2009), and we should help them as best we can. In what follows, we present one way of structuring content for small groups of PhD students. Focus and the extent of detail obviously depend on the time you have available.

Example Teaching Session(s)[3]

Start with academic integrity, vital for good academic practice. Focus on the foundation of research, make them get out of their bubble. Reflect around the university's social responsibility, including sharing of knowledge (cf. the concept of Open Science). With this in mind, pass on to practicalities around source use: how to cite, how to search, how to share. Always link practicalities to academic integrity, but also to learning. Citing sources correctly requires a good grasp of the content you are reading. Having a reflective approach to your literature search guides you toward finding your own place in the research landscape. Sharing your knowledge, either as textual publications or research data, opens for a more meticulous prepublication process, and last but not least, a broader feedback from peers and others.

In the next section, we turn to another group of students who needs special attention, i.e., off-campus students.

6.2.2.2 Off-campus students: different working days requiring flexible solutions

As mentioned throughout this book, the 21st century campus is composed of students differing in a variety of dimensions (cf. also Wingate, 2015), including when it comes to how and when to study; some need to work and take care of their families, but also, "[students] have high expectations of how they should learn, selecting the technologies and learning environments that best meet their needs with a sophisticated understanding of how to manipulate these to their advantage" (Conole & Creanor, 2007, p. 11). Thus, to ensure the same good quality teaching for all students enrolled in our universities, we need to create IL learning environments that are optimal also when it comes to flexibility and availability.

[3] This is inspired by the seminar series *Take control of your PhD journey: From (p)reflection to publishing*, organized regularly since 2015 by the University Library at UiT The Arctic University of Norway.

As off-line students increase in number, and technology improves, the distinction between on-campus and off-campus teaching provided by libraries diminishes (cf. literature review in Ritterbush, 2013). However, the same study reveals that distance learners underutilize library resources and services, which, in our view, in part stems from an "out of sight, out of thought" tendency among university staff, including librarians. It is thus our job to make sure we connect with those students. We will return to practicalities, such as the use of online material, in Sections 6.3.2 and 6.3.5, and instead concentrate here on the (re-) acquisition of information literacy among mature students in further and continuing education.

Mature students in further and continuing education often have many years of real-life working experience. But are they any different than regular on-campus students? Research, referenced in Kahu, Stephens, Leach, and Zepke (2015), describes this group as students with very high engagement, but with low retention rates. Kahu et al. (2015) carried out a qualitative study among mature distance students in New Zealand, targeting to explore the link between academic engagement and student emotions. The results show a clear link in that some emotions formed part of the very engagement, e.g., interest and enjoyment, others constituted inhibitors of engagement, e.g., frustration and worry, and others again acted as outcomes that in turn influenced engagement, e.g., pride and disappointment. The conclusion of this research, although not contrasted with research focusing on younger on-campus students, points to the importance of being aware of the students' socio-cultural context.

In our information literacy teaching, when meeting with these students, we should make use of their current situation in developing themes for discussion and activities, and thereby help the students see the relevance of their prior knowledge for their current studies. Let us take a rather classic example, with mature distance students embarking on a profession-based master's program. They are highly motivated but often feel behind when re-entering university, both when it comes to theoretical knowledge and use of online resources. In this case, we should make three things clear from the very beginning: Their real-life experience is an advantage, the output of their master's may be used by practitioners in the field, and it will form part of the scholarly literature on their discipline.[4] If this might trigger a certain level of anxiety, at the same time its reality orients the students and gives

[4] Note that not all institutions make master's theses available. Further, a small, unpublished survey carried out in Norway has revealed that several institutions only publish those with a grade C or higher (Leif Longva, UiT The Arctic University of Norway, p.c.).

them a better defined starting point. This is where available library services become essential. Being away from campus most of the time, we need to show the distance students that we are there for them, by providing everything from overarching discussions on academic integrity to guiding them in retrieval of online resources. All to help them maintain their enthusiasm, write a good thesis, and contribute to their own and others' work life.

Example Exercise

In this exercise, we want the master's students to evaluate the type of research project they are initiating. In a first stage, the aim is to make them see the value and responsibility connected with MA research. Via reflection, either individually or in pairs, make the participants reflect around their motivation for doing a MA, and identify instrumental versus developmental factors. After discussion in class, either oral or via an ARS such as padlet, make them reflect around the reuse of MA research: what are their thoughts around the quality of MA theses in their field? Which function could and should the MA theses play as work material and scholarly record, respectively? Here, a discussion on evaluation criteria might be useful. As MA theses are not subject to regular peer review, and grades are not available, determining their quality hinges on the reader's evaluation skills. This discussion benefits from being followed by a search session, where students must search master theses and employ selected evaluation criteria. This task has an additional advantage in that it introduces students to, and trains them in using, a variety of search portals, e.g., institutional archives, open access repositories, and the library's subscription-based databases.

To conclude this section, we underline the importance of getting to know your student group before you meet them in the teaching session, including their discipline, level of study, and socio-cultural context. With these aspects in mind, you can tailor your teaching session to best meet their needs, better engage them, and improve the chances of their having learned something, and being motivated to continue learning, when they exit the classroom.

6.2.3 How to make our teaching visible and attractive?

As mentioned in Chapter 2, Information Literacy: The What and How, a major challenge for many teachers of information literacy is the little time allocated to their teaching. Ideally, IL should be a full-term course,

preferably with credits, so that students see the course as equally valuable as other induction courses. This would enable students to progress step by step into the important issues of academic formation, it would be easier to assess their needs to start with, and easier to measure the progress they make throughout the semester. Further, the IL teacher would have a perception of the students' knowledge prior to and after IL teaching sessions, and thus make it easier to adjust her teaching as the students increase their understanding.

This scenario is however quite rarely the case, and what we need to do, is to make sure IL teaching session(s) are set at a time where students are receptive for learning. If you have the chance, briefly meeting with the students throughout the semester, either online or face-to-face, is ideal in that different themes can be brought up when most relevant. For instance, knowledge about learning strategies should come early in the first semester of university study, so that students can structure and carry out their studies with the best techniques in mind. Also an initial reflection on the purpose and dynamics in academia might be useful for students fresh out of upper secondary school. Searching and citing literature, on the other hand, should come just before starting a written assignment (but not too long before, otherwise it might be hard to see the relevance, and you run the risk of the students engaging less). If you cannot schedule more than one meeting with the students, ask faculty or study administration well in advance if you can have 5 minutes at a general introductory meeting in the beginning of the semester. Here, you can prepare the students for the teaching session to come, and you can point to material they should consult prior to meeting with you. Nowadays, there are many free, good quality, online resources that are suitable for such individual study, e.g., *Academic Information Seeking* (www.coursera.org) and *iKomp* (www.ikomp.no).

As for doctoral students, where (compulsory) courses are fewer, the library should encourage participation during the first year, before they are too deep into the writing and publication race. They should further be encouraged to take other library courses, when relevant in their work process. Many libraries currently offer courses on publishing and data management, but PhD students—who, as we have seen, avoid spending time on things considered not immediately relevant—are not necessarily up-to-date about the variety of library offers (cf. Fleming-May & Yuro, 2009). In addition to promoting your offer directly to PhD students, and via student administration, we encourage you to check whether there are

places where the supervisors meet as a group, e.g., seminars on doctoral supervision, and if there are, check whether you—or others—can inform the supervisors about the relevance of the library support services.

Dialog with faculty and study administration is vital for IL teaching to be at its most effective. While faculty can implement IL skills and competencies into their own teaching and assignments, study administration can influence integration of information literacy into formal requirements on all levels of education, from BA to PhD. There seems to be an agreement, especially among policy-makers, that "information literacy involve[s] much more than just library skills" (Saunders, 2008, p. 100), and we see in fact that initiatives are taken to introduce information literacy relevant themes even before the first semester, either as a prep course or integrated in courses in upper secondary school, to facilitate the transition to higher education (see, e.g., McPhail, 2015; Talikka, 2006). But all this does not necessarily imply that local faculty and administration at universities know what IL contains, or how it can help the student learning process—and, in the end, the institution's reputation and position.

We believe raising awareness of the scope of IL is part of the library's job. This is challenging, but with patience and with a firm belief in the quality and importance of the library's IL teaching, integration is possible (for an example of integration and positive impact of library teaching on student writing, see Booth, Lowe, Tagge & Stone, 2015). The library must get out of the library (cf. Reeves, Nishimuta, McMillan, & Godin, 2004), and should further approach faculty and administration (and students) on different levels, simultaneously. The library direction regularly meets with deans and other decision-makers, and the IL teachers are in the position to contact faculty and departmental study administration. It is wise to always be ready to offer your services, and if they do not buy your product immediately, the circumstances being lack of time or lack of interest, do not lose hope, but concentrate on what can be done in the given situation. Revise your expectations and perspectives, continue working on the quality and relevance of your teaching, read up on relevant research or administrative documents, and examine student feedback, all to have well-founded arguments for the importance of information literacy in your next meeting with faculty and/or study administration. If faculty seems to have a hard time grasping the essence of the subject, focus on those who do and invite them to collaborate, either in teaching, internal workshops, or conference papers—all for both parts to receive valuable input on one's thoughts and actions. Faculty talk to each other,

and in our experience, with time, more and more individual teachers take interest and invite the library to present their offer.

Even though some researchers, for instance Webber and Johnston (2000), advocate IL as a separate discipline, most will argue that IL skills are better taught integrated in the curriculum of the various disciplines. According to Smith (2003), "embedding information skills within a disciplinary framework establishes context, meaning, and relevance for learners." Furthermore, she writes that "the approach to seeking and using information, are dependent on the structures and processes of a specific discipline" and that different disciplines have different resources and methods. Another reason for embedding IL teaching into subject-specific courses is that it increases the sense of relevance, importance, and thereby the status of information literacy among students. Cochrane (2006, p. 110) found that students felt "academic rather than library staff should be responsible for the delivery of IL", but we believe that a faculty–library collaboration is still favorable in that the library can add the meta perspective whereby IL is more easily seen as an overarching part of academic practice. Collaboration could also be expanded to include peer inquiry specialists, i.e., students trained in important aspects of information literacy by the library, available to less experienced peers. These trained students can serve a dual function: support other students within the discipline in times of need, and form a more easily navigable bridge between the latter and the library teaching personnel (see, e.g., Salomon, Glassman, & Lee, 2016).

Thus, as we perceive it, proper integration with subject courses is a better solution than creating separate full-term IL courses, since it supports the presumption that IL is linked to all disciplines in academia. This demands quite a bit more from faculty, who needs to be aware about how they teach and how they integrate elements of IL in their day-to-day lecturing or teaching, but here the library can be of service. It is also essential that it is made explicit that students will be evaluated not only on how they master the subject at the exam but also on their choice of and use of sources (for more details on assessment, see Section 6.4).

With the above-mentioned challenges in mind, it seems that a crucial trait in IL teachers must be flexibility, strong perseverance, and a clear grasp of pedagogical teaching methods. As librarians, we will always be second to faculty, and rightly so. Very few of us, at least those of us working in larger institutions, will get the chance to follow student groups

from their induction course until their finished degree. Thus we must work hard on being noticed and visible, and make our mark when we can. Pedagogic knowledge and didactic skills are therefore essential among IL teachers. Even though some library schools may offer courses in pedagogy or related topics, quite a few librarians have little or no pedagogical education. This means that librarians are very often self-taught when it comes to teaching methods and will most likely build their teaching on their own experiences. We cannot sit, however, and wait for library schools to increase elements of pedagogy in library training. Rather, we should team up with our colleagues and discuss teaching in light of research, current trends, and requirements. Together, IL teacher groups have years of various experiences and a multitude of competencies and skills, and bringing these together, creating an including and inspiring environment for teacher development, individual and as a team, we can progress and thereby present our teaching to faculty and students with confidence in what we are doing (for inspiration, we advise you to consult the blog *Hand in Hand*, run by Partners in Teaching, Learning and Assessment, Clarion University, https://handinhandclarion.wordpress.com/).

A warning, though, in the end: When working on developing your teaching and integrating it into study programs, make sure you continuously map the human resources available at the library. If you see that the amount of teaching demanded does not match with the people you have available, think alternatively. Which aspects are most important to teach? Which student groups could be put together? Which information could be provided by the faculty and not by the library? Which information can be put in an online resource?

In the next section, we turn to the hows and whys in implementation of IL teaching.

6.3 IMPLEMENTATION

In this section, we will take a look at three different ways of implementing IL teaching: the lecture, the flipped classroom, and teaching for collaborative learning. Hopefully, our suggestions for using these forms of teaching make sense against the backdrop of the other chapters of this book. While we deal with these teaching methods in separate subsections,

we often in practice find they overlap. In particular, collaborative learning activities typically constitute the major part of a flipped classroom session, and lectures may either be ingredients (as mini-lectures) of a mostly active and collaborative learning session, or incorporate collaborative learning teaching interventions.

6.3.1 Lecturing

In Chapter 3, Things We Know About How Learning Happens, we saw that the evidence in favor of adopting teaching approaches that aim for conceptual change through supporting students' active sense making seems solid. And in this book, we argue that student-centered, active and collaborative teaching methods are likely to be sensible ways of implementing these approaches. We have also seen how easily we can walk into the trap of deluging students with information, overburdening their limited working memories and impeding learning.

As mentioned in the preceding section, as IL teachers, we sometimes work under less than ideal conditions. We often contribute to courses with IL sessions that are less than perfectly integrated, and are often unable to communicate with student groups properly to prepare them for a given teaching session. Many of our contributions are in large enrollment introductory courses, where the plenary auditorium lecture is the usual modus operandi. Consequently, we may not always be able to properly set the stage for implementing our preferred teaching approach in the way we want to, and sometimes the plenary auditorium lecture is the only option available to us. And even when we are fortunate enough to exert more influence on the conditions for our own teaching, there is usually a need to spend at least some of our teaching time simply informing or explaining.

Lecturing is often caricatured as teacher-centered, one-way information transmission from an expert teacher to passively receptive students. Given that we sometimes are more or less bound to using the lecture, how can we make the most of it? How can we adapt it to better fit our conceptions of teaching and learning in the service of helping students become information literate? In this section we offer our suggestions for making the most out of teaching situations that call for lecturing.

6.3.1.1 Structuring the lecture

If the classic lecture has any redeeming features, it may be that it provides an opportunity for an experienced and knowledgeable academic to communicate her personal "take" on what would otherwise just be a set of

things a student should know. This includes the mental organization of bits of knowledge into coherently integrated units, as well as displaying the expert mind in action, providing a model for student thinking about the lecture topic.

We recommend starting a lecture with a clear exposition of the purpose of the session. This usually includes mentioning (1) the ultimate purpose of attaining the learning outcomes, (2) clear statements of the learning outcomes themselves, and (3) the criteria on which attainment of the learning outcomes will be evaluated. All of this is in order to help students form clear learning intentions and an idea of what success looks like. This is perhaps the part of any teaching session that is both the most important and the most difficult for an IL teacher to get right. Most students have chosen a discipline to study and may consider IL a nuisance mostly irrelevant to their chosen field.

One way to frame this exposition is to begin with a question. For most IL session topics and learning objectives, a variant of the "why is this true?"-question we discussed in Section 4.3.1.3 usually works well. For instance, "Why would anyone trust your conclusions?" can help frame learning outcome statements on citing sources, while "How do you decide whether or not to trust the conclusions of an alleged expert?" can help frame outcome statements on source criticism. Situating the question in a concrete, relevant context is a good idea. For instance, providing a real-life example or two of the absence of source criticism or the confusion engendered by inaccurate referencing helps bring the importance of an introductory question to the fore. Preferably, the example should come from a domain somewhat related to the student group's chosen profession or discipline.

The introduction to a lecture is also a good time to use a student response system (see Section 4.3.3). Two to three well-chosen questions can simultaneously serve as a frame for the lecture topic, and also highlight gaps in student knowledge, further helping students see the need for learning.

Sometime during the first few minutes, provide an overview of the lecture, i.e., how the lecture is segmented into different parts, how the parts fit together, and preferably that they will constitute answers to the introductory question(s). Both the exposition of purpose and the provision of a structural overview will help students organize the lecture topic material and thus enhance their ability to process and learn (cf. Section 3.1.5). Providing a skeleton lecture outline as a handout

(or in an LMS) for students to use for their own note-taking is another way to communicate that structure, and also, incidentally, seems to boost learning compared to students taking their own notes (e.g. Hattie, 2011, p. 135).

The rest of the lecture is preferably organized into a few segments, each representing an important concept or idea. The overall structure is preferably one of increasing complexity, gradually building connections between the ideas. Also, if possible, moving from basic concepts and ideas to application of the integrated system of ideas, using worked examples.

We also recommend returning to the structure of the lecture in between segments. Summarizing the previous segment, explaining how it connects to the next one and how it relates to the overall argument or answer to the introductory question. If you are using some form of presentation software, try to provide simple visual cues to the lecture structure throughout.

6.3.1.2 Breakouts and interactivity

In Section 3.1.2, we reviewed research indicating that lapses in attention to some extent can be curtailed by interspersing a lecture with meaningful learning activities. Again, this is a good use of student response systems. Two to three questions in between each segment refreshes attention, while simultaneously providing feedback opportunities (cf. making student learning visible) and exploiting the power of the testing effect.

If possible, design SRS breakouts to be at least partly cumulative. By this we mean including one or two questions from earlier sessions or segments, so as to provide repeated retrieval practice. Of course, student responses can be elicited without an SRS. This has the advantage of avoiding the hassle of game pins and urls, etc., at the cost of giving up anonymous responding and accurate record keeping. A simple show of hands as a rough vote counting for the various answer options can serve very well, but may require a bit more judicious arrangement of answer options.

Also, brief or partial versions of any collaborative learning activities, similar to those we describe in Section 6.3.3, are excellent options for maintaining student engagement and attention throughout a lecture.

All forms of student activity like these are opportunities to model deep learning strategies, as discussed in Chapter 4, Learning Strategies.

6.3.1.3 A note on using presentation software

When using presentation software for lecturing, avoid overfilling the slides or frames. Above all, avoid overfilling them with words. Slides with

too much text will cause competition between the words on the slides and the words you say, as discussed in Section 3.1.4. Occasionally, though, we might need to quote a passage of something or other, in which case a certain amount of text is useful. But in such cases, we should make sure to read all of the text out loud before discussing it.

Probably, the best use of presentation software uses mostly images or figures, with a few keywords. When images and keywords or very brief explanations are integrated in such a manner that the words are presented in or near the parts of a figure they pertain to, this eases information processing and helps learning.

One way of integrating words and images in a good way is to build concept maps. The major concepts or ideas of the lecture can be represented as larger blobs or boxes, and connections between them can be drawn in as lines or arrows, along with a label describing the nature of the relationship. It may be useful to begin with one central idea or statement, possibly in the form of an answer to the introductory question of the lecture, with the major concepts from each lecture segment as blobs around this central idea. Details and specifics of each idea can be represented by smaller blobs connected to each of the major concepts, again with labeled connectors.

Gradually drawing the concept map, in between lecture segments, while commenting on the relationships between the concepts is a great way to summarize and is, incidentally, also an example of elaborative processing, and another instance of modeling effective learning strategies.

6.3.2 Flipping the IL Classroom for active learning

As repeatedly mentioned, IL teachers often have only a few sessions of limited teaching time with any group of students. Given the dimensions of our discipline and our eagerness to share as much of it as we possibly can, we are often tempted to stuff those sessions uncomfortably full, risking information overload in our students. In Chapter 3, Things We Know About How Learning Happens, we warned against giving in to this temptation, on the grounds of universal cognitive limitations. We also saw, in Section 3.4.2, that teaching for active learning is very likely to be more effective than traditional lecturing (but see Section 6.3.1 for our advice on lecturing effectively).

Still, it is probably true all the same, that just any kind of activity will not automatically provide better learning than a good lecture. And if

some students are overconfident, uninterested, and at the same time unfamiliar with some of the concepts we rely on when teaching, then hoping that they will happily engage in our IL activities right off the bat may be hoping for too much.

How, then, can we prepare the ground for effective learning activities? How can we sow seeds of engagement and prime the concepts students need in order to participate meaningfully in in-class activities? One possible way to meet these challenges is to structure teaching according to the model that has come to be known as the inverted or flipped classroom. Under the flipped classroom model, the teacher-centered, expository, "information-transmission teaching" (Abeysekera & Dawson, 2015, p. 3), is moved out of, and prior to the classroom session, in order to make room for more student-centered, active learning activities in the classroom session itself. Arguably, then, a marked advantage of the flipped classroom model is that it allows us to combine traditional didactic approaches to teaching (i.e., lecturing) with student-centered, active learning approaches.

Moving the information-transmission part of the teaching out of the classroom usually means transferring it to video. Some teachers rely on other media, but video lectures are by far the most common. A video could be anything from a simple set of PowerPoint slides with added narration, to a live image of the teacher with audio and visual aids such as a whiteboard or digital note-taking using a tablet or a smart board, or, if equipment and support is available, a studio production using green screen. Teachers flipping their classrooms use very different approaches, and it certainly seems possible to create videos that do the job well enough without investing in expensive equipment or software.

While the main goal of the flipped classroom structure is to free up time in the session for a different kind of learning experience, moving the lecture, the first exposure to new material, out of the classroom session arguably has a number of other advantages. First, we find that lecturing on video tends to discipline us, the teachers, to rethink the structure and content of our message, usually resulting in fewer digressions, more to-the-point exposition, and a better portioning of the points we want to make. All of this leads to lecture segments that are both clearer and shorter than a live lecture would usually be. This in turn helps prevent overburdened working memories (cf. Section 3.1.3) and lapses in sustained attention (cf. Section 3.1.2) in our students. Second, and related to the first point, viewing lectures on video allows students a kind of control

that may be unavailable in a live lecture setting. Being able to pause, rewind or jump ahead, or to view when and where it is most convenient, may help students more easily encode the concepts we want them to learn. (On the other hand, a frequent complaint about lectures on video is that there is no way to ask questions and have them answered then and there.) Third, viewing video prior to practicing recall and application in the classroom session allows a little bit of time to pass between different occasions of engaging with the material. And if the videos are accompanied by brief comprehension check type quizzes, either embedded in the video or behind a link nearby, this in effect provides a form of distributed practice, which we know supports retention (see Chapter 4, Learning Strategies).

Arguably, though, the real advantages of the flipped classroom model are the consequences of introducing more active learning into the teaching session (Jensen, Kummer, & d M Godoy, 2015). In fact, while it seems most studies comparing courses using the flipped classroom model to those using traditional, lecture-based teaching find higher student achievement in the flipped condition (e.g., Anderson & Brennan, 2015; Foldnes, 2016), some find little or no effect. Interestingly, a perusal of the null effect studies reveals that some of them tend to use a control group comparison where the traditional teaching already involves several active learning elements (e.g., Yong, Levy, & Lape, 2015). In our opinion, this indicates that there is less to be gained from adopting the flipped classroom model if you are already using mostly student-centered active learning teaching methods. Hence, the flipped classroom is perhaps best considered a tool for opening up the classroom session for more active learning.

How then, could the flipped classroom model be implemented in IL teaching? Based on our own experiences with flipped IL teaching, we would offer the following advice. (For a detailed example of a flipped IL session, see Section 6.3.2.5.)

6.3.2.1 Developing videos

First, it is a good idea to develop your own videos. This provides a personal touch and can contribute to that sense of belonging or relatedness that helps build learner motivation (see Section 5.3). It likely also increases perceived and possibly actual correspondence between learning materials, activities in the classroom session, and the learning goals or intended learning outcomes of the session or course.

Videos should be relatively short. There is no very accurate research-based estimate of optimal video length, but between 5 and 15 minutes seems to work well, and to match many of the recommendations in the literature. If total lecturing time needs to be more than 15 minutes, it is probably better to record two or three videos, rather than an overly long one.

Regarding content and structure, a video lecture (or set of videos comprising a lecture topic) can generally follow the same overall organization as a full-length live lecture (see Section 6.3.1.1), minus group activity "break outs," interesting digressions, or other "extras." A useful rule of thumb is to start by explaining the reasons for learning the knowledge and competencies targeted in a given session. While brevity is a virtue, particularly in video lectures, we think it is well worth taking the time to emphasize the ultimate benefits of IL competencies, and the values they help us uphold (cf. Chapter 5, Toward Academic Integrity and Critical Thinking). Next, provide the conceptual overview needed for a basic understanding of the competencies targeted in the session. Finish with an explanation or a demonstration of how to perform the procedures that comprise the technical or behavioral components of the relevant competency. In other words, provide a worked example or two, if appropriate.

6.3.2.2 Ensuring student preparation

Second, a key to successful flipping is that students comply with the instruction to engage with the preclass videos, comprehension check quizzes, or any other preparatory activity. If you are teaching a full course with several successive sessions, there may be time to "train" the students, by demonstrating that showing up unprepared has negative consequences (e.g., the disapproval of fellow students, poor learning, and overall lower enjoyment). In one-shot sessions, on the other hand, there is no such opportunity, and we need to find other ways of ensuring student compliance. We suggest meeting with the students face-to-face a couple of weeks before the session, to explain both the purpose of the session, as well as the rationale of the flipped classroom. Being honest and direct about the consequences of not preparing (e.g., "you will not be able to participate if you haven't") can be very effective. Face-to-face meetings like this seem to work a lot better than just providing the same message using an LMS, e-mail, or delivering it through another teacher. It is still a very good idea to provide a reminder or two a few days before the session. E-mail or LMS will suffice for this.

If you are teaching a full course, if you work in an educational system that allows it, and if it is otherwise feasible, you could consider basing part of the course grade on student participation. This is usually a powerful motivator, particularly once students realize they are unable to contribute much if they have not prepared.

If you provide a preparatory quiz in conjunction with the videos, this may also motivate students to engage with the preclass materials, particularly if the quizzes are carefully crafted to match the content of the videos, such that viewing the videos allows successful completion of the quiz, while not having viewed them would likely lead to failure. Some students find quizzes hard to resist, and we have anecdotal evidence to indicate that the experience of taking a good quiz may lead some students to recommend the preparations to less eager peers. We have also found it useful to include in the quiz an open-ended item allowing students to ask any questions they have about the topic of the session. An important function of this is that it can help alert us to what are common misunderstandings or misconceptions, or to how videos can be improved. It may also allow some adjustment of the planned session activities. Furthermore, it may provide some extra motivation to turn up for the session, for the students who have asked a question. Obviously, taking these questions seriously and responding to them in session is important.

6.3.2.3 Structured in-class activities

Third, careful planning of the session activities is important. One aspect to keep in mind is the overall structure of the session. It is often useful to start out with a brief Q&A session. This allows students another opportunity to ask for clarification, and it allows you to clear up difficulties revealed by patterns of student responses to the quiz. Reviewing every single question of the pre-class quiz may not be necessary, particularly if feedback is provided when students submit their answer (which is possible to arrange for in most systems).

For the rest of the in-session learning activities, aim for progressive difficulty, if feasible. In fact, it may be helpful to consider the whole lesson, preclass activities included, as progressing in cognitive complexity. Here you could think in terms of levels of taxonomies of learning outcomes, discussed in Section 6.2.1. Presession videos and quizzes provide a first exposure, some recall practice, and perhaps some simple application. The Q&A session allows students to negotiate their understanding of the concepts involved in the targeted competency. The main part of the

session could then start with some relatively uncomplicated application, moving on to more complex tasks needing flexible application of more than one concept or principle and/or creative problem solving. Not all topics or lessons may naturally lend themselves to this sort of organization, but it is a useful framework to keep in mind.

Apart from the overall organization of the session, each planned activity should, at least as a rule of thumb, have a clear structure. This includes stating a clear goal, preferably with explicit success criteria (cf. Hattie, 2011). Also, if it is not already obvious from how the session topic has been introduced, it includes explaining the link between the intended learning outcomes of the activity, and the overall intended learning outcomes of the course or session. Another essential key to providing sufficient activity structure is clear instructions on how students should work toward the stated goals or outcomes. Here, a caveat is in order. Instructions should be explicit and detailed enough to prevent confusion about how to proceed, while at the same time leaving enough degrees of freedom for students to deliberate and make their own decisions. Without structure, students will waste both time and limited cognitive resources figuring out what to do, rather than focusing on learning the intended concepts, procedures, or competencies (Kirschner, Sweller, & Clark, 2006).

Usually, a session will contain several activities. Try to provide a reasonable amount of time for students to do them. Estimating the optimal time window is not always easy, so trial and error may be the best way forward here. More importantly, make sure to provide plenary, teacher-led discussions or demonstrations of solutions or possible answers to exercises and tasks for each activity. Often, a good way to prepare for this is to ask a student group, while you are circulating during the group activity, if they would be willing to present and explain their solution to the whole class. Most groups will, especially if you reassure them that their solution is reasonable or perhaps particularly interesting. A group with a decent but not perfect solution often works well for these discussions. They provide a model for groups that struggled, while at the same time there is room for other student groups to contribute additional advice or contrasting solutions.

6.3.2.4 Providing guidance in learning activities

We have already seen in Section 3.4.2 that the collaborative subtype of active learning pedagogies is likely to be effective. One of the reasons may be that feelings of mutual responsibility help students get each other

started on constructively solving a given task. This in turn means our time can be spent helping pairs or groups of students who need clarification in order to proceed, rather than on persuading reluctant loners to give the task a try. We therefore recommend using collaborative activities in flipped classroom sessions. (For more in-depth discussion of the practicalities of designing and implementing collaborative learning activities, see Section 6.3.3).

If student groups do not ask for guidance, it can be hard to decide if and how to provide it. We do not want to interfere with the work of a group that is on task and progressing well. However, in our experience, students will often take the opportunity to ask a question about their work if the teacher is nearby and indicating that she is available to help. Asking a group how they are doing is one way to express this availability. Some students may be reluctant to ask for support even if they feel they might need it, and even if the teacher has made it clear that it is available. And sometimes, students may need support, even if they think they don't. Hence, they may not take up an offer of help or support in response to your query, replying "Oh, we're fine," or something similar. In this case, a follow-up request to show you how they are progressing—"Good. Show me what you have done so far!" or "What are you thinking?" or "What is your plan?"—often gets a constructive interchange going, and allows you to provide a bit of guidance or some welcome encouragement. In particular, some students may opt for the very simplest possible solution to an exercise, without exploring alternative, and perhaps optimal solutions. They may become passive while waiting for a plenary discussion. When encountering such groups, comment on their solution, but encourage them to look for even better ones, unless, of course, there is only one reasonable.

6.3.2.5 A sample flipped IL session

While we honestly try our best in this chapter to offer specific advise and concrete, applicable tips for implementing the ideas discussed in this book, we sometimes feel we remain too much in the abstract, despite our best efforts. In an attempt to better bring to life the idea of flipping an information literacy classroom, we provide here a relatively complete description of a sample flipped classroom information literacy session. We hope it provides a useful illustration of the ideas discussed in this section. We should warn, however, that this is just one possible way to implement them; details can and should vary, depending on topic and learning goals.

The session context and purpose. This is an intermediate level session, offered to second or third year psychology students who already have a basis from introductory information literacy sessions. They are familiar with various types of scholarly sources, they are familiar with their institutions' library discovery system, they have practiced using scholarly sources in their own written work, including citing and referencing them. The session is scheduled as part of a course on academic writing, and its purpose is to help students attain basic proficiency in literature searching, using a controlled search vocabulary and Boolean and other operators in a discipline-specific, actively indexed reference database (PsycINFO on Ovid). The session builds on the already established familiarity with scholarly sources and intuitive literature searching. Specifically, expected learning outcomes for the session are that students should be able to (1) explain the workings of controlled search vocabularies and apply this knowledge in searches; (2) appropriately supplement controlled vocabulary searching with text word searching; (3) use AND and OR correctly while building searches using the search history; and (4) manage result lists, e.g., using advanced limits and export functions.

Previously, this session had been taught in a traditional manner. About 60 of the allotted 135 minutes were spent by the teacher explaining and demonstrating, while the remainder was spent on student doing exercises. The session received consistently high student ratings on evaluation forms, but both teacher and students felt there was too little time for students to practice. The teacher therefore decided to flip the session, in order to win more time for active learning. (See Låg, 2016, for a report on how flipping this session impacted student evaluations.)

Pre-class materials and preparation. Going over the targeted learning outcomes and previous in-session lecturing and demonstration, it was found that the teacher-centered instruction could be shortened substantially without losing much content. It was pared down from 60 minutes and recorded onto 4 videos with a total playing time of 25 minutes. Two of the videos were lectures using PowerPoint with a frame showing the instructor, and audio of his voice. These two videos introduced controlled vocabularies and Boolean operators (one video for each of these concepts). The other two videos were screencasts with instructor voice-over demonstrating the application of these concepts in a relatively simple and a somewhat more complex search in the Ovid interface.

In addition to the videos, a brief quiz (five multiple-choice questions) served as a comprehension check and simple retrieval practice. The quiz

was voluntary and did not count towards the students' grades. A message introducing the session, its purpose and intended learning outcomes, containing links to videos (they were hosted on YouTube) as well as the preclass quiz were posted in the LMS 2 weeks prior to the session. Importantly, in collaboration with the teacher responsible for the writing course of which the session was part, we scheduled a face-to-face meeting during another class with the students, about 2 weeks prior to the session. This is in order to explain the session and how it works fully to the students, as outlined above. Students were reminded of the need to prepare via an extra message in their LMS, as well as an e-mail message, 2 or 3 days ahead of the session.

In-class lesson plan and activities. The session itself started with a brief Q&A session and a quick review of the preclass quiz. There has usually been no more than a couple of questions. Next, the teacher introduced the session activities, which were supplied on a piece of paper, numbered, and listed (roughly) in order of increasing difficulty. Students were asked to form pairs and to get to work on the first exercise. They were encouraged to take careful note of how they were thinking, in order to be prepared for the plenary discussion that follows each exercise.

As the students worked, the teacher circulated, answered students' questions, asked them how they were doing, and observing how they worked and the solutions they arrived at. Students who quickly arrived at a solution they were happy with were challenged to consider alternatives and to formulate an explanation of why their solution was satisfactory. After about 8 minutes, the teacher alerted the class that they had to arrive at a solution if they had not already, and that the pairs that did have a solution should be prepared to explain it. Once the 10 minutes were up, the teacher interrupted, and asked if someone would like to present their solution to the class. If no one volunteered, he invited pairs he had observed during the previous few minutes that had reasonable solutions. They would usually be willing to present their solution when they realize they have been picked because their solution is reasonable. The teacher invited the students to reconstruct their solution on the presenter computer with projector, and to explain what they were doing and why as they went along. Once they were done, the rest of the class was invited to share alternative solutions and to ask questions or offer comments to the pair that had presented. Sometimes they needed a bit of encouragement, and here it helps if the teacher can call on pairs he knows have arrived at ok solutions that perhaps differ slightly from those of the

presenting groups. Usually, once students realize that it is ok to offer any sort of thoughts or ideas related to the exercise, more will contribute. It is perhaps particularly important to be supportive of the students that arrived at different solutions to the one that the teacher or student consensus favors. Emphasizing what can be learned from considering alternatives, even if they are discarded, is one way to do this.

Following the plenary discussion of the first exercise, the teacher started the students off on the next one. In doing so, he explained that the next one would be slightly harder than the first one and offered a hint or two as to what additional considerations might help solve it. The rest of the session then followed and repeated this pattern, gradually increasing the complexity of exercises and the time allotted to each. The last 5 minutes of the session were devoted to students filling in a simple teaching evaluation form (see Section 6.4.6 for more on student evaluations of IL teaching).

6.3.3 Collaborative learning

In Section 3.4.2, we cited evidence to the effect that collaborative learning, a popular variety of active learning, tends to yield superior student achievement when compared to individual or competitive learning. Further, in Chapter 5, Toward Academic Integrity and Critical Thinking, we argued that discourse and dialog with peers and academic authorities is important for development of Academic Bildung and critical thinking. In this section, we introduce our own understanding of collaborative learning and provide some examples of how it can be implemented in an IL context.

Following Barkley, Major, and Cross (2014), we will apply the term collaborative learning to a relatively broad collection of different group learning activities. Specifically, we will define collaborative learning as two or more students working together, contributing equally, on activities designed to foster learning. This is broad enough to include most varieties of intentional, planned, and structured group activities, without being too liberal (i.e., it excludes just seating students together and telling them to talk to each other). In our definition, cooperative learning, by some considered a more tightly controlled and narrowly defined type of group activity, is subsumed under the collaborative umbrella. Still, while our approach to collaborative learning is eclectic, and we do not adhere to a particular tradition, we do recommend structured activity, as argued in Section 6.3.2 on flipping the IL classroom.

When implementing collaborative learning in an IL classroom, it is useful to consider some of the reasons why it works so well. This helps us guide how we plan and practice it in our sessions. Of course, knowing *that* it works tells us no more than just that, and theories of *why* are mostly just theories; more or less validated theories, to be sure, but hard to establish firmly as causes of the effectiveness of collaborative learning. Nevertheless, on the basis of the theory and research reviewed throughout this book, we can construct a few likely causal factors that serve as useful guideposts.

First, collaborative learning may foster learning because it involves elaborative processing, generating explanations, and practicing retrieval. In short, it resembles a combination of the most effective, high-utility learning strategies reviewed in Section 4.1. Interestingly, recent findings suggest that practicing retrieval from memory collaboratively, instead of on our own, further boosts the effectiveness of practice testing (Wissman & Rawson, 2015). The reason is probably in part that it provides opportunities for distinctive processing, i.e., the simultaneous processing of similarities and dissimilarities among to-be-remembered concepts.

Second, and closely related to the first point, collaborative learning provides lots of opportunities for students to receive some feedback on their own attempts to gain mastery over that which they are trying to learn. Remember from Section 3.2.2 that students tend not to be very good at accurately judging the quality of their own learning. When working together in small groups or teams, students are forced to voice their ideas, their reasoning behind conclusions and solutions, and hence their own understanding and mastery of to-be-learned concepts and skills are directly or indirectly tested. Fellow students will usually provide support, comments, objections, or alternative interpretations and solutions, highlighting the quality of each student's contribution. If students are adopting a learning orientation (c.f. Section 3.3.1), they are likely to be able to use the feedback inherent in these situations to their advantage. Collaborative learning supports the visibility of student learning (see Section 3.4.1) by offering feedback opportunities.

Third, working together seems to trigger some of the social instincts that help us learn. We saw in Chapter 4, Learning Strategies, that our motivation to engage in something depends in part on our perceptions of relatedness; if we feel that an activity or setting helps fulfill our need for secure and satisfying connections with others, then we are more likely to invest in it. Furthermore, if the collaborative activities are designed such

that there is a positive interdependence—each student's effort and learning positively impacts the learning of the rest of the group—students are likely to feel a responsibility to contribute. From our own experience, we find that the more unenterprising or timid students, who, in solitary activities will tend to make a half-hearted attempt at it, and then just sit there staring passively at what they have produced, will often become more active, more likely to look for alternative strategies and solutions to an exercise, once they have a partner or two to work together with.

6.3.3.1 Designing collaborative IL learning activities

Besides aiming for that positive interdependence and an appropriate amount of task structure (cf. Section 6.3.2), we recommend considering the value of accountability and of using low-level cognitive tasks in the design of collaborative IL activities.

Accountability in collaborative IL learning activities can be built in by keeping in mind their potential for informal formative assessment. For this to be fulfilled, each activity should have a relatively clearly identifiable end product of some sort. This could be as small and uncomplicated as the groups' proposed solution to a problem or an exercise, perhaps including an explanation, or as elaborate and complex as a complete, written project report. For most IL teaching contexts, we tend to find ourselves near the small/uncomplicated end of that scale. Next, this product must somehow be displayed, reported, or registered. Again, this is most easily done informally, and can be achieved by asking some or all of the groups to report their results in a plenary discussion. In both the task design and in the way plenary discussions of task results are handled, it is worth considering how each student's contribution to the group's product can be identified. Prompting other members of a group to add something to what their spokesperson has already expressed, or asking if there were any disagreements or discussions in the group before they reach a consensus, are examples of ways to promote such visibility.

As with any learning task, it is of course essential that collaborative learning activities are designed with the intended learning outcomes of the session and course in mind (c.f. Section 6.2.1). This may seem obvious when stated bluntly like this, but it is surprisingly easy to forget and worth repeating. While arguments in favor of active learning teaching strategies in general, and collaborative learning in particular, tend to extoll the virtues of these strategies with regard to fostering higher order cognition, it is worth keeping in mind that higher order thinking depends on foundational

knowledge (c.f. Section 3.1.5). Hence, we would advocate occasionally making room for and designing activities that specifically target understanding, remembering, and simple application of key concepts, rather than always going straight for the most complex and demanding creative synthesis. Aiming too high without a solid foundation risks confusion and frustration, and minimal learning gains. As an added benefit, an easy warmup task or two allows a chance for even the weaker students to experience some success, and such activities may thus be considered competence supporting, in the self-determination sense (Deci, Vallerand, Pelletier & Ryan, 1991).

Often, the specifics of the learning activity influences group size and composition. Nevertheless, we would like to offer a couple of general considerations regarding the formation of groups in collaborative IL settings. With regard to group size, there is no unequivocal consensus, and a recent meta-analysis found no moderating influence of group size on the effect of collaborative learning interventions (Tomcho & Foels, 2012). But if we assume that collaborative learning is effective in part because it engenders elaborative and distinctive processing, and allows students opportunities to both practice expressing their thoughts as well as to receive feedback from fellow students and teacher on their attempts to master what they are trying to learn, then we should aim for groups that allow this to happen for all members of the group. In general, this seems easier to achieve with relatively small groups (2–5 students). Larger groups (6 and up) may work for some activities, particularly if each member has a designated role and the activity lasts over several sessions. Usually, though, we tend to work with short duration activities as part of one or two sessions, and in such settings it is a lot harder to find time for each group member to contribute if the group is too big. Even with tightly structured activities with designated roles for each group member, it is easier to "hide in the crowd" when the group is larger.

Another consideration concerns the practicalities of working together over computers. If you are fortunate enough to teach in a modern classroom where students can easily share their screens on a monitor or projector, then it may be more practicable with more group members. Often, though, when students are working on computers, it is a good idea to keep groups small enough that they can all comfortably look at the same computer screen (2–3 students). As a rule of thumb, then, we recommend using small groups.

When forming groups, a number of options are available. If you are using ad hoc groups in a lecture setting, then it may be most efficient to

allow students to select group members based on preferences and seating. This has the advantage of being quick and easy, but may come at a slight cost imposed by the fact that students often sit together with their friends, and so they may more easily gravitate toward familiar patterns of interaction and waste time reviewing events from their personal lives, or some such, rather than focusing on the learning task.

If the class is small enough (up to perhaps 30–40 students) and the session is devoted to collaborative learning activities, then we recommend using either the counting technique or randomizing names to select groups. In the counting technique, start off by dividing the class size by the desired group size to find the number of groups needed. For instance, in a class of 30 students and a group size of 5, 6 groups would be required. Let the students count up from 1 through 6, by having each student state aloud his or her number, repeating this as you move through the class. Groups can then form based on the numbers they have stated (i.e., all ones form a group, all twos form a group, etc.).

If the class comes together more than once, it may be worthwhile to use names when assigning groups. One way to do this is to use a spreadsheet with student names in one column, a random number in the second column (in Excel, simply use the = RAND() function), and group number in the third (repeated as many times as the desired number of group members). This setup allows you to quickly sort the rows of the first two columns based on the random numbers, and students can then read off group membership from the third. Once the spreadsheet is made, reassigning groups is very easy, so this setup is ideal for sessions with two to three different, independent activities. An advantage of repeated random group assignment is that it reduces the likelihood of students suffering in a dysfunctional group for more than part of the session.

6.3.3.2 Sample collaborative IL activities

In this section, we will briefly describe two sample collaborative learning activities. They are based on much used patterns for organizing group work, and populated with different IL learning tasks. Note that the overall pattern or structure of the activity may suit a number of different IL learning tasks.

In-text citation team competition

The goal of this activity is to allow students to begin the process of getting a feel for when and how to cite. This is an area of persistent

insecurity for a lot of students. Expositions of "what needs a citation" tend to be hard for them to apply or to translate into actual technique, even when it is accompanied by clear examples. While this activity by no means turns students into expert scholars with a polished citation technique, we find it does tend to allay some of the insecurity, and it helps link the principles of in-text citation as explained by the teacher (or the handout, or the video lecture, or whatever) to the students' own judgments and decisions.

In preparation for this activity, locate a handful of paragraphs from a scholarly text, preferably from the student groups' own discipline, that showcases a typical use of in-text citations. Part of the introduction to a scholarly journal article seems to work well. Your goal should be 2–5 paragraphs with a total of around 6–10 in-text citations. Copy the paragraphs into a text editor, along with a shortened reference list for the sources cited in those paragraphs. Save this as the task solution. Next, in another version of the file, delete all the in-text citations and the reference list. This—the bare paragraphs of text—serves as a student handout/worksheet.

The task is, for each group (we suggest 2–3 group members for this activity), to (1) place dummy citations in the text, indicating each citation placement with a number and (2) to provide a short justification (a sentence or two) for each of the placements. Once all groups have placed their imagined citations where they think they should be (15–30 minutes, depending on the text segment you have chosen), have them swap handouts with another group for scoring. Next, quickly go through the original paragraphs with their original citations, scoring 1 point for each dummy citation that matches a citation placement in the original.

After each team's effort is scored and a winning team has been identified, take plenty of time to do a thorough plenary discussion walkthrough of each paragraph, eliciting contributions from the teams as you go. You could take the winning team's justifications for their decisions as a starting point, and ask for other justifications, questions about why there should not be a citation somewhere, or anything else the other groups might like to comment on. Note that there may be very good reasons for doing things somewhat differently from the original solution, and this should be acknowledged. This, incidentally, is a particularly useful property of this task: it highlights the fact that there are often several sensible ways to use citations in a text that supports the ultimate goals of scholarly writing, and this may be why students often feel somewhat less insecure after having done it.

Buzz groups

Buzz groups are often used as an activity in lectures for helping the students stay focused. However, buzz groups are also possibilities for the students to engage themselves personally and voice their own understanding and ideas. This can also involve training their discussions skills and develop their skills in critical thinking, by their identification of their reasoning behind conclusions and solutions, an earlier mentioned advantage of collaborative learning in general. Buzz groups are formed by giving pairs, threes or fours small timed tasks where the students engage in short discussions. The teacher may need to follow up on the way the groups are formed, particularly if the students are unfamiliar with this way of working. The time frame may vary from 2 up to 10 minutes, but 3–5 minutes is perhaps more common. Also in this respect is it important to be clear, running the time schedule tight for the buzzing as well as for the summing up. The task can be to answer specific prepared questions, define concepts, discuss their own experiences or values relating to themes of the lecture. However, it is important that the task is definite and clear. Brookfield and Preskill (2005) have found that the best discussions are those in which students make judgments regarding the relative merits, relevance, or usefulness of an aspect of the lecture. If the point is to develop the critical thinking skills of the students, they suggest that questions include "What's the most contentious statement you've heard so far in the lecture today?" or "What's the most unsupported assertion you've heard in the lecture today?" When the time is up and the class reconvenes, the groups can share their ideas with the whole class and the lecturer can comment and take part in discussing the ideas, being able to correct mistakes and support the good suggestions. Objections to the student's own solutions and alternative perspectives will be a bonus that widens the horizon of herself and the whole class. When the discussion is related to values and normative questions in such a multi-voiced setting, this makes for taking an active stand on issues, and developing your integrity as a member of academia.

6.3.4 Case-based teaching and learning

Students need to get acquainted with academic values for making good choices. Together, the knowledge of general rules and the ability to understand particular situations will form the kind of judgment students need in order to develop academic integrity. Seeing to that students are

familiar with the rules and that they are trained to be able to "read" complex, challenging situations is a sound prophylactic step when we want to lead students into good academic conduct. Getting to be familiar with, thinking about, and practicing the decision making they later will be challenged by in common concrete situations in their academic work, and perhaps in particular in their academic writing, is a precaution for the future. We believe that experience with being in the situations where one will be tried and tested, and where one will need both courage and ability to resistance in order to make good and right decisions, will be helpful for future choices of course of action.

In terms of teaching and instructional design, this insight about students' needs related to academic integrity points toward case-based teaching, where students also should be able to bring in their own experiences and cases. It points toward being exposed to rich example material for seeing different typical situations, and it points to teaching and learning in small groups, with ample possibilities to voice your own thoughts, possibility to address, discuss and take a stand on academic values and practices. It takes time, practice, and personal engagement to evoke commitment and emotional involvement in academic values. This is why we think case-based teaching and learning is a good idea in courses in information literacy, where development of academic integrity often is an intended outcome.

A case is a scenario, real or constructed, and case-based learning is basically the idea that you are to learn something new by being invited into the complex concrete situation of the case, where you are to think yourself into the position of another. The task is to consider the further course of action in a situation containing a problem, or a conflict to be solved, or a decision to be made. The problem or the conflict usually does not have a clear solution, or the decisions that need to be made are not obvious, and it will be necessary to draw on previously acquired knowledge or principles.

In case-based learning, the assignments will often illustrate challenges in the practice of the students. Working on cases presupposes an investigative approach to the task, and a willingness to try out their already acquired knowledge in light of new experiences. In this way, the need for new knowledge and new skills become visible to the student herself, during the work on the task. Case-based learning is ideal for developing a personal sense for the concrete and the particular, in light of general principles. The cases and assignments needs to be well thought out, or, if real, carefully picked out, in order to be relevant for the intended learning outcomes whether these are affective, in the form of attitudes or values

acquired, or cognitive, in terms of knowledge, skills, and general competence. Case-based learning presupposes a high level of student activity where both individual preparations and collaborative work are necessary for solving the tasks.

In case-based *teaching*, it is important that the case descriptions give the students possibilities for developing an understanding of the challenges they will meet in practice. The case itself may be a shorter or longer note, or it may be a video cut. The case will describe the actors involved and their roles and interests, and the case will often have the perspective of a main actor. The case may be supplied with additional material like newspaper articles, reports, or pictures, and the level of complexity will depend on the course objectives, or intended learning outcomes (Lycke, 2016, p. 176). This means that the work on developing cases can be time-consuming for the teacher.

In case-based teaching and learning, it is common to organize the work in three different phases: (1) individual preparation, (2) small group work, and (3) discussion in class. The teacher will have to time and plan the sessions carefully. We suggest that the teacher divides the students into groups and gives the groups specific assignments and allotted time, and then the groups present their reasoning in class.

Preparation: The presentation of the case could be open or the teacher may encourage students to be more or less systematic in their approach to the analysis of the case. The Center for Teaching and Learning at Boston University suggests the following systematic approach:

What is the issue?
What is the goal of the analysis?
What is the context of the problem?
What key facts should be considered?
What alternatives are available to the decision-maker?
What would you recommend—and why?

(Boston University Center for Teaching and Learning, 2017)

Small group work: Kirsten Lycke suggests the following questions for focusing the group work on the case:

How did the situation emerge?
How is the involved viewing the situation?
How can the situation be handled?
What are the expected consequences of different courses of action?

(Lycke 2016, p. 177, our translation)

Discussion in class: The discussion in class should be led by the instructor in order to keep the discussion on track, and also in order to be able to highlight issues of specific importance, correcting mistakes and not the least, to meet the intended learning outcomes of the session. It is important that the acquired insight of the students come to the fore, and that it feels safe to present their views, draw conclusions, generalize, argue for and against solutions, and ask further questions. However, case method teaching is likely to lead not only the students but also you as a teacher to new and unexpected places. It is thus wise to think through how you will handle it.

Lycke (2016, p. 179) recommends that the work on the case material should lead to a dialog about transfer to other situations and to the students' reflection on their own learning. Further, in a summary of the discussions it is important to highlight the principles and questions involved in the case, and encourage the students to relate the casework to themselves and to their own practice.

Both collaborative learning in general and case-based learning in particular allow students to bring their perspectives and thoughts into class. This is important for supporting the students' motivation for learning in line with self-determination theory and the theory of Academic Bildung. Reeve (2009) has pointed out that in autonomy-supportive teaching, the teacher's use of language should be noncontrolling and informative in the sense that words like "must" and "shall" should be avoided in the communication about the curriculum and the learning activities. Patience has also emerged as an important factor in order to facilitate that learning (at least to some extent) can take place in the student's own pace. Kusurkar, Croiset, and Ten Cate (2011) provide many specific tips on how to drive motivation increasing learning. These are basically aimed at medical students, but we think they can act independently of discipline or profession. The tips are about, among other things, how to provide students with responsibility to familiarize themselves with various minor subjects as they prepare, and present to a group of other students. They recommend that students not be compelled or forced to take part in this, but that they are encouraged and given time to collect courage and do the mental preparation, as many often do, to make this happen. Kusurkar et al. (2011) highlight the importance of setting aside time to provide feedback and that feedback must focus on improvement, a focus on learning and that it should not take the form of "personal attacks." They further highlight the importance of emotional support that involves developing a warm

and positive atmosphere that gives room for sharing—also of dissatisfaction with various parts of the instruction when that occurs.

We have now reviewed a variety of ways in which IL teaching can be implemented. To end this section, and before turning to Section 6.4 on assessment and evaluation, we would like to present our main inspiration for writing this book. In 2013, we felt the need to do some changes in our IL teaching. If the concrete output was an online resource on information literacy, iKomp (www.ikomp.no), it also led to a shift in focus in our teaching in general, both content-wise and structure-wise. Further, to create this course, we needed to improve our competencies and skills related to e-learning environments. Section 6.3.6 presents some experiences and advice on how you can proceed in developing an online IL teaching and learning environment.

6.3.5 The hows and whys of going online with iKomp

If you have decided to use or experiment with technology in your IL teaching, remember to ask yourself: How is it going to be different from what you usually do? Is it just a digital version of the old face-to-face way of doing something? If yes, does technology make it better? When you decide to modify the way of presenting content, i.e., going partly or completely online, you should simultaneously think about how the very content could be presented. Using technology in teaching and learning settings should *add* to, rather than just replace or modify, traditional methods of teaching, i.e., we should strive to create an optimal e-learning environment.

Section 6.3.2.5 presented a sample flipped classroom IL session, linking learning outcomes and selection of activities in a combination of online and face-to-face teaching. In this section, we will focus on how you could proceed in creating an optimal e-learning environment, whether its purpose is to serve as a complement to face-to-face teaching, an alternative to face-to-face teaching for distance students, or an IL encyclopedia. A little bit of a warning, though: Creating good online teaching material takes time, and if this is a significant constraint in your working day, consider using some of the good quality material that is freely available online.

So how did we proceed? Until a few years ago, IL teaching in our institution primarily consisted of one-shot sessions for BA students, and we spent a lot of time in class on general library services, and technicalities of searching and citing scholarly literature. We felt, however, that we

did not manage to reach the students (and obviously not the ones off campus), and we considered it was time to take action. Our concrete goal was to create an online resource, in a MOOC format, that could function as a complement or supplement to our face-to-face teaching. A more diffuse goal was to modify the focus of our teaching—and, in fact, simply by starting working, discussing, and struggling, we gradually saw more clearly what was wise to do, cf. "[iKomp] allowed us to relocate training on searching and citing to the online environment, and thereby devote face-to-face meetings entirely to issues we consider far more important, i.e., how information literacy skills can foster learning" (Løkse, Andreassen, Låg, & Stenersen, 2016, p. 122). We created a working group at the library consisting of six people, with quite different areas of expertise (four subject librarians with formal training in different disciplines and various degrees of IL teaching experience, one consultant working on ICT and learning, and one graphic designer), we got a *Go!* from the library direction, and started working. The work was carried out alongside our regular tasks, but the mere fact of being driven by the same inspiration and the idea of a good end product strengthened the interpersonal bonds within the team and made us prioritize the online resource as much as possible. It nevertheless took us around 18 months before we had a first published version of iKomp.[5]

iKomp is structured in four interrelated, though independent, modules, which, together, encompass what we consider to be the major topics within information literacy: (1) learning strategies, (2) information evaluation (including critical thinking), (3) the hows and whys of literature searching, and (4) academic formation (including the hows and whys of citing sources).

Learning strategies was deliberately chosen as the opening module, as it emphasizes the importance of being aware of our own learning and of planning our learning properly. Usually, students are advised to take this module during the first few weeks at university, and, according to anonymous feedback from our MOOC users, the content is highly appreciated. The second module goes directly into the core of information literacy, being able to critically evaluate the information that surrounds us and pick out the best and most relevant parts of it. We also had nonacademic users in mind when developing this module, as the ability to make informed choices is vital, whether it be at school, at home, or at the

[5] *iKomp* is an abbreviation of the Norwegian term for information literacy: *informasjonskompetanse*.

workplace. The third module involves learning how to carry out the best possible searches. Many new students are quite inexperienced in searching other sources than Google, and need to understand how and why searching—basic or advanced—efficiently can help them get better results. The fourth module about academic formation asks students to reflect on their motivation for embarking on an academic education, and what they see as their role in academia. These are rather big questions, but still very important as they introduce reflection on the values of respect, integrity, and honesty, which (should) permeate academic thinking. We also use this module to go through the referencing and citation process, as this is of major concern for both students and faculty.

A mix of videos, texts, activities, and self-tests characterizes the entire iKomp course. Also, there is a 40 piece multiple-choice question exam at the end of the course for those who want or must have a certificate as proof of passing the course. This certificate can be uploaded into the institutional LMS for those subjects that choose iKomp as an obligatory course. In the first version, we authorized an unlimited number of attempts on the exam, and we provided explanations to the wrong answers. However, the examination of exam user data, whereby only 22.6% passed the exam on the first attempt, and 24.8% used more than 10 attempts ($n = 399$), indicated that the students did not engage very much with course content. We thus decided to make the exam settings stricter, allowing four attempts only and replacing wrong answer explanations with hints back to course content. A test with $n = 614$ revealed that 82% of the users passed on the first attempt, and that many used the *save* button in the exam module, which might indicate that the students were working on content as they proceeded in the exam. (For details, see Andreassen, Figenschou, & Stenersen, 2016; Andreassen, Låg, & Stenersen, 2015.)

Since our institution values open access—and by extension, open science as a whole—to information, the iKomp course is made freely available, regardless of institutional affiliation, on the open source platform Bibsys Open edX. This platform has an additional advantage which is to provide detailed user data via the analytics module Insights. Further, to cater for international students, the course also comes in an English version. As a result of this openness, and our promotion of iKomp on various conferences, the course has attracted attention from other educational institutions, including upper secondary schools in our region.

In light of the increased focus on dropout rates and retention, we clearly see a future cooperation with secondary education institutions as

fruitful for preparing students for academia. Finally, as for faculty outreach, a gradually stronger focus on correct source use among study administration, decision-makers, and information literate up-to-date faculty members, has led several units at our institution to make iKomp an obligatory part of the first year of study. This allows us to more easily use iKomp as a complement to our face-to-face teaching, and it provides an alternative for distance students. But we still have a long way to go before all intended users use, and see the use of, iKomp. We acknowledge that change does not happen overnight, but we see that a good quality product, happy students, and pressure from above, help us in promoting and integrating what we believe is a valuable contribution to the institution's work on graduating information literate students.

6.3.6 The hows and whys of online IL course development

Our work on iKomp (cf. Section 6.3.5) has focused on and been primarily concerned with improving information literacy teaching. Intuitively, we took a step towards the online environment, as this constitutes a normal and recognizable way of working for students. The majority of them know how to use online tools. But for us teachers, how to proceed in an unfamiliar tech landscape? Planning, designing, and implementing an online course is an immense undertaking by anyone's measure. Big challenges like this, that give raise to hesitation, doubt in our own abilities, and stress—can easily put you right off an attempt to make an online course. But our claim would be that it is fun, it is challenging, and you are going to learn something new about how to teach, about how to collaborate with others and it might even change your view on things like online courses, multiple-choice tests, and ultimately, technology's natural place in the future classroom.

If you want to go for development of an online IL learning course, this would mean personalizing your teaching online (cf. Section 6.3.2). The best advice we can possibly give you is to try to identify the challenges in your teaching, together with colleagues, and generate ideas on how to explain your key concepts through examples, tests and videos, having the intended learning outcomes of the students in mind. Further, do not forget to look at how other institutions are developing and making use of online courses. Spend some time reading and finding out about the various capabilities, and limitations of online content delivery systems. Course designers often think more about the course design and its content than on how well a system performs in relation to it. Trying to fit a finished course into a

content management system can be quite a painful experience both for you as a course designer and your development team.

When starting to think about creating an online course there are thus some obvious perspectives to consider. Course designers are, in one sense, those involved in creating the learning objectives, course notes, videos, tests, exams, and so on. However, a team that takes on the task of creating an online experience must in fact be a combination of both academics and technical staff working together as one. These teams are often working in very different environments; content is created in MS Word, graphics are created in Adobe CC, and the delivering framework is based on Open Source content management systems (CMS)—just to give an example of a hypothetical working environment. This should not discourage you in any way. Just be aware of the fact, you are not going to understand everything everyone is talking about during such a process, but after a while you might have learnt something new, and find yourself using technical phrases too.

When you visualize something, you are thinking about the task ahead in quite a different way than what you might be used to. As the term indicates, it is a process of seeing, visualizing what you want to achieve or create. Doing this will help you make decisions about what your design should look like on a screen, as well as thinking about who you are doing this for, and why. By working in this way, you will be able to always look back, and see if you are true to your initial vision. It is also imperative to record this, like any other documentation, so doodles and drawings are important in order to document your process.

Visual communication is a vast field of study and combines knowledge on everything from color theory to behavioral psychology. In this case, try to think of it as the "feeling" you want your course to have, humorous or serious, fun or scary (everything is possible!). This is all within the power of your visual communication concept; how are users going to interact with the content, and are they going to enjoy it or not? These are questions that need answering in terms of the initial idea and concept. It might not be something you put too much into, but at some level you will have made a set of decisions on these matters, and you will find that it does not take long before you get a "feeling" of whether you are straying and not focusing on the right details. Having included your visuals from the start could be what defines your success.

There are at least three different perspectives to keep in mind in any online course development project. On the one hand, we have the perspective of those who have identified the initial problem, and see the

need for something new to meet a specific challenge. Then we have those who, together with the initial identifiers, are charged with solving the problem—in our case technical staff working with online development. And last we have to consider our end users, here, the students.

Taking the leap, from identifying a problem, and deciding to try to do something new and perhaps completely foreign, is a very brave step indeed. The perspective from the initiators' point of view is the first in a vast number of steps this group is going to make. As a development group works their way through a project, this perspective is the guide that is going to keep the project on track. The initiator(s) have a unique point of view, and that is one of realizing that things can be done easier, and/or better. Also, knowing what the actual initial challenge was will help the entire project keep on track.

So, how can implementation of the instructors' perspective impact the effectiveness of learning? The instructional method of design lends its ideas from architecture in general where structure and meaning, or form follows function, are at its core. In designing an online course, much of the effort in design follows these principles. Value can be added to any course when a clear route is planned.

In the iKomp project (cf. Section 6.3.5), we started with an initial problem, or at least with a question, about how to reach our IL students with our message. The idea was first and foremost to have a supplement or alternative to our face-to-face teaching, but we also worked hard on dividing the content up in a new way. We ended up with a combination of a linear model and a nonlinear model, whereby we give the users an experience of direction, but at the same time the possibility to move freely between the modules.

Let us sum up. Choosing to move learning/teaching course content over to digital media is a challenge. However, as librarians in the 21st century we should relate to technology, and, in fact, if we want to make IL teaching at our institution as effective as possible, we should also make sure faculty (and study administration when relevant) understand how to make best use of the available online resources. Thus we end this section with some general advice that might come in handy when you want to prepare yourself and your institution to be ready for developing an online learning resource.

- Evaluate new technologies to discover new and better ways to enhance instruction
- Read up on (or conduct) research studies evaluating the use of technologies and their impact on student learning outcomes

- Conduct training sessions teaching faculty and staff how to use new technologies
- Create training materials to accommodate the self-learners.

We now turn to the final section of this chapter, which focuses on how to assess and evaluate our IL teaching.

6.4 ASSESSMENT AND EVALUATION

In this section, we discuss issues related to the assessment of information literacy learning in students, and evaluation of teaching quality. The first part is devoted to a few general matters, where our position is mostly derived from conclusions arrived at earlier in this book. The following subsection deals with IL teachers' relationship with the disciplines, and how this influences our approach to assessment. Thereafter, we discuss the centrality of formative assessment and look at a couple of sample IL assessments. Last, we look at student evaluations of teaching and peer evaluations of teaching.

6.4.1 Thinking about assessment

We argued in Chapter 3, Things We Know About How Learning Happens, that our conceptions of learning and teaching really do matter for the quality of student learning. Of course, this includes our conceptions about assessment. In this subsection, we want to offer three general points related to how we might think regarding assessment in order to best support both teaching and learning.

First, following the drift of a number of authorities on teaching and assessment in higher education (e.g., Biggs & Tang, 2011; Svinicki et al., 2011), we believe IL teachers should consider assessment as something that we do first and foremost in order to support learning, rather than something done as a control measure. Documenting learning is important for a number of reasons, but enhancing learning is a primary purpose for us. One of the reasons for adopting this stance is that IL teachers are not always in a position to exercise control over summative assessments in the courses we contribute to.

Second, following our discussion in Section 6.2.1, we should always strive to align assessment of IL knowledge and competencies

with the intended learning outcome statements for the sessions and for the courses to which the IL sessions contribute. Students will tend to orient themselves toward what they perceive to be the real assessment criteria, and to adopt learning approaches and strategies in accordance. Hence, teaching and teacher's intended learning outcomes will be discounted to the extent that they misalign with assessments as the students see them.

Third, when thinking about assessment, we should keep in mind that clearly stated intended learning outcomes and success criteria are important prerequisites for student learning, and that effective teaching aims to make learning visible (c.f. Sections 3.1.1 and 3.4.1).

If we accept these points as reasonably valid, then it seems to follow that assessment somehow needs to play a major role in the sessions IL teachers and students spend together. We should build our teaching around our assessment, and use it explicitly and actively in both learning activities and expository teaching. We are, in other words, making a case here for embedded formative assessment.

6.4.2 Assessing IL with(in) the disciplines

In Section 6.2.3, we discussed the need for IL teachers to work toward the best possible integration of IL teaching in the various disciplines we serve. Most IL teachers serve several different disciplines and departments, and most experience a varying degree of success in their efforts to integrate.

In an ideal situation, an IL teacher is allowed to rather directly influence and design part of the assessment strategy for a given course or program. In such cases, the biggest obstacle to aligned assessment is out of the way, and we can choose assessment items and/or assignments for the summative assessments that best suit the teaching we contribute with and the learning activities of the students.

In many cases, however, summative assessments are already designed by faculty responsible for the course to which we contribute. This does not mean we should abandon the ideals of constructive alignment, but it does mean we need to be a bit more creative in order to make clear the connections between what we offer and how students are assessed.

Sometimes both the learning outcome statements for the course, the assessment assignments and the evaluation criteria line up fairly well with the IL learning outcome statements we might want to use for the IL teaching. In such cases, it is relatively straight forward to design IL

sessions and formative assessments that match the summative assessments for the course.

For some courses, however, the summative assessments may only very implicitly include an assessment of IL. In such cases, we need to develop a common understanding with responsible faculty of how IL outcomes are indirectly valued and assessed. This may involve some delicate balancing. We want to communicate to students how the effects of IL competencies and deep learning strategies become visible to their evaluators, and how they matter to their final assessment results, while at the same time making sure that we do not overstate that connection or by implication accidentally blame and shame faculty for not having thought about making the IL outcomes explicit in course documentation and assessments.

In some rare cases, we may have to contribute to courses where traces of IL in the course summative assessments are few or nonexistent. In such cases, we may have to rely more on appeals to the longer term goals and values of students, and to assessments in other courses the student group is likely to also take.

In every case, however, we can and should always include assessment as part of our teaching. That is, we should practice embedded formative assessment by building our teaching around assessment items and activities.

6.4.3 Embedded, formative assessment

The research base supporting the use of embedded formative assessment is solid, both in general (e.g., Black & William, 1998; William, 2011), and specifically for information literacy (e.g., Schilling & Applegate, 2012). We do hope, however, that the case we have made for teaching for active, collaborative learning naturally lends its support to the use of formative assessment. Now, a reasonable objection to the idea of including formative assessment in our IL sessions is that it would take too much time away from actual teaching. We have mentioned several times in this book the often limited time an IL teacher has with a group of students. We have moreover argued that much of that teaching time should be devoted to collaborative learning activities in addition to any expository teaching we might need to do. How can we fit even more into our IL sessions?

The trick is to consider learning activities and assessment as so closely connected as to be almost indistinguishable. At various points in this chapter, we have provided some examples of IL learning activities. Many of

these can be considered ways to elicit evidence of learning. And, since learning activities should be designed with outcome statements in mind, most, if not all, learning activities will serve this purpose. We recommend being very explicit about their potential to provide the sort of practice that will prepare the students for any summative assessments. This implies that embedded formative assessment can and should be engaged in throughout most IL sessions, and form a natural part of IL teaching. Sometimes, though, it can be a good idea to make a particular use of informal, test-like assessment at the beginning and end of the contact with a group of students, particularly if it lasts across more than one session.

As mentioned in Section 6.3.1 on lecturing, the start of a session is a good time to include a bit of formative assessment, perhaps in the form of a brief quiz, or a handful of very simple application exercises. This helps counteract the Dunning–Kruger effect, which may be particularly strong for students in the IL domain. It also helps establish a baseline, and thus helps an IL teacher who wants to properly evaluate the impact of her teaching. If a brief assessment can be administered prior to the session, as in a flipped classroom arrangement (see Section 6.3.2.2), this has the added advantage of forming a basis for adjustment in the plans or implementation of the teaching session itself. At the end of the series of sessions, an identical or very similar assessment can be repeated, thus allowing both teacher and students to compare performance before and after the sessions. This can be an important supplement to subjective student evaluations of teaching effectiveness (see Section 6.4.6).

6.4.4 Common IL assessment techniques

By far the most popular assessment technique for the attainment of IL learning goals is the multiple-choice questionnaire (MCQ). One review of IL assessment case studies found that around half of all IL assessments were either MCQ (34%) or quizzes/tests (15%; Walsh, 2009). This is probably because such assessments are relatively easy to administer, usually quite quick to complete, and very easy to score or grade. MCQs are sometimes reviled for their alleged inability to measure higher order thinking, and for their alleged tendency to pull students toward surface approaches to learning. As we argued in Section 3.2, these beliefs about the merits of MCQs may not be entirely accurate.

There are a number of MCQ assessments available in the IL assessment literature. Some are rather ambitious, like the Information Literacy

Test developed by Cameron, Wise, and Lottridge (2007). This is a comprehensive, standardized 60-item MCQ based on the ACRL standards (American Library Association, 2006). While such measures have some advantages, like comprehensiveness and verifiable measurement reliability, they do tend to become unwieldy, and hence to defeat what may be the strong points of MCQs, i.e., their ease of administration and scoring. Besides this, assessment designed to cover the width of IL competencies will usually cover a lot more than is reasonably covered in most IL contributions to a given course. As such, they will often miss the mark, and detract from, rather than contribute to, constructive alignment.

While a number of briefer MCQs have also been described in the literature, probably as a consequence of most IL teachers' wish to design their own assessment instruments in order to tailor them to their own teaching, few of these are readily adoptable, exactly for this very same reason. Furthermore, if the primary purpose of the assessment items we use is formative, and we want to use them in a teaching context, then administering a whole questionnaire may prove too cumbersome. That being said, the literature on MCQ assessments of IL learning is a great source of inspiration for any IL teacher working on her own assessments items, both for summative and formative purposes.

When designing multiple-choice questions, we have found it helpful to keep in mind the following: (1) always aim for plausible foils (the incorrect alternatives); (2) look for opportunities to measure application and inference, not just factual recall; (3) when using multiple-choice questions for in-session, formative purposes, using rather elaborate cases and/or problems that require a bit of work before an answer is arrived at is sometimes helpful; and (4) pilot the MC items before use, particularly if they are to be used as part of a summative assessment.

Another popular assessment type for IL learning is rubric-based assessment for written assignments. This may be the assessment type of choice for summative assessments in courses where IL objectives and teaching are well integrated, and where students' achievement is graded on the basis of a written assignment involving the use of sources. Rubric assessment seems to eminently serve the need to make student learning visible, providing guidance and inspiration for IL teachers to improve their teaching (e.g., Oakleaf, 2011).

We would like to point out, though, that such rubrics can also serve as an excellent focus for in-class learning activities, and hence for formative assessment. Formulating an assignment that serves as a mini-version

of some aspect being assessed by the rubric, and then having students practice applying the rubric to each other's solutions to the activity is a great way to align teaching to assessment. Notably, there is evidence indicating that the very act of applying assessment criteria, such as a rubric, to other students' texts may be a particularly powerful learning catalyst (Greenberg, 2015; Li, Liu, & Steckelberg, 2010).

As with MCQ assessments, it is probably a good idea to develop your own rubrics, adapted to the relevant discipline and the particular teaching context in which it is to be used. Again, however, there are a number of excellent rubrics in the IL teaching literature that can serve as helpful inspiration and sources of ideas (e.g., van Helvoort, 2010).

6.4.5 Assessing PhD students' information literacy

To end the section on assessment of information literacy learning, let us recall Section 6.2.2.1, where the variety of student groups was discussed. As already mentioned, PhD support in academic libraries is fairly new, but increasing, and this includes the amount of teaching sessions that provide credit. Also mentioned in Section 6.2.2.1 was this student group's fear of spending time on something not of immediate use for their PhD project. The natural question in this regard is: how can we assess their information literacy learning all while making them realize the benefit of carrying out the assessment task? If you are lucky to meet with the PhD students several times, you have the possibility of giving them a variety of assignments. One such example is the seminar series *Researching and Writing a Critical Literature Review*, organized at Harvard Graduate School of Education (see https://canvas.harvard.edu/courses/5206/assignments/syllabus). During the seminar series, and with their own project in mind, the PhD students are expected to write research memos, prior to each class, submit a conference paper proposal, provide feedback to peers, and write up an end-of-semester assignment in the format of a reflection on the hows and whys of a literature review (semester 1) and a complete literature review (semester 2), both graded and commented by professors.

In most cases, though, we meet with the PhD students within a limited period of time, trying to cover several aspects of information literacy, e.g., citing, searching, and sharing knowledge. To assess their learning on all these aspects, and without having to resort to several time-consuming assignments, you need to connect these very aspects during the teaching session(s), so that the students can work with the assignment with a clear

process in mind. One example that can serve as inspiration is developed at the University of Umeå, within the frame of a PhD course labeled *Information Retrieval and Academic Publishing*, where students are asked to search and select 5 journals within their field, all while describing the search process and the factors used in the process of selection. This exercise could easily be extended to embrace also sharing of knowledge, i.e., evaluation and (lack of) selection of OA journals.

In sum, although the overarching goal for IL teaching is similar, whether the student group is BA or PhD, the format and content of the assessment should differ. For teachers meeting with PhD students, it goes without saying that they need, to a certain point, to be familiar with what constitutes a doctoral writing process. If you do not have a PhD degree yourself, team up and discuss with colleagues who do, talk with faculty, and read.

6.4.6 Student evaluation

In addition to reading up on research, talking with colleagues and faculty, and your own experiences, the effectiveness of your teaching should also be evaluated via some sort of student feedback. In many institutions, written student evaluation is encouraged, or even made mandatory, by the administration, and as teachers we are thereby constantly confronted with the students' view of our "performance." While this might be one of the few channels whereby students can communicate their opinion of the course (and by extension, with us, the teachers), it might for some teachers trigger a wide range of emotions in that we take positive feedback to be a good sign, thereby feeling pride and confidence, and negative feedback to be a bad sign, thereby feeling disappointment and failure. While in particular qualitative feedback (typically open comment fields in the end of the evaluation form) might provide useful information about the student's experience, there are however many pitfalls. All students might not fill out the form, some students might have a particularly bad day (or a particularly good one), and some might confuse learning with having been entertained or having been presented with material that is easy to work with. The general assumption of a link between learning and high rating is thus problematic, and even refuted in the meta-analysis carried out by Uttl, White, and Gonzalez (2016).

We do not mean that you should avoid written evaluation altogether. Allowing the students to anonymously pronounce on the teaching session, and in favoring qualitative answers, you get access to information

about how your teaching is perceived, also by the more silent and passive participants in the student group. Here, to make the evaluation as representative as possible, make sure you devote 10 minutes in the end of the class to this, so that students feel more obliged to answer (once they are out the door, they tend to forget it). Further, in our experience, written evaluation is useful when you are in the process of designing your teaching. Being open about this to your students, you can ask them more developed questions on aspects in your teaching that you are uncertain about. This is particularly relevant and useful on higher levels, i.e., MA and PhD, where they already have years of training and you want to avoid overlap in course content.

Rather, to measure the success of your teaching, we suggest you use written evaluations in combination with user data provided through assignments (these being online or in class). While students might orally express a mastery of citing sources, their actual performance might indicate otherwise. This comparison of different types of student feedback allows you to modify both the content of the teaching, as well as the way things are presented. As mentioned in Section 6.3.5, the platform we use for our online IL resource (Bibsys Open edX) comes with the analytics module *Insights* that provides clear data on where the students struggle and, further, what they spend more or less time on within the course.

6.4.7 Peer evaluation of teaching

As mentioned in Section 6.2.3, working together with inspiring and trusted colleagues may have positive influence on the quality and learning effectiveness of your teaching. However, you should also consider bringing your colleague to your teaching session, inviting her to contribute with peer evaluation. With peer evaluation, we mean establishing cooperation with a colleague whereby you meet with the latter prior to, during, and after your teaching session. While the main goal is to improve various aspects of your teaching, i.e., planning, implementation, content, communication, etc., another goal is for your colleague to learn something from it, as well. Functioning as peer evaluators, we are not expected to sit in the back of the classroom and see whether the PowerPoint presentation is nice, the break is long enough, and all participants are awake. Nor should we sit there and search for things that we would have done "better." Rather, having been confined the responsibility as peer evaluator, we need to engage at all levels (silently, though, during the session itself) in

order to provide sound feedback. While this has the possibility of increasing the competencies and skills within the teacher group, it also solidifies the interpersonal bonds within—making us feel more part of a collaborative whole, with a common goal.

So how do we proceed? Lauvås, Lycke, and Handal (2004) propose three stages: (1) a meeting before the session, using as starting point a reflection written by the teacher; (2) peer evaluator presence during the session; (3) a meeting after the session, where the teaching session is analyzed in part in light of the initial reflection, in part in light of the presession meeting, and in part in light of the peer evaluator's own impressions. In what follows, we present the main points of a peer evaluation formula, developed by teachers in pedagogical competence for higher education at UiT The Arctic University of Norway.

Example Formula

Part 1

(filled out by the teacher prior to the presession meeting)

- What is the intended learning outcome of the teaching session?
- Describe a rough plan for the teaching session
- Describe your role and responsibility with regard to the student group
- On which elements do you wish feedback from the observer?
- Which aspects of your teaching do you in particular want to work on?

Part 2

(filled out by the observer during the session)

- What went well, and what can be improved, with regard to:
- Clarity of the intended learning outcome
- Planning and organization
- Format of teaching session
- Content
- Student participation
- Use of tools
- Communication

Part 3

(filled out by the teacher after the session)

- Evaluation of own teaching session

It might feel a bit scary to have colleagues in the classroom, but never forget that the purpose is to improve your (and their) teaching, which in

turn improves the learning effectiveness and student happiness. Also, exposing yourself this way will make you even more conscious and critical to what you do, and also more aware of all the positive sides of your teaching that are already there. Finally, documenting our peer evaluation is not a bad idea when you think about future meetings with faculty and study administration: This shows that you—and the library—take your responsibility as teachers in higher education seriously.

CHAPTER SEVEN

Epilogue

7.1 FINAL WORDS

You have now read a book about teaching information literacy, with the aspect of learning, academic formation, and the use of technology deeply ingrained. In the 21st century, the librarian's role in higher education goes beyond providing students with tools for searching and citing. In fact, we firmly believe that learning, academic formation, and technology are vital aspects of information literacy teaching, and as librarians with an interest in teaching and care for our students, we should do what we can to make our few teaching lessons as useful as possible. This is not an easy task to achieve without a background in education or pedagogy. Therefore, in this book, we have had strong focus on not just how to provide students with useful learning strategies, but also on discussing the learning process itself, i.e., how we learn, as well as a focus on the normativity of information literacy. We have also reflected around the importance of the acquisition of academic values, how we can help students identify their motivation for being in academia, and how this, together, might lead them to act in line with existing norms and conventions. And we have talked about how technology might contribute to the overall quality of, and accessibility to, our teaching.

As voiced by several organizations, including UNESCO, information literacy is an imperative skill in modern society. The Prague Declaration states that Information Literacy "is a prerequisite for participating effectively in the Information Society, and is part of the basic human right of life long learning".[1] Reflecting on the power of these skills should be enough to make any librarian proud to be assisting citizens on the road to becoming information literate.

[1] http://portal.unesco.org/ci/en/files/19636/11228863531PragueDeclaration.pdf/PragueDeclaration.pdf.

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7.2 THE ROAD GOES EVER ON AND ON[2]

Now what? Do you get out there, trying out some of the points we have focused on in this book? Or do you sit down with the next book on information literacy? Yes, you will probably—and hopefully—do both. Information literacy is a concept constantly in flux along with the rest of the library world, and we encourage not only library schools to increase elements of modern pedagogy in library training, but librarians already working in higher education to keep abreast of advances and new results in educational theory. Further, with online teaching and access to big data, gradually more results on students' developing information literacy (or not) become available.

We believe that libraries should be at the forefront in advocating information literacy for everyone, and we therefore strongly encourage you to continuously nurture your interest and your eagerness to improve your information literacy teaching.

To end this book, we quote an unpublished paper by Shulman (2002, p. 3)[3]: "One of the most powerful motivations for change is looking in the mirror." This holds for students. And it holds for us.

[2] We cannot hide the fact that we are huge Tolkien fans. This quote is taken from *Lord of the Rings: The Fellowship of The Ring* (Tolkien, 1991 [1954], p. 48).

[3] Shulman (2002) is cited by Walker, Golde, Jones, Bueschel, and Hutchings (2008).

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