# Journal of Information Literacy

## ISSN 1750-5968

## Volume 15 Issue 1

## January 2021

## Project report

**Pichel, J., Last, B., de Ronde, J., Garbaciak, A., Hazen, H., and Jongen, S. 2021. Information-Wise: A case for developing an evidence-informed information literacy programme at Maastricht University. *Journal of Information Literacy* 15(1), pp. 105-121.**

***http://dx.doi.org/10.11645/15.1.2845***

# Information-Wise: A case for developing an evidence-informed information literacy programme at Maastricht University

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## Abstract

At Maastricht University (UM), the importance of information literacy (IL) is widely recognised – students require structured support in dealing independently with (academic) information, and encouragement to develop creative and critical approaches when faced with complex questions and sources. IL is especially significant in a problem-based learning (PBL) environment such as that offered by UM, which advocates a constructive, contextual, collaborative, and self-directed approach toward learning and knowledge creation.

The project Information-Wise launched in February 2019 and resulted in an evidence-informed IL programme for bachelor students. The ADDIE model (analysis, design, development, implementation, evaluation) was adopted to organise the development process of the programme. The analysis phase was conducted by gathering qualitative and quantitative evidence. Two literature reviews and a university-wide survey with responses from over 600 bachelor students and about 100 staff teachers resulted in recommendations for an IL programme at UM. The design phase consisted of the development of an IL framework that embraces the PBL vision of UM. The framework consists of four dimensions: 1) Resource Discovery, 2) Critical Assessment, 3) Organising Information, 4) Creation & Communication. In order to translate the conceptual research outcomes and framework dimensions into educational practices, the project team created a developmental rubric with intended learning outcomes (ILOs). In the development phase, a five-step piloting approach was used to design

teaching activities and assessments that support students in achieving these rubric ILOs. The constructive alignment approach helped to align these activities with the content of the subject courses in which these pilots took place. Part of the IL programme is an online curriculum consisting of generic and discipline-specific online modules. For the implementation phase, this report presents Do's, Don'ts, and Don't knows, which outline the future integration of the IL programme into faculty curricula. The evaluation phase still has to be done.

## Keywords

curriculum design; evidence-based practice; information literacy; instructional design; Netherlands; online learning; problem-based learning

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# 1. Vision of information literacy education at UM

## 1.1 Background

In the year 2020, we experienced a global crisis: COVID-19. A related phenomenon is the rise of disinformation, referred to as the *disinfodemic* by UNESCO (UNESCO, 2020). This wave of disinformation results in public distrust of media and therefore threatens democratic values. Education can play a major role in responding to this challenge by teaching learners of all ages to be information literate: to discover credible sources, critically evaluate the information with which they engage, ethically organise information, and engage actively and consciously in the creation and sharing of information.

At Maastricht University (UM), the importance of information literacy (IL) is widely recognised – students require structured support in dealing independently with (academic) information, and encouragement to develop creative and critical approaches when faced with complex questions and sources. This is especially the case in a problem-based learning (PBL) environment, which advocates a constructive, contextual, collaborative, and self-directed approach toward learning and knowledge creation (Dodd, 2007; Dolmans, 2019; Santharooban & Premadasa, 2015). Given today's digital and technological developments, such as big data and social media, higher education institutes need to (re-)examine their role in providing IL education that meets the standards and challenges of the digital era.

## 1.2 The project aims

In this light, the education innovation project Information-Wise launched in March 2019. Project Information-Wise is a collaboration between the Maastricht University Institute of Education Innovation (EDLAB), the University Library, and all six faculties, which aims to create an evidence-informed programme for IL at UM. The project team decided to start designing this programme for bachelor students, as it will be used as a foundation for potential master's (and PhD) programmes. More specifically, the project aimed to:

- Gain an in-depth and comprehensive understanding of the issues students face regarding their IL skills from both a student and teaching staff perspective.
- Develop a coherent and blended information and digital literacy programme with generic and discipline-specific modules, in which students from all faculties will gain knowledge about, practise, and receive feedback on their IL skills.
- Pilot and constructively align these modules in different faculty courses to evaluate their effectiveness.

In order to get an in-depth understanding, academic literature was reviewed on a) the current trends in the changing information landscape (Pichel et al., 2018) and b) how to assess informed learning (Jongen et al., 2019). The next step was to conduct empirical research on the

challenges that students and academic staff face in dealing with information during learning. These outcomes were the basis for the development of the UM IL framework (thereafter UM framework), which provides a university-wide approach for IL skills education at UM. In line with the EDview (EDview is a project researching and improving the state of Problem Based Learning at Maastricht University) recommendations (EDview, 2018), the framework vision embraces the PBL principles: learning as a constructive, collaborative, contextual, and self-directed process. It centres IL as part of students' learning process. At the core of this vision is the UM bachelor student, who is confronted with a flood of information created by quick and easy access to a wealth of (online) information sources as a consequence of the changing information landscape.

Why do students need to plan a search, stop searching, evaluate the trustworthiness of a source and why should students organise information? Which steps do students need to take to further develop their IL skills? How can academic staff support this development? To support staff and students answering these questions, the framework envisages an upgraded academic skills trajectory that gradually teaches students how to be self-reflective and critical when using information at university and beyond.

For the overall development of the IL programme, we followed the ADDIE model for educational design (Figure 1). The ADDIE model is a five-step process used to guide instructional designers in developing instructional materials. As such, the phases are Analysis, Design, Development, Implementation, and Evaluation (Davis, 2013).

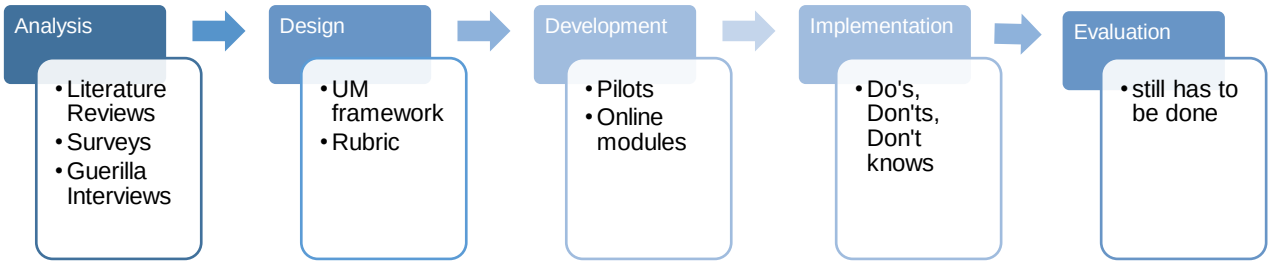


Figure 1: Flow chart showing how the UM IL programme followed the ADDIE model

## 2. Analysis: Research

**For the full details of the research part of this project, see the midterm report* [https://edlab.nl/wp-content/uploads/2020/03/Mid-term-Report_UM-Information-Wise.pdf]

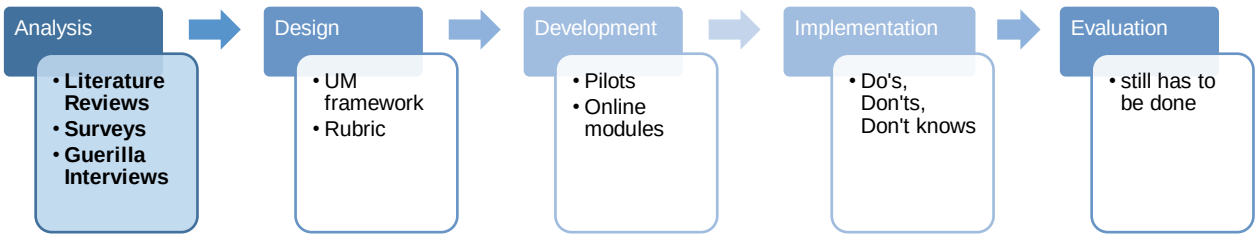


**Figure 2:** Flow chart depicting the ADDIE process with the initial 'analysis' phase highlighted.

The analysis phase (Figure 2) consisted of two literature reviews, university-wide surveys both for teachers and students, and interviews. These were conducted in order to analyse the challenges students and teachers face in learning and teaching IL skills.

## 2.1 Two literature reviews

A central deliverable of this project was the design of an evidence-informed IL programme for bachelor students at UM. To reach that goal, two extensive literature reviews were written. The first one reviewed the changing role of IL skills in higher education and related trends (Pichel et al., 2018) which led to several recommendations for the next steps in the project:

1. Follow evidence-based IL driven by quantitative and qualitative data analysis (both student and teacher data);
2. Build an extensive partnership between library and faculties;
3. Integrate frameworks (for example the Association of College and Research Libraries (ACRL) Framework for IL for Higher Education) into current and future IL activities and harmonise these frameworks with academic skills education in the faculties;
4. Develop information IL linked to course assignment and learning goals or embed these into programmes or course syllabi;
5. Familiarise academic librarians with frameworks (for example ACRL) and professionalise their pedagogical understanding and teaching.

The second narrative review (Jongen et al., 2018) resulted in recommendations on how to analyse informed learning at UM, which were used as input for the next steps in the project:

1. Analyse to what extent the functional, situated, and critical approaches of informed learning are practised with a mixed approach (that is, conducting both qualitative and quantitative analyses);
2. Use quantitative analysis to investigate the issues related to information use within the learning process in a student population and within teaching practice in a teacher population by using surveys;
3. Use qualitative analysis to investigate how students and teachers deal with information in the learning process by using focus groups;
4. Use quantitative analysis to investigate to what extent intended learning outcomes (ILOs) in course manuals meet information literacy standards in different academic programmes;
5. Use both formative and summative assessment to measure IL skills and include the four levels of assessment: 1. Reaction (did students like it?), 2. Learning (did students get it?), 3. Behaviour (can students do it?), and 4. Results (does it matter?) (defined by Kirkpatrick, 2007).

*To read the literature reviews, see* [https://openmonographs.maastrichtuniversity.nl/index.php/ISLHE/catalog/book/2] *for access to the open monograph.*

## 2.2 Surveys and guerrilla interviews

To follow up on these recommendations, a university-wide survey was distributed to students and teachers in the bachelor programmes of UM. In total, 632 students (approximate response rate 5.3% of all bachelor students) and 86 academic staff members (approximate response rate 3.9% of all academic staff) across 18 bachelor programmes responded to closed and open questions. The analysis looked into challenges for these groups in dealing with information in the learning and teaching process and provided several recommendations, mentioned below. In addition, 21 guerrilla interviews (interviews in which students are approached in their learning

environment and receive questions on the spot after they have provided consent) were performed to question students about the use of information in their studies.

## 2.3 Recommendations for IL education at UM

**General recommendation: Employ a constructive alignment approach to integrate IL within all curricula.**
Constructive alignment provides a framework for ensuring that IL efforts align with intended learning outcomes, learning activities, and assessment tasks (Biggs & Tang, 2011). It helps to clarify what students need to learn, how to develop IL skills further, and how these skills will be assessed (Erlinger, 2018; Salisbury et al., 2012). The following recommendations address the employment of constructive alignment, ILOs, teaching and learning activities, and assessment. In order to do so, faculty teachers and information specialists from the University Library should be supported by means of professionalisation programmes.

**#1: Design an bachelor pilot to explore scaffolding the use of provided and non-provided literature within a course to stimulate self-directed learning.**
Descriptive analyses of the survey raised concerns about the lack of stimulating and guiding self-directed learning. Students indicated that they *mainly* focus on the resources provided in the course manual to find information about a topic, while sometimes looking beyond sources provided by the course coordinator. In addition, they indicated that they *sometimes* have to search independently. No differences were found between the first, second, and third bachelor year in independent searches by the students.

**#2: Diversify the approach to teaching *resource discovery*: make students aware of the difference between (academic) search engines and academic databases and discuss the advantages and disadvantages of each.**
The results of the survey show that bachelor students *always* use the sources provided in the course manual to prepare for a PBL class. The results also show that bachelor students use Google *most of the time*, while students use the databases (e.g. PubMed, Web of Science, PsycINFO) of the University Library about *half of the time*.

**#3: A larger component of *critical assessment of information* should be developed in each bachelor curriculum.**
Students indicated that they critically evaluate sources that they read *most of the time.* Teachers had a different perception. They gave a significantly lower score when asked to indicate to what extent students critically evaluate sources. In the open questions, students indicated certain characteristics that they used for evaluating sources, but no systematic evaluation was deployed. This conclusion was supported by the guerrilla interviews.

**#4: Teach students about *organising information.* Tools (for example reference management tools) could be used to develop this skill. Educating students in the use of specific tools should not be a goal in itself, but a means of enhancing skills for organising information.**
One of the main outcomes of the survey was that a majority of students indicated that they *never* used a reference management tool, such as EndNote, even though they indicated that they were able to reference properly.

**#5: Scaffold IL activities that support students in the creation of (academic) output.**
There was a disagreement between students and teachers regarding the ability to formulate a research question. Students indicated that they felt confident in formulating a research question while teachers provided a lower score. This could indicate that students overestimate their abilities in this complex task. Given that first year students lack research experience and might feel insecure (or overconfident), it is important to provide sufficient guidance for students in mastering these difficult and complex tasks (for example creating a research question, or writing

a research outline). Breaking down the task into smaller parts could reduce students' cognitive overload. For example, students could practice different ways to narrow their research focus by finding relevant keywords before they have to come up with the full research question. This process of reducing support as learners acquire more expertise is called *scaffolding*.

**#6: Teach students how to create and communicate information in a variety of formats (from blogs to academic papers) on multiple digital platforms (for example LinkedIn, Facebook).**
What becomes apparent throughout the survey responses is that students often perceive themselves as consumers of information instead of creators. The results of the survey supported the concerns that students take a rather passive role by using the provided resources in PBL classes. Students should be stimulated to be creators of information (ranging from blog posts to academic papers) on multiple digital platforms.

**#7: Design an bachelor pilot to measure *informed learning* with an authentic assessment component within the disciplinary context.**
One of the limitations of administering a survey is that it only measures the perception of students or teachers, while it does not measure learning, behaviour, or long-term effects (Erlinger, 2018). The survey provides no evidence of actual attitudinal or behavioural changes in learning how to deal with information. In addition, the effects of library workshops are mainly evaluated by surveys, providing only the perception of students about the effectiveness of these workshops. Thus, *informed learning* (learning about information in the context of a specific discipline) needs to be authentically assessed, meaning that assessment should be contextualised, measure higher-order skills, and foster motivation and engagement.

**#8: Add IL training to the teacher professional development programmes and training in teaching to library professional development programmes.**
Several teachers indicated that they would like to receive more training in how to teach IL. This is in accordance with results from Edview, showing that teaching staff feel a lack of knowledge and skills for providing direction in searching and reviewing literature. This was mentioned in the context of information overload.

## 3. Design: IL programme

The IL programme consists of the UM framework, the UM rubric including ILOs that build on the UM framework dimensions, as well as an online curriculum with generic and domain-specific modules. The design of the programme was informed by the research outcomes and recommendations (see section 2). The structure of the programme is flexible and each part should be adapted to the specific requirements and needs of each faculty programme. The next chapters will further describe and explain the central elements of the IL programme.

### 3.1 The UM IL framework

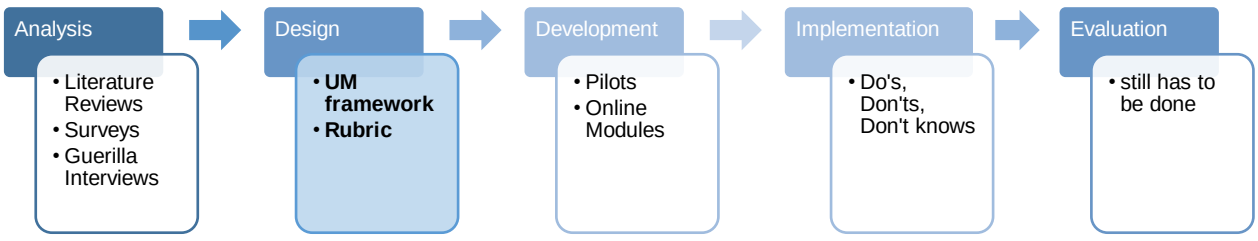

**Figure 3:** Flow chart depicting the ADDIE process with the second phase, 'design', highlighted.
The research phase (Figure 3) provided recommendations for the integration of IL frameworks (for example ACRL) into current and future IL activities at the UM. Following these recommendations, in early 2019, a selection process took place, in which library information specialists evaluated prominent IL frameworks (ACRL, 2016; Cambridge Information Literacy Network, 2019; SCONUL Working Group on Information Literacy, 2011) based on carefully selected criteria (for example, fit with PBL philosophy, usability). This process led to the decision to synthesise the most valuable parts of each framework in order to design a UM IL framework that matches the PBL educational philosophy. For more information on the selection and development process of the UM IL framework, see the midterm report. [https://edlab.nl/wp-content/uploads/2020/03/Mid-term-Report_UM-Information-Wise.pdf]

The UM IL framework combines content from well-known frameworks for IL and includes attitudes and knowledge practices. Attitude can be defined as a learned tendency to evaluate objects, subjects, or persons in a certain way. Knowledge practices are the proficiencies or abilities that students develop as a result of their comprehension of an IL component (ACRL, 2016). These attitudes and knowledge practices are organised through the four different dimensions of the UM framework (see Figure 4 below)

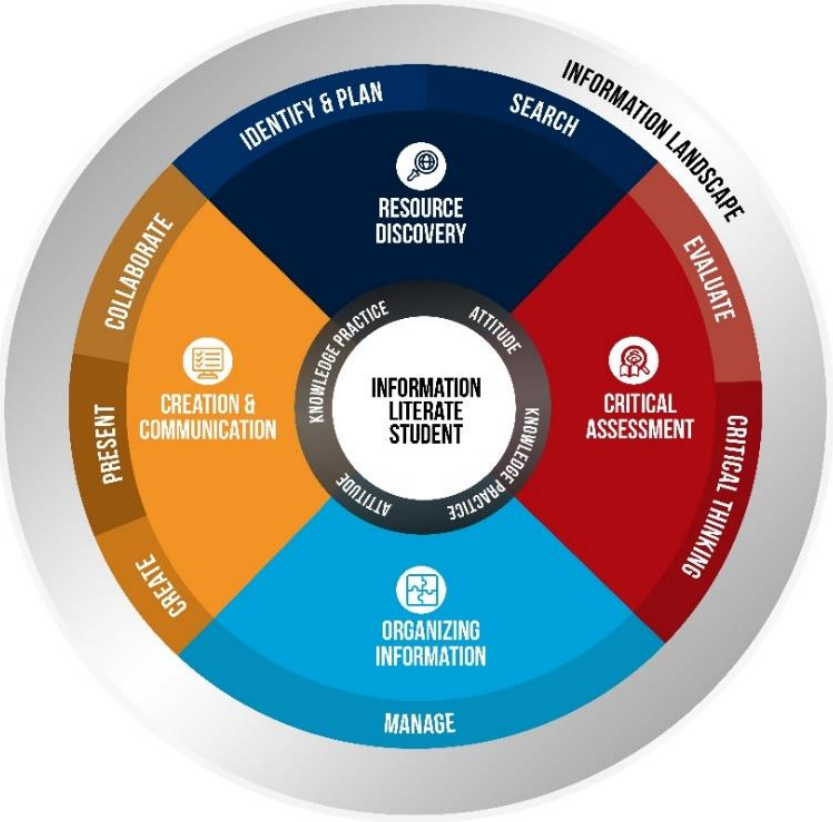


**Figure 4:** Wheel diagram showing UM IL framework.

**Resource Discovery**
Learners who develop skills and attitudes relating to resource discovery are able to **identify** their information need and **plan** a search accordingly. They are able to **search** for resources in an effective manner. They recognise specific formats and types of information appropriate for answering research questions or problem statements.

**Critical Assessment**
Learners who develop skills and attitudes relating to critical assessment take a critical approach towards information that comprises critical thinking about, **evaluation**, and critical reading of information. They **think critically** and reflect on the author's and their own biases.

**Organising Information**
Learners who develop skills and attitudes relating to organising information engage with relevant information, develop strategies (for example concept mapping) and use tools (for example reference managers) for **managing information** of all kinds.

**Creation & Communication**
Learners who develop skills and attitudes relating to creation & communication see themselves and act as information creators in addition to information consumers. They understand that **information creation**, such as presentations, data visualisation, and publishing blog posts, is an iterative process, which entails evaluation, revising, and re-purposing of discovered content. This implies also careful **communication** in virtual settings, considering the ethical perspective of online conversations. They **present** content and themselves online and thereby consciously shape their digital presence.

### 3.2 Rubric for IL education at UM

**For the full details of the UM IL rubric, see the rubric manual* [https://edlab.nl/wp-content/uploads/2020/08/Rubric-manual-final.pdf]

The UM IL rubric presents ILOs that include the level of attitudes and knowledge practices that students acquire over time. The content of these ILOs builds on the dimensions and sub-dimensions of the UM IL framework. The developmental rubric is structured into four levels: (1) Novice, (2) Intermediate, (3) Competent, and (4) Advanced. These levels demonstrate the differentiation of attitudes, knowledge level, and skills level between a novice and an advanced bachelor student in a specific area of IL.

## 4. Development: Pilots and online modules

### 4.1 IL pilots

The challenge for the project team was to translate the conceptual UM framework and rubric ILOs (see chapters 3.1, 3.2), as well as the research outcomes (see chapter 2), into teaching and assessment activities. We conducted a series of pilots within faculty courses to try and test a framework-inspired approach to teaching and assessment. The goal was to pilot within at least four out of six UM faculties in order to account for discipline-specific differences and challenges with regard to IL education.

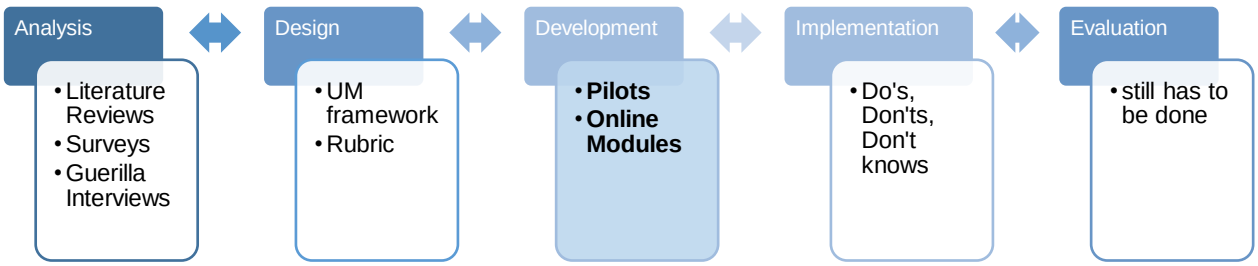


**Figure 5:** Flow chart depicting the ADDIE process with the third phase, 'development', highlighted.

Inspired by prominent instructional design approaches (for example radical prototyping) the project team developed, evaluated, and learned from eleven pilots (Figure 5). The process involved five steps: 1) gather information, 2) build, 3) pilot, 4) evaluate, and 5) scale & sustain (see Figure 6). The developed pilots addressed **at least one of the framework dimensions** and followed **at least one of the recommendations of the research phase** (for an overview of the pilots see *Appendix A*). Although the pilot development and evaluation followed a logical structure, we did not progress through a series of sequential stages but followed a non-linear process. There were several reasons for this; as well as common challenges within courses (for example, low student participation in pilots), external circumstances (COVID-19) required logistical and instructional flexibility from the pilot participants.

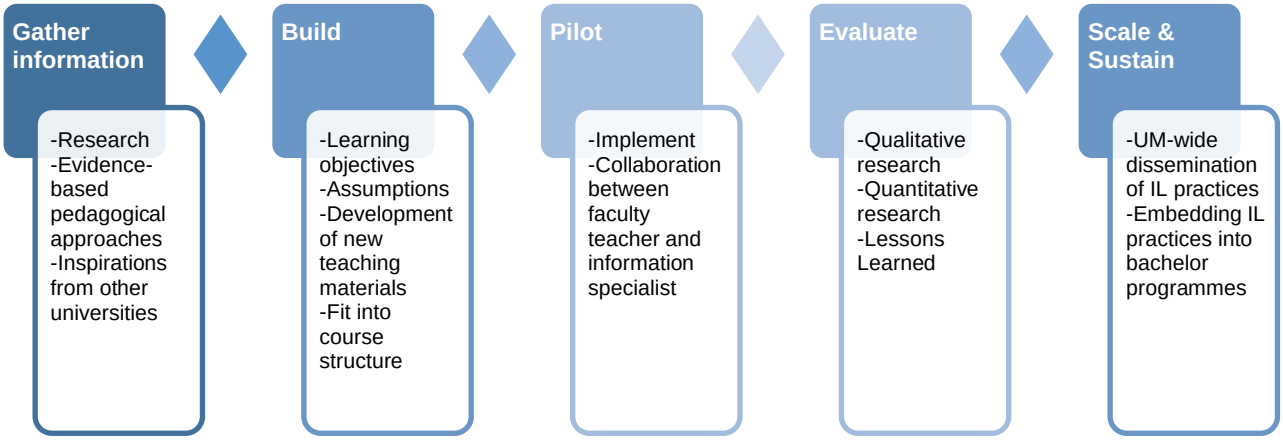


**Figure 6:** Chart showing Information-Wise pilot process.

**Gather information**
The design of the pilots was informed by the insights we gained from the previous research (literature reviews, quick scan) and recommendations based on a UM-wide survey. The interventions were built on evidence-based pedagogical approaches (for example constructive alignment, self-regulated learning) to ensure the application of proven concepts to improve students' IL skills. At the same time, we were inspired by IL activities from other universities (for example VU Amsterdam), and developed pilots that contained more experimental elements (for example, a digital detox workshop, an IL game).

**Build**
In this phase, we explored assumptions, leading to hypotheses about how the pilots would affect students' IL skills in the selected courses. For example, in one pilot we hypothesised that because of added IL activities, students would critically evaluate the quality of sources and select the most appropriate sources for their research plan (see *Appendix B* for a description of this pilot). Such propositions led to the design of new teaching materials in close cooperation with the pilot participants.

We designed the pilots according to a bottom-up approach, closely cooperating with project team members who were in charge of courses and thus had the power to test and experiment. In the pilot development phase, information specialists from the University Library played an active role next to the course coordinator. They consulted and advised course coordinators on potential IL activities. Their role was also to ensure that these activities were constructively aligned with the ILOs, teaching activities, and assessments of the course in which the pilot took place.

**Pilot**
In this phase, we ran the pilots in the context of a real classroom and under realistic conditions (for example, students wrote a research paper). The pilots intended to translate and integrate UM IL framework dimension(s) as well as the research recommendations into faculty courses. At this stage, information specialists and project members collaborated closely with the respective course coordinator to facilitate the pilot implementation. For the pilot execution, it was important to align the pilot activities with the course structure and flow. In one pilot, it was sufficient to add a short task to one of the tutorial meetings, as well as adding two questions to the final examination. See *Appendix C* for more information on this pilot.

*Where did we pilot?*
We piloted in five out of six UM faculties, which allowed us to account for faculty-specific differences and expectations. The pilots ran in both academic skills courses and subject courses. It was important to not only teach IL as a discrete skill (functional approach) but also practise IL to better grasp the subject content (situated approach). This approach is in line with informed learning, which emphasises that a student should use information in the context of learning about a topic (Bruce & Hughes, 2010).

**Evaluate**
In the evaluation phase, we analysed the pilot outcomes based on the assumptions we made and reflected on the initially formulated hypotheses. This yielded results about both the effectiveness and the limitations of such learning interventions in a course setting. The evaluation phase led to reflections on and insights into the opportunities and changes necessary to improve the instructional material. Such insights can be used to scale up the piloted learning interventions within the UM community.

In the evaluation phase, we worked closely together with teachers and students, and tried to gain insights into their experience. We used a mixed-method approach using qualitative (for example interviews, focus groups) and quantitative (for example pre-and post-test) measurements to collect data about the students' learning experience. One formative approach to assessment was the use of a learning diary, which showed students' reflection and progress in developing IL skills over time. The data collected gave us an indication of how the pilots affected students' knowledge, ability, and attitude towards IL. See *Appendix D* for more details about the learning diaries approach.

**Scale & sustain**
The final step of the development process is **scale and sustain.** Scaling implies the dissemination of project deliverables; during the project period, most activities have been tested within one programme. By scaling, we intend to disseminate these activities and ensure those project deliverables are implemented university-wide. Sustaining implies durable and lasting implementation within UM educational programs.

The goal of this project is to better integrate IL education within UM programs, instead of offering individual workshops on the topic. During the pilot period, teaching activities have been designed in such a way that they can be easily integrated within bachelor courses. Therefore, the next step is to go into the faculties and define 'how' these practices should be embedded in educational programs.

How will this be achieved? In the autumn of 2020, conversations will take place between the faculty vice-deans of education and the library management in which the 'how to' of the sustainable implementation will be discussed. The implementation approach will differ per faculty, as each faculty is organised differently. Nevertheless, the ideal outcome of these conversations is a clearly defined strategy as to how and where IL practices will be embedded within the respective faculty programs. For this, the right people must take part in these

conversations. Here, we would stress the importance of involving those who have the power and mandate to change the course content and/or are responsible for academic skills trajectories.

## 4.2 Online modules

While the pilots were aimed at experimenting with new initiatives regarding IL within the faculty programmes, the aim of designing online modules was to design specific online modules within the four dimensions (resource discovery, critical assessment, organising information, and creation & communication) and integrate these structurally within all bachelor programmes. Faculty teachers can implement these online materials into their course after consultation and with the support of information specialists.

**Development approach**
For the overall development of the online modules, we used the UM framework, which was the result of the **analysis.** Based on this framework, a rubric was developed (including clear ILOs) that formed the basis for the **design** of the modules. In addition, we designed a curriculum blueprint, which outlined the structure of modules, the delivery method, and the design principles. When this was finished, we went into **development**. By using module and slide plans, we structured the development stage, and provided the core team with the right information to start building the courseware.

In order to better cater to faculty needs, we decided to build micro-modules, each with their own difficulty level, that together form the four dimensions of the UM IL framework (see Figure 7 below). Every micro-module can be completed separately, and can consist of a generic part and discipline-specific parts, based on student and/or teacher needs. The internal module structure will look as follows:

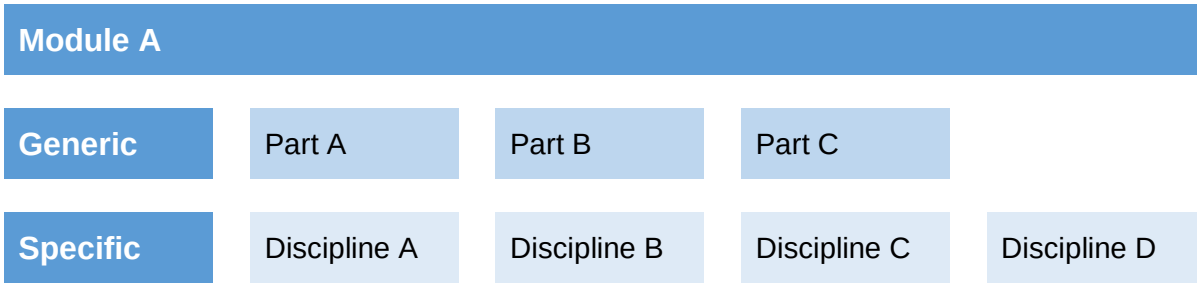


**Figure 7:** Online module structure.

**Implementation**
Access to the online content goes via ***discipline,*** as well as via the ***framework dimensions.*** The content is accessible via the Library website, and can easily be embedded into Canvas (the Learning Management System of the UM). We decided to split the framework into smaller chunks of micro-modules (as mentioned above). This makes it easier to integrate specific elements into (online) courses, for example embedded within a Canvas assignment. All modules are built with the same structure in mind, and participants receive a certificate of completion when finished.

At the end of the project, we developed micro-modules for each framework dimension, and work on these will extend into stage four: **implementation**. In the upcoming academic year, the information specialists of the University Library will talk with faculty programme and course coordinators about how to embed IL into their curriculum and courses. Concurrently with the implementation, we will evaluate and adjust the micro-modules accordingly. In this way, we aim to provide an up-to-date and contextual online curriculum that fits well into PBL education.

## 5. Implementation: Do's, don'ts, and don't knows

The project has delivered an evidence-based programme for IL education at UM. The next step is to ensure sustainable and structural implementation into faculty education. In this final chapter, we describe the Do's, Don'ts, and Don't knows that will inform the further uptake of the project outcomes.

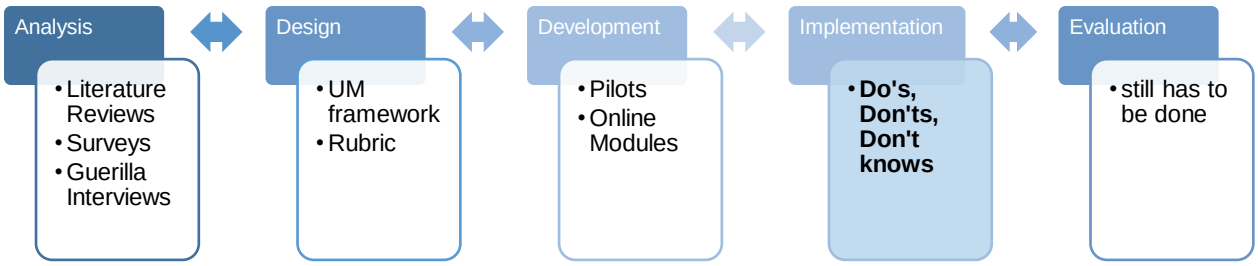


**Figure 8:** Flow chart depicting the ADDIE process with the fourth phase, 'implementation', highlighted.

### 5.1 Do's

**1) Ensure the sustainable implementation of the IL curriculum into faculty programmes and courses**

UM has a decentralised organisation. Therefore the University Library will have a conversation with each faculty to discuss the implementation of the IL curriculum.

**2) Make an inventory of IL practices in faculty programmes and courses**

Use the framework vision, rubric ILOs, and recommendations as guidelines for identifying IL practices at your faculty (curriculum mapping).

**3) Continue integrating IL skills training into Continuing Professional Development**

Several teachers indicated that they would like to receive more training in how to design and teach IL practices. Consequently, we recommend expanding the current offer of continuous professional development (CPD) related to IL education. As many institutes implement distance learning or hybrid models in the upcoming academic year, we advise thinking of alternative ways to inform teachers about IL topics such as online lunch lectures and other creative online formats.

**4) Continue building partnerships in IL between the University Library, faculties, and innovation education departments**

Institutionalising IL education costs effort and time. We recommend making IL skills education a joint effort between Library, faculties, and innovation education departments to create accountability and ensure sustainable implementation within the whole institute.

**5) Use Canvas as a tool to enhance IL education**

Naturally integrate the IL programme into UM's new Learning Management System, Canvas.

**6) Continue researching the needs and effectiveness of IL practices**

a. Identify the available data from past IL pilots and check if further analyses are possible and useful.
b. Assess and evaluate the impact of the pilot activities and online modules on students' attitudes and behaviour related to IL (that is, actual learning).

c. Examine new developments in pedagogy and didactical approaches for IL education (game-based, online learning approaches, etc.).

## 5.2 Don’ts

**1) Offer workshops/lectures about IL that are disconnected from the subject content**

Previous literature reviews at UM (Pichel et al., 2018; Jongen et al., 2019) argued that ‘one-shot’ workshops are inefficient in helping students to develop IL skills. Workshops that are taught outside the syllabus might be perceived as disconnected from the course subject by students and teaching staff.

**2) Copy the UM rubric ILOs into your course syllabus**

While the ILOs of the developmental rubric can be helpful in (re-)designing IL practices, they should not be copied into course books. As these ILOs need to fit into the overall programme vision, as well as the discipline-specific teaching and learning activities within the course manual, an adjustment of these ILOs for meeting specific programme needs should be considered.

**3) Create new IL activities without having an overview of what is already offered at your faculty**

Some programmes and courses already explicitly address IL throughout the curriculum. It is therefore not always necessary to change or add new ILOs or activities. First, a proper assessment of the needs and nature of the programme / course design should be conducted before adding anything new to it.

## 5.3 Don’t knows

**1) How to follow up on Information-Wise and maintain momentum?**

In order to keep up momentum, we suggest initiating projects at UM that follow up on the Information-Wise project. Ideally, these initiatives will build on the Information-Wise project outcomes and ensure further sustainable implementation.

**2) How will IL be implemented into faculty education?**

The University Library will meet the vice-deans of education in autumn (beginning of Academic Year 2020/21) to reach agreements and formulate a plan for further scale up of IL education in faculties.

**3) What will the programme look like for master's and PhD students?**

The Information-project resulted in an IL programme that forms the basis for master’s and PhD programmes. The further development of IL for master’s and PhD students should continue in close cooperation with the research support team of the University Library as well as faculty stakeholders. The existing UM IL rubric could be expanded to account for the expected level of master’s and PhD students.

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# 6. Appendices

## Appendix A) Table giving overview of IL Pilots.

| Pilot | Faculty* | Programme | Year | Dimension** | Recommendations*** |
|---|---|---|---|---|---|
| **Learning Diary** | FHML | Health Sciences | BA year 1 | RD, CA, OI, | 1,2,3,4 |
| **Workshop Searching & Referencing** | FPN | BA Psychology | BA year 2 | RD, OI | 2 |
| **Assessment Rubric** | FSE | UCM | BA year 1 | CA | 1, 3, 7 |
| **Bullshit Lecture** | FSE/FPN | UCM/ BA Psychology | BA year 1 & 2 | CA | 3 |
| **Critical Assessment Online Tutorial** | FSE | MSP | BA year 1 | CA | 3 |
| **CRAAP-test** | SBE | Fiscal Economics | BA year 1 | CA | 3, 7 |
| **Digital Detox Workshop** | SSC/Library | Available for all faculties | All Years | CC | 6 |
| **Self-Assessment Rubric** | FHML | Biomedical Sciences | BA year 1 | RD, CA, OI, CC | 1, 2, 3, 4 |
| **Search Planning Form** | FL | European Law | BA year 1 | RD | 1, 2 |
| **CPD Workshop** | All faculties | Available for all faculties | All years | RD, CA, OI, CC | 8 |
| **IL Game** | All faculties | Available for all faculties | All years | RD, CA, OI, CC | 6 |

*FHML = Faculty of Health, Medicine, and Life Sciences, FPN = Faculty of Psychology and Neuroscience, FSE = Faculty of Science and Engineering, SBE = School of Business and Economics, SSC = Student Service Centre, FL = Faculty of Law, CPD = Continuing Professional Development
**RD = Resource Discovery, CA = Critical Assessment, OI = Organising information, CC = Creation & Communication
***1 = Encourage self-directed learning, 2 = diversify resource strategies, 3 = increase focus on critical assessment, 4 = organise information beyond reference tools, 5 = scaffold support in creating & communicating, 6 = support various formats, 7 = authentic assessment, 8 = include in CPD

## Appendix B) Case example: Co-designing IL teaching activities (FSE)

Project members from the University College Maastricht (UCM) intended to put more emphasis on the Critical Assessment dimension in their course *Academic Skills Introduction II*. The information specialist liaison for this faculty and a member of the core-team wrote a proposal for including IL ILOs and activities into the course book. They followed the constructive alignment approach, which indicates that new teaching activities need to match the intended learning outcomes and assessments of the course.

As such, the pilot team decided to adjust and incorporate the UM rubric ILOs into an existing grading rubric, which assesses students' performance in writing a research plan. Based on these ILOs and assessment criteria, the team designed a lecture on 'bullshit' that provided explanation and tips on how to identify misinformation and biases in online environments. Next to that, the course coordinators created an assignment in which students had to read and critically assess an academic journal paper, and thereby apply the knowledge they acquired from the lecture. Finally, because of these activities, it was hypothesised that students would improve their ability to evaluate the quality of sources and select the most appropriate sources for their research plan.

## Appendix C) Case example: Pilot in first year course at Fiscal Economics bachelor programme (SBE)

In the first introductory course of the Fiscal Economics Bachelor programme at the School of Business and Economics, students deal with academic and non-academic sources. In period 1 of Academic Year 2019/2020, an IL pilot was aligned with the course structure to support students in comparing the quality of different types of sources. In a collaborative process, the course coordinators and the information specialist designed a new task to achieve this aim. In this task, students had to re-evaluate some of the course sources in order to understand their differences in quality and to gain more insight into the usefulness of available sources. The approach used for this evaluation was the CRAAP-test. The CRAAP test is designed to check the currency, reliability, authority, accuracy, and purpose of various sources. To ensure constructive alignment of the teaching activity, a question regarding the application of the CRAAP test was included in the final examination. Since the added task and exam question were situated in the course syllabus, it was not much additional work for the course team to integrate the IL activities.

## Appendix D) Case example: Evaluating learning diary pilot at Faculty of Health, Medicine and Life Sciences (FHML)

In the first year of the bachelor programme Health Sciences (FHML), students need to produce a written assignment. As well as writing, students need to find at least two additional (academic) sources in the Online Library and explain their systematic search strategy. In the first weeks of the course, students receive training in systematic literature search and EndNote provided by the University Library. The pilot team included IL related prompts (that is, a learning diary) with the reflection assignments, where students could position their learning from the library workshops and assignments within a personal perspective. The students wrote three diary entries over a period of three weeks, answering a set of reflective questions related to their search, evaluation, and organisation of sources. We hypothesised that by employing a reflective diary, students would become more critical towards the information they use and would select appropriate sources based on their information need.

In order to capture the learning progress of the students, we analysed the learning diaries both quantitatively and qualitatively. We used SPSS (statistical analysis) and ATLAS Ti (coding) for

this analysis. Preliminary results from the qualitative analysis indicated that students who actively used the learning diary showed a more critical attitude towards the information they used and selected appropriate sources based on their information need. Nevertheless, the statistical analysis did not yield any conclusive or significant results. We identified two main reasons for this. First, some students filled the diary at a later stage and had therefore already received IL training when completing the pre-test week. Second, all students received a library workshop on systematic literature search before the pre-test was conducted and hence had acquired pre-existing knowledge of IL. To gain more insights, we conducted a focus group with the mentors who assessed the students' writing assignments. From the input of the mentors and the analysis, we concluded that learning diaries are most effective as a mandatory part of the course (during the pilot period, they were voluntary), as input for feedback between students and mentors, as well as part of the final assignment.