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# MakeITeasy: guiding higher education actors to take ownership of the development and strengthening of their digital skills

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**Abstract**

The MakeITeasy platform is the backbone of the University of Geneva's "Digital Skills" institutional project. The objective of the system is to allow the actors, students, teachers, researchers, administrative and technical staff to develop and strengthen their digital skills. It is a matter of allowing individuals to evaluate themselves to self-regulate. The design of the platform is organized around a framework of digital skills, which is based on the DigComp framework of the European Commission and the Digital Capabilities Framework of JISC. The MakeITeasy platform is organized around four components: 1) a self-positioning test, allowing people to situate themselves in the reference framework; this test produces 2) an individual digital skills profile, which offers then to compare oneself to 3) target profiles to be reached; and finally, 4) a recommendation system which lists training courses to fill the gaps in one's skills. The platform is currently being developed for the students, doctoral students, and teacher populations. The self-positioning tool covers the generic competencies of the reference framework in its entirety while being as concise as possible so that it can be completed in full. The questions are based on occupational situations because the context to which they are attached makes it easier to assess the mastery of the skill by different categories of members of the university community. The tool presents the same generic competency at least three times in different scenarios and uses the responses to the three situations to decide the level of mastery. The test situations and questions as well as the entire platform were evaluated by various user tests.

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# 1 Introduction

The issue of digital skills is the subject of much work and development in the higher education sector. As Sparks points out, “because DIL – Digital Information Literacy – skills are important for professional and academic success, higher education institutions should consider the extent to which their students possess these skills yet also recognize that the construct of DIL reflects the coordination of cognitive skills, thereby extending beyond the ability to use specific technologies for their own sake.” (2016). This insight can be extended to all populations in the academic world: teachers and administrative and technical staff. Many works focus on tools to position students mainly (Marín & Castañeda, 2022; Sillat et al., 2021). Few propose complete systems to support the training of target audiences to skills (Bancal & Dobaire, 2022; Borrás-Gené, 2018; Meyer et al., 2021). Ulfert et al. (2022) provide a systematic overview and comparison of existing measures of digital self-efficacy (DSE) to current theoretical digital competence frameworks. They conclude that “the majority of scales have been developed for specific contexts or groups, especially in the educational domain. In our review of the literature, we found that DSE – Digital Self-Efficacy – scales were primarily targeted at high school and university students and were often device- or software-specific rather than function-specific.”

In this context, the MakeITeasy platform is the backbone of the University of Geneva's "Digital Skills" institutional project. The final objective of the system is to allow the actors, students, teachers, researchers, administrative and technical staff, to orient themselves to develop and strengthen their digital skills. As recommended by Bachy (Bachy, 2021), it is a matter of allowing individuals to evaluate themselves to self-regulate. The design of the platform is based on a framework of digital skills (Ortoleva et al., 2022) which is based on the DigComp framework of the European Commission and the Digital Capabilities Framework of the JISC. The MakeITeasy system is organized around four components: 1) a self-positioning test; 2) an individual digital skills profile; 3) target skills profiles; and finally; and 4) a recommendation system which lists training courses to fill the gaps in one's skills. The platform is currently being developed for the students, doctoral students, and teacher populations. In the rest of the article, we first present the direction taken for the development of the platform considering the state of the art in the field and the constraints imposed by the local context. The global design of the platform is then presented, followed by a detailed description of each of the platform's components. We then proceed to a presentation of the results of the evaluation and user tests before concluding with a discussion.

# 2 Direction taken according to related works

There are different approaches to assessing an individual's digital skills, ranging from a simple MCQ to simulation environments (Bartolomé et al., 2021; Mattar et al., 2022; Sparks et al., 2016). The validity of the results is of course variable depending on the devices used, but also on the context in which the assessment is conducted. Mattar et al. (2022) identifies four types of assessment tools: by direct knowledge; by self-assessment; by scenarios; and by performance. In our context, it is a matter of allowing the users of the platform to be able to position themselves and not to formally evaluate and rate them. Therefore, we chose a hybrid solution of scenarios based on occupational situations that cross-reference competencies several times and self-evaluation. This choice has the advantage of leading to a procedure that is controlled over time and that contextualizes the competencies to be evaluated. This solution also has advantages in terms of durability. Indeed, occupational scenarios are less likely to change over time than performance-based assessment or even direct knowledge-based assessment, which rely directly on tools and technologies that are bound to change rapidly. Moreover, performance-based approaches rely on complex simulation environments that are much more complex

to develop and maintain than a questionnaire. This is an important aspect to consider for the maintenance and sustainability of the platform.

To complete the process, it is necessary, once everyone can position him/herself in the skills framework, to allow training. Many platforms offer content developed specifically for them (Bancal & Dobaire, 2022; Borrás-Gené, 2018; Meyer et al., 2021; Platteaux, Salietti, et al., 2022). This approach causes problems of maintenance and sustainability of the platform, as it is necessary to keep the contents and educational resources that are proposed up to date. The approach adopted here is based on the observation that 1) the University already offers many training courses and resources for digital learning and that new ones are continually being developed; 2) there are also many valuable external resources available to the University's populations. It seems therefore relevant to propose a directory of training courses that are targeted according to the individual profile and annotated according to criteria that allow each person to plan their training according to their existing workload. It should be noted that this approach does not prevent the development of specific training for digital skills. Moreover, the directory obtained makes it possible to inventory the offer and to orient the development of new training courses.

# 3 MakeITeasy

## 3.1 Global design and architecture

The MakeITeasy platform is organized around 4 main components as depicted in Figure 1. All these components are aligned with the University's digital skills framework. It is this alignment that guarantees the coherence of the whole system. The self-positioning test is the gateway to the platform. Each user must first complete the test by answering the questionnaire, which will then enable the platform's functionality. It is necessary to establish the user's positioning in relation to the skills framework.

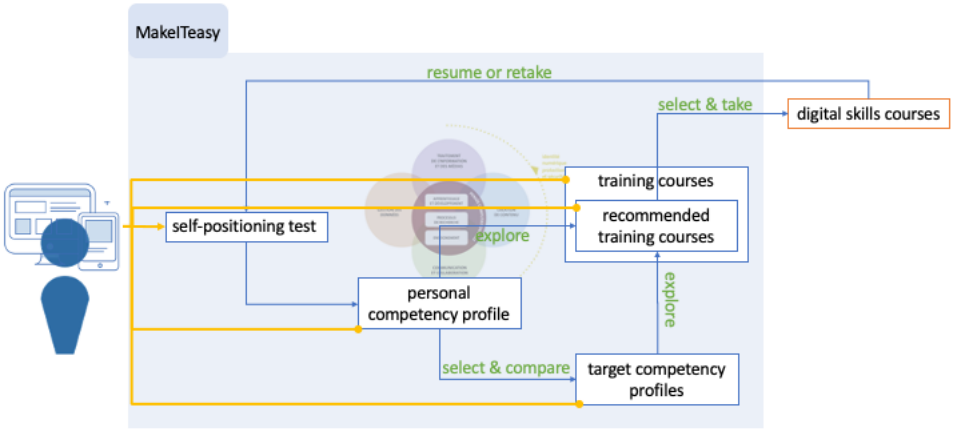


**Figure 1 :** Global architecture of the Make-IT-Easy platform

Once the positioning is established, a personal competence profile is created and can be visualized in different forms and at different levels of precision. The visualization is done in relation to a target competency profile. The platform can manage several target profiles and each user, depending on his role (student, doctoral student, teacher or administrative or technical staff) can compare his personal profile to one of the available target profiles. It is this comparison that allows the platform to determine the competences considered as missing. Based on this analysis, the platform will select the trainings

that cover the competences to be acquired in order to match the target profile. The platform is not a teaching management platform and does not contain any courses, but rather points the users to trainings that can be of different types, formats and durations (such as traditional University courses, they can be internal or external distance learning courses accessible to the members of the University, MOOCs, face-to-face workshops, video clips, etc.) For each identified training, a sheet is available which indicates the skills covered, but also information allowing to establish a pragmatic choice. The principle being self-training, users are supposed to train outside their main activities. It is therefore necessary to provide them with practical information: duration, timetable, course format, etc., which will enable them to determine whether a relevant course can be inserted into their schedule. The courses themselves are outside the platform. Users can indicate that they decide to take a training course, which allows them to visualize it in their profile by indicating the skills of the training course taken as in progress.

Each time the user thinks he has acquired new skills, either by taking a recommended training course or during other activities, he can position himself again, either by taking the parts of the self-positioning questionnaire that correspond to the skills considered as not acquired, or by taking the questionnaire in its entirety. With the path between the components of the platform, a loop is thus established (identifiable by the blue arrows that link the components in Figure 1) which, over time, allows the members of the University to manage the development of their digital skills.

Self-assessment and comparison with a target profile identifies the user's strengths and weaknesses in terms of digital skills. This is not a formal evaluation, but a way to find one's way in the skills framework. The recommendation of training courses according to the positioning and the comparison with the target profile then allows him/her to plan the learning activities to progress. The return to self-positioning allows for the monitoring of progress and the adaptation of planning accordingly.

## 3.2 The digital skills framework

The definition of the skills needed to master digital tools has been the subject of much discussion and work and is widely used to assess digital competence in higher education (Zhao et al., 2021). The Digital Competence Framework for Citizen developed by the European Commission, also known as DigComp (Carretero et al., 2017), has become a reference document within the European Union to represent and assess the competences of "digital citizens".

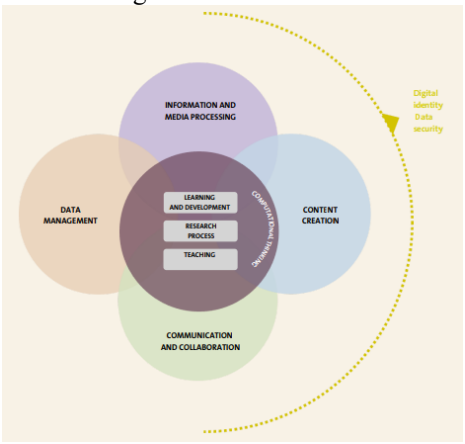


**Figure 2 :** Digital skills framework structure

In Switzerland, this same document has been used by the Federal Statistical Office to assess the digital skills of the country's population in an international comparison. Another widely used and cited model is the Digital Capability Framework (DCF) developed by the JISC. Contrary to DigComp, which has a broad and generalist scope, the framework proposed by JISC focuses on the digital competencies

to be used by students or professionals working in educational contexts, and thus offers elements of reflection that are particularly relevant for adaptation to the University of Geneva. These two frameworks served as a basis for the development of the UNIGE digital competency framework and were adapted to reflect the activities and needs of the specific academic context of the University of Geneva. DigComp allows for the definition of generic competencies common to all University member categories. Its intersection with the DCF allows us to contextualize these generic competencies by role in the academic community. The UNIGE digital skills framework is thus intended for all the University's populations: students, research professors, doctoral students and administrative and technical staff.

The digital skills framework is organized around four competency domains that assess the ability to operate in a digital world or learning environment: information and media processing; content creation; communication and collaboration; and data management. In addition to these four core areas, the framework adds a transversal area presenting skills specific to computational thinking. These transversal competencies refer to the ability to exploit digital methods and tools in their entirety for the formulation of a problem and the development of a solution. The UNIGE framework also presents a series of competencies related to security and digital identity, activated independently of the field of activity. Each one of these domains is composed of several competences, which are declined in four successive mastery levels. The first level corresponds to the baseline, need to perform academic tasks and begin university studies and activities. The second level, more advanced, denotes a mastery of tools for basic to more complex operations. The third level is a superior mastery which should be acquired or aimed for specific skills particularly relevant for one's role and discipline. Finally, the fourth level, expert, couples a high level of expertise on the competences with the ability to transfer and activate this competence in others. In the academic context, these competency domains are activated in learning, teaching, or research situations, each of which has its own specificities. The digital skills framework therefore places three dimensions specific to academic activities at the intersection of the competency domains: learning and development; research and teaching. These three dimensions are not applicable to the entire university population in the same way. The framework is therefore adapted to each of the identified roles.

## 3.3 Self-positioning questionnaire

The students self-positioning tool is developed from the in-depth reference framework according to Platteaux et al (2022). It must be complete in relation to the generic competences of the reference framework and as concise as possible so that the student completes it in full.

Students' skills are questioned by presenting to them realistic situations because the contextualization of use will make it easier to assess their mastery of the competency. The tool thus presents the same generic skill at least three times and uses the responses to the three different situations to decide on the level of mastery. The test consists of successively presenting each person with several situations contextualized according to his/her academic role, for example that of a learner for a student, corresponding to the transversal skills. For each situation, several questions are asked. These questions correspond to the achievement of generic skill levels. The person is asked if he/she feel able to perform it (not at all, rather not, quite, completely). Depending on the answer given, questions at a lower or higher level are presented. The decision to assign a competency is based on the weighting of the answers to 3 questions that involve this competency. These questions are spread over different occupational situations. This redundancy is there to partially compensate for the subjective dimension of the self-evaluation.

The scenarios of the learning situations as well as questions on these scenarios by levels of mastery were tested and evaluated with tutors (students employed by the University to assist their peers in using the institutional e-learning environments and informatic tools) to ensure that they are understandable, credible, and realistic.

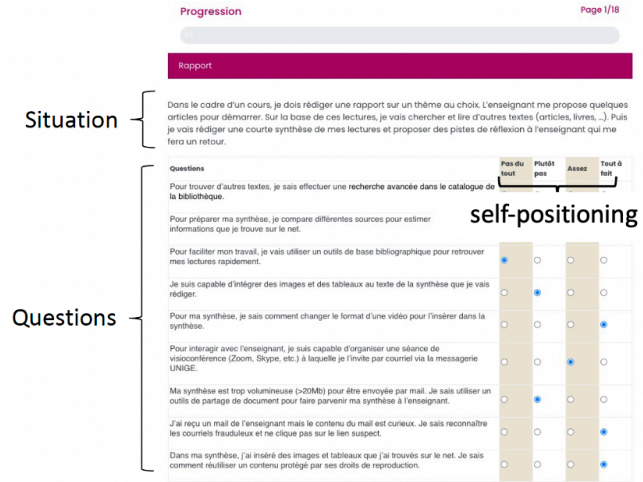


**Figure 3 :** Example of situation and questions proposed in the self-positioning test

## 3.4 Competency personal/target profiles

Once the questionnaire has been completed for the first time, the system is able to define the person's digital skills profile. A set of visualization tools are proposed to allow the person to get acquainted with his profile. To position oneself, the visualization of the individual profile is done in comparison to a target profile that the person can choose according to his/her current situation at the University, for example a Bachelor student in computer science or in comparison to a hypothetical situation, for example a Master student who would like to know how his/her current profile compares to the expectations to do a PhD.


**Figure 4 :** Global visualization of the individual profile compared to a target profile (left) and detailed view of the profile by skills and levels

Two levels of visualization are proposed which bring two levels of details. The first level is global and presents only the competency domains (Figure 4, left). The second level goes down into the details of the skills and levels (Figure 4, right). It allows to identify precisely the skills considered as acquired, those in progress (according to the training declared as in progress) and those that are not acquired. These are the ones that are then targeted by the training recommendations.

## 3.5 Recommendations for digital training courses

The recommendation system currently integrates more than 100 training resources: seminars, MOOCs, workshops, video clips, etc. In order to establish the directory of proposed training courses,

the first step was to list all the training courses already available at the University, regardless of their format. In addition, several steps were taken to develop other content, resources and training that could be added later. All these training courses are annotated according to the competencies defined in the reference framework they cover. The system uses these annotations to make training suggestions. The suggested trainings allow everyone to complete his/her current profile to reach the target profile to which he/she is compared. It is essential that in a self-training context, the information provided to describe the training courses allows people to determine, in addition to the skills targeted by the training and its content, whether they can integrate it into their daily activity schedule. Therefore, descriptive metadata are added on the format of the training, but also on the audiences and languages planned and available.

## 3.6 Flexibility and adaptability

The platform was designed to consider the challenge of multiplicity, described by Serres (2014): "multiplicity of cultures, of relations between these cultures, with sometimes delicate delimitations, multiplicity of activated competences, of actors, of problems, of research objects, of issues... This multi-dimensionality of information cultures at the university would require a major research and theoretical reflection project, to translate it into training systems". Indeed, each faculty/department can develop and integrate its own positioning questionnaire as well as target profiles that will allow people to evaluate themselves in relation to the expectations of their study programs or discipline. The system integrates a generic target profile, which guarantees that everyone can situate him/herself globally in the institution, even if his/her faculty/department does not propose adapted target profiles. This flexibility in the design of the system ensures that it can be systematically used by all populations but also systematically adaptable to all academic contexts (subject to prior work on defining a target skills profile and a positioning questionnaire).

Some of the faculties have been creating their own target profile, as well as, as a result, developing an adapted version of the generic positioning questionnaire. The adaptation of the target profile is based on the selection of competences and levels of competences directly from the reference framework, in order to meet the needs of the students enrolled in their faculty. In addition, the level of granularity chosen for the target profile is also adaptable, leading to the creation of multiple profiles and questionnaires within certain faculties. At the Faculty of Psychology and Educational Sciences, for example, two target profiles are currently being designed, one for bachelor students, the other for master students. At the Faculty of Sciences, a strategic choice has been made to focus on future students, in order to assess their digital skills before they enter university. Therefore, some of the occupational situations designed for university students had to be reviewed. At the Faculty of Medicine, current discussions suggest that the adaptation might take place at the level of the three existing bachelor sections. As mentioned before, such adaptations were intended when designing the platform, making this process collaborative, rigorous and effective.

## 3.7 Users' tests and evaluation

The student platform, which was the first to be developed and completed, was tested with 6 people, recruited by word of mouth, who completed the tests. They are 5 students, 4 of whom also have a part-time position at the University (instructor, tutor, administrative clerk, and collaborator). On average, these 5 people have been students for 5 years and are 26 years old. The 6th person is a former collaborator from the Faculty of Medicine with 30 years of service and pre-retirement age of 64. The 6 participants all use a private laptop for their academic activities. Half of them also have an institutional desktop. One uses a tablet sometimes, and occasionally a smartphone for his academic activities.

It is important to remember here that what is being evaluated is not the relevance of the self-positioning test, which was already tested by the tutors, as mentioned before and which the literature

leads us to believe will provide sufficient positioning to enable orientation in the development of digital skills, but the platform and the interest that the process it proposes generates for university users. A series of 6 significant tasks to be carried out on the platform was submitted to the participants to test the essential functionalities of the platform such as completing the full self-positioning questionnaire. A post-test questionnaire asked them about the platform's strengths, weaknesses, and areas for improvement.

The results indicate that all participants would recommend the platform to their colleagues either strongly (4) or somewhat (2). The participants were also asked to complete the AttrakDiff questionnaire (Hassenzahl, 2006), with a 5-point Likert scale. Overall, the platform was quite successful, as all four dimensions of the AttrakDiff test showed largely positive scores in average with a range of values between -2.0 and 2.0: Overall attractiveness: 1.7; Pragmatic quality: 1.3; Hedonic quality – stimulation: 1.0; Hedonic quality – identification: 1.2. The verbal exchanges also show the enthusiasm of the participants, which is promising for a future success with students since 5 of the 6 participants are part of this population.

The self-positioning questionnaire was always completed within the estimated time (30 minutes), which is satisfactory. In terms of length, some participants noted the redundancy of certain questions, although they understood that this was necessary. When participants did not understand a statement, they concluded that they did not have the skill. The "per situation" format seems therefore relevant to use. The design of the individual profile was particularly appreciated by all participants. Indeed, the choice of graphic representations of the profile is not negligible, and the use of distinct colors by competency was emphasized. In addition, the possibility of clicking on the competences and discovering the content of the competence framework is reported as a non-negligible added value. Finally, the training recommendation section was described as relevant after exploring the individual profile because it naturally invites visitors to take training. However, none of the six participants understood that these trainings were selected according to the individual profile. This fact should therefore be highlighted, as opposed to the possibility of viewing all the training courses in the institution. Nevertheless, the description forms of the trainings are described as clear and complete.

# 4 Discussion and conclusion

We have described the approach that was adopted to develop a platform that offers a simple iterative approach to enable all members of the university community to take ownership of the development of their digital competencies based on an offer of digital training courses listed and annotated. All the components that make up the platform are aligned with an institutional skills framework developed for this purpose that intersects generic skills with occupational skills from the university sector. This approach makes it possible to design sustainable self-positioning questionnaires that place the different populations in occupational situations.

User tests and the evaluation of the platform were conducted with a group of students, which provided an initial assessment of its potential. Release to the entire academic population will allow for a more systematic evaluation of the quality of the system. It will also provide data to perform comprehensive assessments of the digital skills of different populations and to use the digital traces to continuously adapt the platform and competence framework.

Other functionalities are currently being studied such as the introduction of open badges or micro-credits to facilitate the understanding and appropriation of digital skills or the development of dashboards allowing the platform administrators to adjust the different components: questionnaire, trainings, or the faculties to analyze the evolution of the digital skills of their populations and take the appropriate measures.

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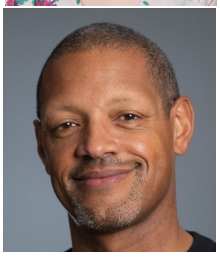
# 6 Author biographies

Laurent Moccozet received his PhD in Information Systems from the University of Geneva, Switzerland, in 1996. He is currently a senior researcher at the Institute of Information Service Science and the Global Studies Institute at the University of Geneva. His research activities are focused on the application of information and communication technologies to the representation, production, enhancement, dissemination, and visualization of human knowledge in the fields of education, culture and health.

Giulia Ortoleva obtained her PdD in Educational Sciences in 2015 at the University of Geneva. Currently, she is a scientific collaborator in the Faculty of Psychology and Educational Sciences of the University of Geneva. She is now coordinator of a training program for digital skills of the students as well as a technology-enhanced learning support within the faculty.



Patrick Roth received his PhD at the University of Geneva in 2002 in the field of Human Computer Interaction (HCI). Laureate of the LATSIS prize 2004, he then completed a Postdoc in the HCI group at the Humboldt University. He is currently head of the eLearning unit at the University of Geneva. His interests include LMS, ePortfolio, mobile Learning, UX and Multimodal Interaction.

Elsa-Line Huwyler obtainer her Master in adult education from the University of Geneva, Switzerland, in 2021. She is currently working for the University of Geneva as an e-learning techno-pedagogist.

Marcos Aristides obtained his PhD in Education Sciences in 2015 at the University of Geneva. Currently he is a scientific advisor at the University of Geneva, in charge of the implementation of a digital skills auto-assessment tool for university teachers. Formerly, he led postdoc research at Universidade Federal do Estado do Rio de Janeiro (UNIRIO) about sound descriptors (metadata) of musical documents (2021) and another postdoc research (2020) in information technologies for music education at Universidade Federal do Ceará, Brazil. His main research concerns are about teacher's and student's production of digital educational resources.