A Learning Module for BA students to Develop ICT Skills for their Learning Activities

Un module de formation visant le développement des compétences TICE chez les étudiants en baccalauréat

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Abstract

This case illustrates the process of developing a learning module to support BA students in their use of ICT (Information and Communication Technology) tools in their learning. At the university where this case occurred, the skill level of ICT use among students in a learning context was very heterogeneous. The E-learning Competency Centre, or ECC, which was in charge of techno-pedagogical development at the institution, created a hybrid learning module that offered students learning materials and activities with both face-to-face workshops and online tutorials for autonomous learning. The students were able to choose subjects they wanted to learn "à la carte" by taking tutorials on their own and/or by participating in face-to-face workshops. The module described in this case is currently under construction. The design phase of this project is the focus of this case study.

Keywords: Higher education - ICT in a learning context – Transferable skills - Hybrid scenario - *À la carte* modules - Design

Institutional context

Case participants

- **Omar** is a techno-pedagogical adviser (instructional designer or ID) in the E-learning Competency Centre at Mid-Range University (MRU).

- **Renée** is a techno-pedagogical adviser, ID, in the E-learning Competency Centre of the partner university (Mountain High University, MHU) in a Personalised Learning Environment project.
- **Dr. Markus Villeroy** is a Vice-President of Mid-Range University (MRU).
- **Maria** is a lecturer in charge of the "ICT in a Learning Context" pilot course.
- **Hélène** is a multimedia producer at the MRU E-learning Competency Centre.
- **Diana** is a 2nd year undergraduate student.
- **John** is a 1st-year MA student.
- **Luca** is a PhD student.

This case had a particular configuration with regard to its case participants. First, the ECC staff who were involved in the project played dual roles: techno-pedagogical advisers and lecturers. Second, a national project, *Personal Learning Environment* (PLE), was launched to deal with student ICT issues that impacted several universities. These universities were organised as a network through their e-learning competence centres, making the development and implementation phases of this case possible. Furthermore, the participation of staff and faculty from several e-learning centres allowed for varying points of views about these issues, depending on the specifics of each institution.

The case analysed here dealt with the design of a learning module supporting BA students in their use of ICT tools. The case took place in a European university, which has 10,000 students and offers mainly on-campus courses. The case involved IDs who work in the E-learning Competence Centre (ECC) of Mid- Range University (MRU). This centre was created about 15

years earlier and included five staff members with computer science and educational science skills. It offered support for regular and adjunct faculty members who wanted to use ICT in their courses. The Centre participated in the design and implementation of an E-learning strategy at MRU, in which the ICT use mainly supported hybrid courses, alternating between face-to-face and online, and "enhanced classrooms," that is, classrooms equipped and networked with educational technologies (Draper, Cargill, & Cutts, 2002). MRU used Moodle as its Learning Management System (LMS) for 500 courses each semester.

> Omar (ID): *"Over the last few years, a change in our activities has steered us towards the development of services that directly impact students. There are also more and more inter-university projects for services and tools linked with e-learning."*

The context

Omar was thinking about ECCs, like the one where he worked, and their specifics, which aimed to create a favourable context for the development of cases, similar to the one presented here.

> Omar: *"ECCs like ours have a lot of experience in the design of hybrid courses and expertise in many subjects dealing with uses of ICT in a learning context. The staff at the centre have academic backgrounds, either PhDs or MAs in education or computer science, and have specialised in technology for learning and teaching. In order to develop and implement training, other experts in various fields are also involved, both from our university and from our project partners. When these experts intervene, ECC staff assume their usual role as instructional designers, or IDs, focused on helping with the implementation and evaluation of computer apps, which facilitate learning activities. There are other experts, too, quite often from our libraries, who are in charge of training about information literacy and scientific information retrieval. Other experts include faculty members who, as professors or lecturers, are responsible for methodology in courses and seminars in various curricula (literature, education, etc.)."*

Omar was also aware of his role, as an ID at an ECC at the institutional level. As such, his role involved the ongoing task of creating a dialog about e-learning at his university with

administrative staff and academics alike. At the university, there were staff working out of the President's office, who were in charge of answering teaching questions and supporting (?) the Deans. These staff looked at e-learning from a more global point of view than the ID. Omar knew that these multiple points of view allowed for a systemic vision of the innovation opportunities, as described by Peraya and Viens in 2005, in a case similar to the one analysed here.

Facts: The design steps of this case

Beginning of the case

The idea of developing a learning module on educational ICT came to Omar and his colleagues after the subject had arisen several times in discussions at the ECC among staff members and lecturers and faculty at the University.

> Maria: "*Proficiency in the use of computer software is very heterogeneous among students. Some students are very good at using ICT in a learning context while others struggle. This is very clear when students are involved in learning activities during class. Furthermore, the computer help desk assists students in solving common problems with regard to the use of their university accounts, password changes, installing software, network connections, etc."*
>
> Omar: *"It's true that there still aren't any internal resources at the University to help students when they start studying here; there's nothing to help them improve their ICT skills for learning tasks. Currently, each department is responsible for courses dedicated to academic work, including the use of ICT. Methodological courses, namely to support the development of writing skills for BA students, do exist in some curricula. This concerns, in fact, all of the transferable and generic competencies of which Rey spoke in his 1996 book."*
>
> Maria: "*I agree. I read an article by Brougère and Bézille, from 2007 I think, where they show that students largely master such competencies informally. We should offer them more organised resources as soon as they begin their undergraduate studies."*

Hélène: "*There is a section in Carré's 2010 book that could help us create the resources that provide students with the opportunity to teach themselves in a self-directed learning setting. This could be done in workshops or in a hybrid environment. It is important to use both online resources and face-to-face gatherings. This should be the core of our training module so as to best respond to the needs of our heterogeneous public."*

Analysis: student needs

Concerned by these observations, Omar and his colleagues began to analyze student ICT skills in a learning context:

Maria: "*Among students who use ICT (software and web tools) in their private lives, many don't transfer these skills to learning activities. They all tend to know how to use word processing software like MS Word but they don't always master basic tasks such as inserting a picture or creating a table of contents (TOC) using Word's TOC function. On top of that, they often lack relevant knowledge of new tools, such as Web 2.0 tools, and the possible advantages these might bring to their university studies. For example, bibliographic management tools, such as Zotero and Mendeley, or social media networking and collaboration tools are literally unknown to them or perhaps, simply ignored."*

Omar: "*May I propose we begin by identifying student ICT training needs more accurately? Let's look at what's in the literature, but let's also get concrete examples from students via interviews. For instance, we could ask them:* What learning tasks are the easiest to master and which are the most difficult? Describe how you do these tasks. What kind of help or training do you need? *I think these two sources of data, from the literature and from interviews, will be helpful throughout the project."*

***A parte*: it's an ICT generation, but not when it comes to learning**

A review of the literature by the ID and design team quickly highlighted the need for a training module on using ICT for learning. The review confirmed that ICT proficiency is an inescapable factor in success in higher education and in the transition to professional life (see Verhoeven, Heerwegh, & De Wit, 2010). The review also confirmed that young adult students have little knowledge of the ICT competencies expected from them in higher education (Ramanau, Hosein

& Jones, 2010; JISC, 2009). It also showed that the current generation of students, entering higher education, are not a homogeneous population with regard to experiences, preferences, or ICT skills in a learning context (McKeachie & Svinicki, 2010; Jisc, 2009; Seusiss, 2003). It showed furthermore that there are multiple realities, or even a digital divide between experienced ICT users and less experienced ICT students (Réjean, 2009). This convinced the members of the ECC of the usefulness of such training.

Omar: *"Based on the competency frameworks described in the literature, we can begin to clearly identify and structure the learning goals for our training. We could especially use the work done in 2011 by Platteaux, Foerster, Luethi, and Hoein."*

Hélène: *"Right! They provide us with overall goals, focused on student tasks. And a skill like* "mastering an information search" *is always linked to recent ICT tools developments in a learning context."*

Omar: "*Speaking of tasks, I also thought about how we could clarify our vocabulary. I think that the lexicon of Célier – published in 2007 – conveniently establishes the differences between tasks, activities, and actions. And the glossary written by Henry and Cormier in 2006 shows the distinction between learning situation and context."*

Between analysis and design: taking part in an inter-institutional project

For Omar, it was clear that there was work to be done. While this internal project was shaping up, it seemed to hit some roadblocks, such as a lack of human resources. The desire was there but the project was an added workload to the already full agendas of his colleagues, and it was difficult to get the project moving. Over the course of several months, Omar postponed starting the production phase.

Hélène: "*We have a big problem. We don't have enough manpower to complete the learning needs analysis, develop the corresponding training storyboard, assemble and produce the contents and activities, and design and create the resources and documents for the contents and activities to set up the training."*

At that very moment, a solution seemed obvious to Omar, who had an ID colleague, Renée, working at another university. Omar called Renée.

> Omar: "*Hello Renée. I heard that your university ECC had the idea for an inter-institutional project on the Personalised Learning Environment (PLE) and that you are looking for partners."*
>
> Renée: *"Yes, we want to develop and set up technical, conceptual, and instructional means to help students start thinking about what ICT could do for them, to build and/or improve their personal learning environments."*
>
> Omar: *"That is very interesting. We have a project here, which is currently in-house, that aims to evaluate student needs for training documents, both pedagogical and academic, and to design training scenarios to answer these needs. We could broaden this work with you."*
>
> Renée: "*You could also evaluate some of our pilot courses to assess the validity and the relevancy of our innovative practices, with the ultimate goal to improve them."*

So it was decided. The two ECCs agreed to collaborate. Omar discussed the project proposal that he and Renée had just written with his colleagues.

> Omar, after having co-written the proposal: "Me and *my colleague, Renée, at the MHU ECC, have just finished writing the project proposal to submit to a national E-learning development fund. The project has a software development component, which aims to develop a PLE tool, and an educational aspect, which aims to familiarize students with the PLE concept and improve their use of ICT in a learning context."*
>
> Hélène: "*That's great! We can address our pedagogical concerns about using ICT skills in a learning context. And, at the same time, we can achieve the overall goal of developing a PLE, which is both a tool and an individual mental construct; this fits very well with our thinking on the tool-task-learning sequence."*

Between the needs analysis phase and the learning tasks design phase

Omar just got the good news: the project had been accepted. To continue developing the training, the team decided not to start with the ICT tools but rather with the tasks that students had to complete during their studies. For Omar's team, it was also time to define the main goals of the training, which included the additional benefits that ICT mastery, in a learning context, could

bring during the performance of these tasks. They drafted a scientific report to explain the needs of undergraduate student training in using ICT in a learning context, describing 10 documented learning tasks, and presenting the «Information search» task in the form of a course description. Omar then went to see the Vice-President in charge of Teaching and the Dean of a faculty partner to discuss the project. They identified the broader needs of the university, which was a valuable contribution to the design of this project.

> Omar: "*Good morning Dr. Villeroy. I would like to tell you about our project and discuss the need for the "ICT* in a learning context*" training modules we're proposing in order to better target our undergraduate population and set up the best ways to integrate these training modules into the undergraduate curriculum."*
>
> Dr. Villeroy: *"I agree that training modules on transferable* ICT *skills for undergraduate students are important. However, I don't know if adding them across the board to the curriculum is the best solution. Maybe workshops offered between terms would also highlight this service, which might otherwise get lost in the mass of courses offered during our regular terms."*

Design: task documentation

To begin the second phase of the project, Omar's team focused on one task at a time and put together the learning resources required for each of them (see Figure 1). First of all, the team had to decide what these resources would be.

Figure 1 **The learning resources for the task "Write a document"**

Figure 1 shows the beginning of the resource "Document writing" where an explanation of the purpose of the task was provided: "*Writing documents is a task that you will do many times, as for summarizing a text, compiling reading notes, writing an essay, a report or a research work (such as seminar work, MA thesis, PhD dissertation). Quite often, such a writing task comes after an information search. To choose the adequate tools for writing...*" In the lower part of the Figure, there are links towards a "Scenario" describing all of the different steps in a writing task process and a "*Comparative tools table* "is provided to help students choose the best tools for the job (text editors, note-taking tools, text correctors, bibliographic managers, etc.).

Omar: *"We should document each learning task by identifying each step and determining how ICTs can help students perform them."*

Hélène: "*We can explore websites, training resources, and chapters on methodology in books dedicated to these tasks. This way we could produce the learning resources for each task. It'll take a while, but it's worth it."*

Renée: *"Why don't we also write an article together, to clarify the PLE concept? We could go further into the work done by the Moccozet group in 2012."*

Omar: "*And we really need to help students reach a meta-level on transferable tasks. By that I mean - not just learn how to manipulate and use a tool in a task, but also learn how to find and choose a tool, try it out, and to develop one's own toolbox. So we will add the following task in the training module list:* Your use of ICT in a learning context: Choose, try out, and select your ICT-tools to be used in a learning context*."*

Development: creation of training scenarios

After deciding they needed to document each task, Omar's team had to define the contents and the form of the documentation and training resources.

Hélène: "*I suggest different development principles for the training resources linked to the tasks. First of all, we need to create resources that facilitate self-directed learning: multimedia training scenarios, structured around the steps of the task, with practical tips, links to further resources, and activities allowing for completion of the task. It is in these activities that we will integrate the use of ICTs, at the very moment where their use facilitates the work to be done for the task. We have a first example (See Figure 2). We also need to offer a scenario, divided into tasks, to allow students to train for the use of a specific ICT tool when needed, that is, when the student has a task to carry out in his/her own program. It would be better if students entered the task «Information search>> when they began such a search for a seminar. In that way ,they will have a concrete and contextualized task to work on, as described by Herrington and Oliver (2000). At the end of the process, the students will also have a result that can be directly injected into their curricula (the documentation for their seminars). We should also produce documents in SCORM format, to allow for transferability to other institutions and learning platforms."*

Maria: "*Alongside the self-learning scenarios, we will also offer training workshops for undergraduate students. We will use the same resources we produced for self-learning. However, it will be difficult to synchronise the scheduling of the workshops with the students' courses."*

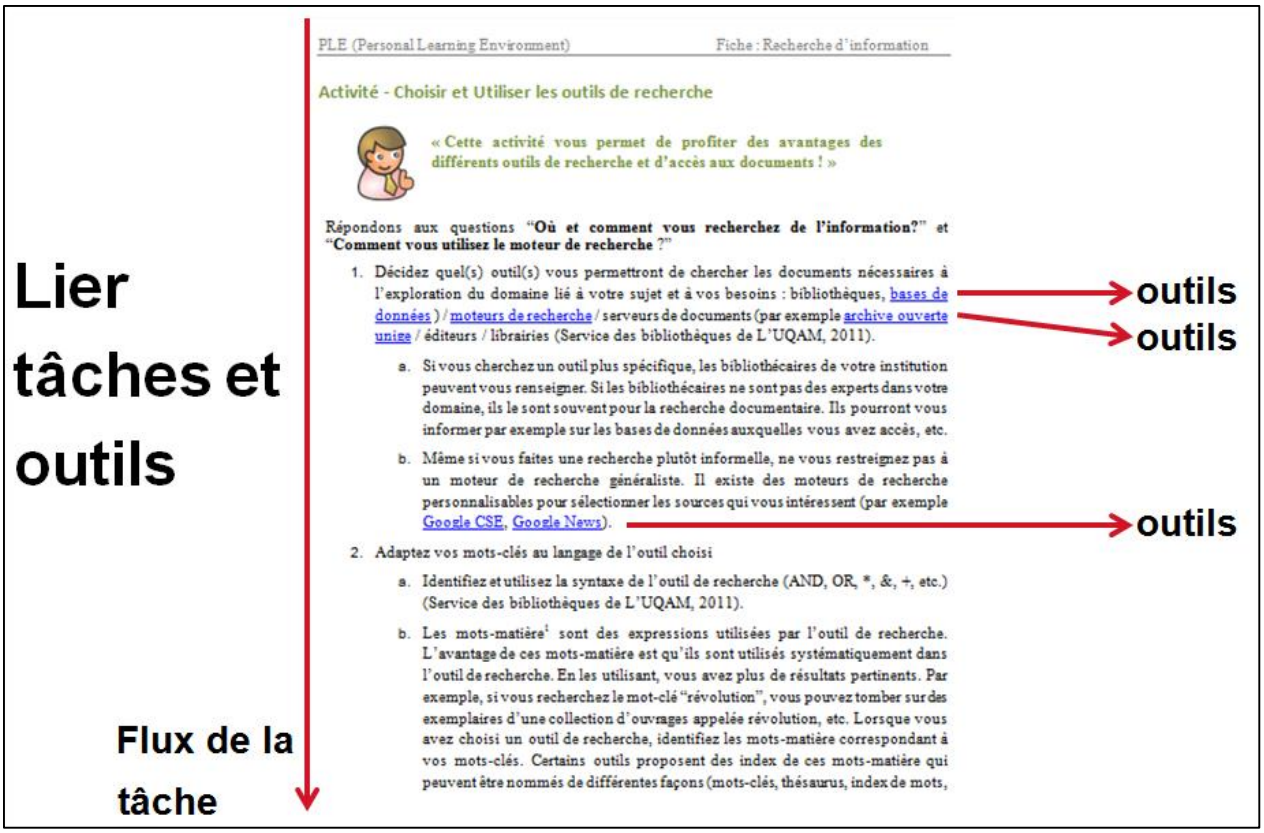

Figure 2 **Flow of a learning task and links with tools**

Figure 2 shows the structure of the scenarios that provides a link between tasks and tools. By reading a scenario, students follow a task flow. For instance, when they open *Document writing*, they find the successive steps to be carried out with descriptions and advice.

Validation, test presentation and student feedback

After creating a first version of the resources for a task, an evaluation process began so improvements could be made.

Omar: *"In the PhD training workshop that we're organising in the PLE project, we'll be presenting a scenario model."*

Renée*: "These advanced students will certainly give us some quality feedback, as they have already developed a good working method using ICT intensely. That*

reminds me of the Studio experience, described by Clinton and Rieber in 2010. They described the scenario of a complete training program about educational multimedia. We could find some ideas there."

Luca (PhD student at the university during the workshop): "*I think we should add some tables comparing different tools for each tool category: word processors, bibliography management, etc. It would also be nice to have a place somewhere to share and discuss issues, like on a learning platform for creating one's own PLE, like Graasp, as described by Li and colleagues in 2012."*

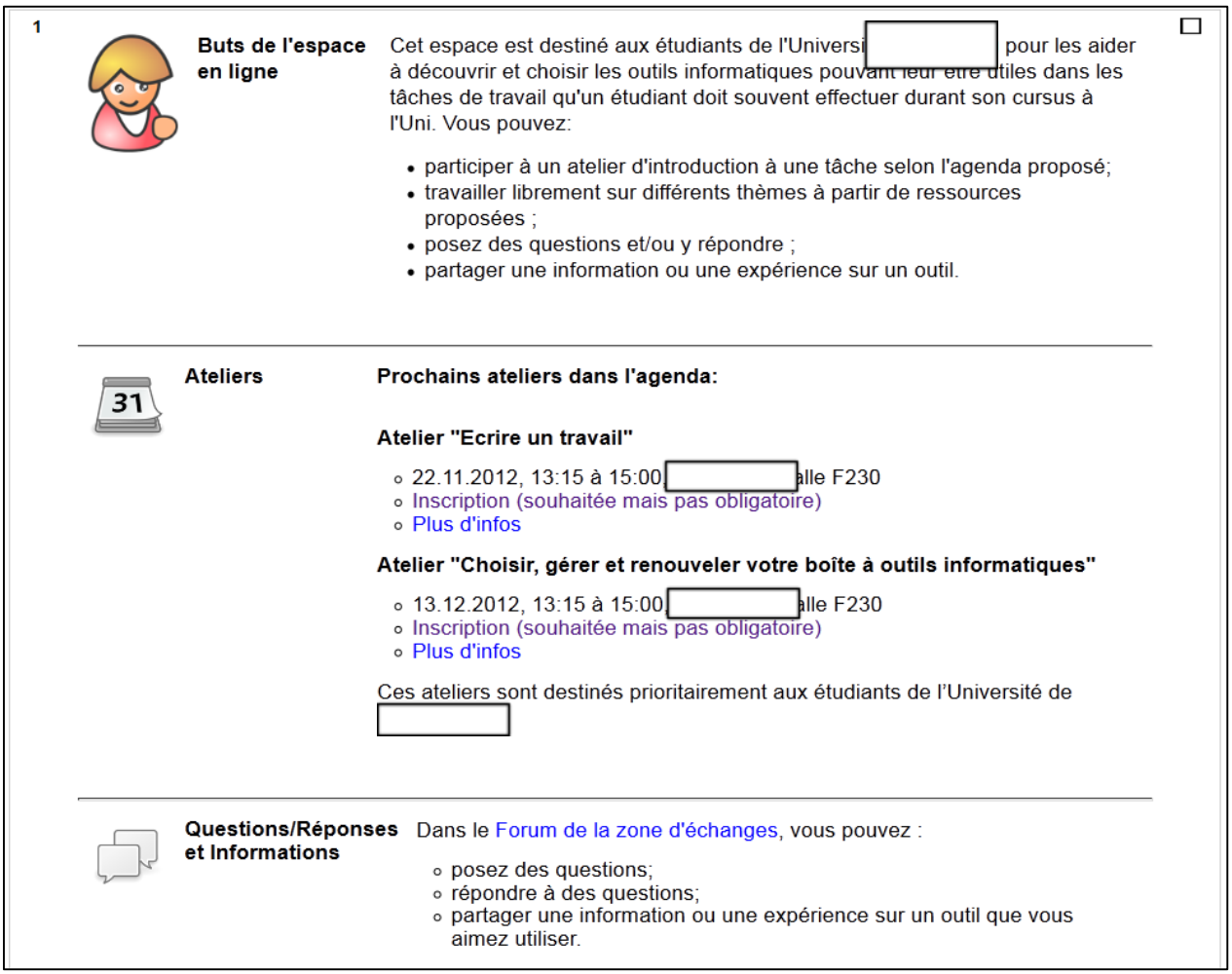

Figure 3 **Global structure of a module**

Figure 3 explains the main points of the online resource space. First, the aims are presented as a training proposal: students are invited to register for various thematic-module workshop sessions, or to interact about questions in a forum, or to use the online free access resources to develop their tool box and learning methods. Then the web page presents the next scheduled workshop sessions.

Design and definition of the global scenario for modules

Omar was a happy camper. Alongside the creation of training documents for the tasks, the global scenario of the module was designed (See Figure 3). He decided to do like Platteaux and his colleagues who, in 2012, explained how the feedback collected from discussions with students allowed to design a strategy for an "a la carte" hybrid training.

Omar: *"After an introduction of the module, which illustrates the process and the different tasks, our training can be structured according to workshop scenarios, each focused on a task: searching for information, writing a document, doing an oral presentation, etc. The overall learning goal of this training is the development of a personal approach for each student building his or her personal PLE. Students can decide which tasks they want to deepen their knowledge of and how they wish to do so: either through self-directed training using the documentation or via face-to-face workshops."*

Hélène: *"As for the online part, a shared online space is available and monitored by instructional designers so Omar, Renée, and you can all get access. Each semester, workshops are given if the number of enrolments warrant them, while also respecting the team's limits".*

Implementation, evaluation, validation and improvement

In the autumn of 2012, Omar and his colleagues opened the first workshops and their self-learning scenarios.

Hélène: *"These resources are delivered within a Moodle course, on the university LMS, which can be accessed without a password. The platform is also used as a*

discussion forum about ICT in a learning context, and for the workshop enrolment."

Maria: *"Information leaflets are distributed to students arriving at the University, and information sessions about the modules are organized two weeks after the term begins. Announcements are also made in different undergraduate courses in different fields of study."*

Omar: *"When the module is launched, it will generate the first results of a formative evaluation of the process and its products. Validation and improvements are the keys to this launch phase."*

Main design, theoretical and practical problems encountered

Since the beginning of the project, ongoing discussion and reflection about the implemented methodology occurred among the stakeholders of the project. Omar and his team identified some important elements that emerged, which showed the complexity of the design-production process of this hybrid training.

ADDIE steps and schedule overlapping

An essential point that Omar wanted to recommend related to the "*Instructional design*" process (Gagné, Briggs, & Wagner, 1992) as an e-learning project methodology. While managing the steps of the project using the ADDIE approach (analyse, design, development, implementation, and evaluation) (Branch, 2009; Gustafson & Branch, 2002), his team and partners knew that these steps didn't occur in a linear fashion, as the ADDIE model may have suggested.

Maria: *"I remember an analysis from Platteaux and Hoein in 2010, showing that students aren't always convinced of the importance of the contribution of ICT to their daily work as learners. We can consider this element in the design and development of the scenarios of each task: each scenario begins with a justification about the usefulness of what is proposed."*

Omar: *"Implementing the ADDIE steps one after the other can help in the beginning, in order to structure the workflow of a project. But after that, it can be misleading; the steps will often overlap over the life of a project."*

Renée: *"In the design process that we apply, we often have to juggle linear and non-linear aspects. This is a main difficulty. "*

Hélène: *"Let's try to keep in mind that the conceptualisation of some aspects are transformed when faced with development constraints, and this lead to new ideas. I found a 2007 presentation in which Pappas presents the process of the ADDIE model as a cycle, not as a straight line."*

Renée: *"In our case, the ADDIE steps are completely interlinked. Do you remember the meetings/interviews we had with the students during the analysis phase? They actually took place throughout the project and overlapped with the design and development phases."*

Hélène: *"You're right. We can't wait for all these interviews to be over to begin defining the main points of the design and developing the prototypes. If these interviews are thought of as the basis of the design phase, they are actually used more as evaluation-validation elements. "*

Omar: *"Moreover, we cannot lead our project by applying only a methodological approach like ADDIE. The people in charge of the educational development of an e-learning project must, at times, promote their innovations, acting in their institutions at a much less "micro" level than the targeted course or training. Some of the IDs even become project managers and seek human and financial resources to be able to finalise the design and implementation of the training."*

The role of transferable skills in the curriculum

Multiple factors intervened when Omar and his team considered how to deploy training on transferable competences in the university: What skills? For which students? Which training modes?

Maria: *"Skills and proficiency levels are very heterogeneous among our students. We have to identify the skills they consider necessary, those that motivate them, and those for which they are willing to invest some time."*

Omar: "*There is great variety in the frameworks for ICT skills development in a learning context, as described in the literature. The number of frameworks and their differences (wording and definitions of skills, groups of skills) makes it difficult to rely on these frameworks to design training. If we decide to start from the tasks*

that students have to do during their academic careers, instead of starting from the tools, the frameworks become more useful."

Renée: *"The complexity also exists in the multiple points of view that abound with regard to the development of transferable skills in universities. They are simultaneously considered as optional in degree courses and as learning fundamentals necessary in today's world. Acquiring working methods and tools is becoming more and more important at university."*

Maria: *"In a survey from Dell'Ambrogio, Rinaldi, and Strassen conducted in 2009, the transferable skill "using common ICT tools" is targeted by students. But, in the field, organising a training module is slowed down because teaching is still strongly centered on the transmission of academic content."*

It was mainly a matter of "*developing learning strategies that are necessary to continue studies with a high degree of autonomy*" (Projektleitung, & Bologna-Koordination (Eds.), 2012, p. 67, translated), according to the Dublin descriptors presented in the *Recommendations* of the national conference of university rectors for the coordinated renewal of undergraduate studies in national "specialised academies" (*hautes écoles* in French), within the Bologna process.

Evaluation: first results

Omar regretted that only a few students took part in the two workshop briefing sessions that were organized to present the first module. Omar recalled the remarks that were made, mainly about the scheduling of the module:

Diana (undergraduate): *"We did not see the announcement in the leaflet that we received. Two weeks after the term starts (September 2012) is maybe a little early. Everybody is still deciding their electives."*

Omar: *"But January or February may be too late? "*

Diana: *"Maybe. But sometimes you have to hit a brick wall before convincing yourself that such training is important."*

John (a first-year undergrad)*: "I know now that it would have made my life a lot easier."*

But Omar's team remembered that another activity, which took place with different students

during other brainstorming workshops got good results. Students had to describe the steps they took and the tools they used to accomplish two tasks they considered important, one they mastered, and one they struggled with.

Maria: *"These descriptions give a great deal of interesting data to analyse student competences and to design learning activities. An ongoing analysis focuses on the following questions: When are ICT used to learn a task? What benefits do ICT tools bring to the task? Is the starting point the task or the tool? To what extent are students aware of the importance of using ICT to learn? Where are the problems? Do they differentiate between the steps of a task that they master or don't master? What is their degree of engagement in the task?"*

Omar: *"These workshops highlight how relevant these issues are to student learning. They allow students to think about their learning strategies and allow the ID to play the role of a tutor, or to find good examples of practice to show to the other students. But, in the meantime, in the current state of the module, the workshops also generate questions about evaluating ICT skills in a learning context: which criteria should be added to the evaluation grid to correctly assess a student's way of completing a task?"*

Temporary conclusions

After this first completion of the ADDIE steps, Omar was more and more convinced that the development of ICT skills represented a real need in universities because both students' studies and their future workplaces continually require them to make better use of computer-based technologies.

Omar: *In the hybrid training mode, which is more and more common in universities, professors and students are active participants. If we want to have more autonomous, participative and performing students, we need to make sure that they, as well as their professors, are able to benefit from the ICT tools they have at their disposal. The sooner they begin developing these learning support skills, the sooner they will be able to benefit from them to build solid skills in their field.*

What is the best way for them to develop these transferable skills? In the case presented here, Omar's team suggested to do this in an "à la carte" fashion.

Maria: *"Time will tell if this initiative gets the attention of students in different fields of study. We will also know if more incentives are needed, such as ECTS-Credits*[1]*, certifications, etc."*

Renée (ID): *"In the field of generic and meta-cognitive skills development, similar to our ICT skills in a learning context, Allan and Clarke (2007) identified some do's and don'ts: 1) DON'T offer a weekly course module for just a a term or two 2) DO offer a shorter, credited module for a more effective learning experience; 3) DON'T use activities that are embedded in another course, as they lack flexibility."*

Omar: *"A lot of other questions are still unanswered. How do we evaluate and certify the developed skills, or student proficiency in carrying outs tasks? What self-evaluation options can be suggested to students during self-learning activities and workshop choices? And, digging a little deeper, what skill levels have to be distinguished? The answers to these questions would allow us to validate a student workshop, help students choose the right workshops for their needs, or validate their self-learning processes. Other questions arise concerning teaching resources. The task description should allow us to identify the steps in task completion. Transforming these descriptions into a learning scenario implies the creation of activities that allow students to train and to master the different steps inherent in a task. Learning a task will require a lot more time than executing the task once it is learned. This learning time can also vary between students, based on their needs. Will our training be able to adapt to these pedagogical differences? And will it allow for the development of a personal learning environment?"*

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[1] ECTS: The "European Credit Transfer System » is conceived a system of credits, with a harmonization at a European level, and its implementation was one of the key factors for a transparent and flexible higher education European space." (cf. http://www.crus.ch/index.php?id=515&L=1, translated)

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