

PIX: A Platform for Certification of Digital Competencies

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ABSTRACT

We present Pix, a platform for assessment and certification of digital competencies for French citizens, conducted by the French Ministry of Education together with research institutions. The main idea is to measure, promote and develop digital competencies with the help of challenge-based tasks built using evidence-centered design. An adaptive test is currently developed to reduce the length of assessment, and the collected data will be available for research purposes. It is built upon DigComp 2.0, the European Digital Competence Framework for Citizens, and its source code is publicly available on GitHub under license AGPLv3.

ACM Classification Keywords

K.3.2. Computers and Education: Computer and Information Science Education

Author Keywords

digital competencies; assessment; adaptive testing; cognitive diagnosis; evidence-centered design.

INTRODUCTION

Digital competencies are essential to tackle the ever-increasing complexity of our society and economy. To date, most of the official French initiatives to assess those skills are solely composed of multiple-choice questions. A more fine-grained diagnosis would provide a meaningful tool to foster the development of lifelong learning for all citizens.

Pix¹ is an online platform for assessment and certification of digital skills. It is managed by the French Ministry of Education, in close relationship with public and private stakeholders.

¹<https://pix.beta.gouv.fr>

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It aims at revealing and stimulating the training needs necessary to face the digital transformation of our societies, by measuring, promoting and developing digital competencies. It is built upon DigComp 2.0, the European Digital Competence Framework for Citizens [5].

The main goal of Pix is to provide a free assessment to any French citizen (scholar, student, professional, retired, etc.) that can assess their digital skills, and put a name on what they do not know (e.g., “most wiki-like websites have a publicly available history”). At the end of the test, they can receive a diagnosis, summarizing their strong and weak points, and possibly do the test again at will. Therefore, Pix provides a formative assessment, and people can learn more by sitting for the test again.

The platform is now open in public beta. Its source code is freely available on GitHub², under the license AGPLv3. An adaptive test is currently being developed.

We now describe the impact, the curriculum, the problem statements, the user model and the research purposes of this project.

IMPACT

Within the next two years, Pix will be administered to every French student from *quatrième* to *terminale* (from 8th to 12th grade): 3.5M students, potentially half of all French higher education students (1.25M), together with employment integration organizations.

CURRICULUM AND PROBLEM STATEMENTS

Pix’s curriculum follows the European framework, DigComp 2.0 [5]. Is it composed of five areas:

1. information and data literacy;
2. communication and collaboration;
3. digital content creation;
4. safety;
5. problem solving (in a digital environment).

²<https://github.com/sgmap/pix>

Each area contains competence descriptors such as “1.1 Browsing, searching and filtering data, information and digital content”, and Pix provides a test for each competence. Within a test, a level of proficiency between 1 and 8 is computed, together with the acquisition or non-acquisition of knowledge components called *acquis*, which are learning outcomes.

The goal is to allow citizens to monitor their progress using an account. After each test administration, they will be acknowledged with points on a 1024 pix scale, together with a competency profile. Progress will be encouraged with targeted recommendations of learning resources.

Problem statements are built in a way similar to evidence-centered design [4], because in order to solve them, people have to bring to the system the proof that they managed to perform the requested task. For example, if the short-answer question is: “In the city Montrésor, what street leads to *Rue des Perrières*?” The answer is *Rue de la Couteauderie*, and the most straightforward way for anyone to find it — except if they unfortunately know Montrésor by heart — is to use a mapping service. No matter whether they used Google Maps or OpenStreetMap, if the answer is correct, the learner will prove he masters the corresponding knowledge component *@utiliserv3*, which means they can “find and use a service to get an answer, without a hint.” The problems are thus challenge-based, and fun to solve.

Another, more sophisticated example: in order to verify if you master the notions of Cc and Bcc from an email, Pix asks you to send directly an email to a certain address, by specifying special data in the Cc and Bcc fields. No matter whether you use your laptop or your phone, a bot will verify you actually sent an email and validate your answer.

To date, there are 525 items in the database, designed by a team including teachers and researchers from École normale supérieure de Paris-Saclay.

RESEARCH

Data collected by the platform will be sanitized and made publicly available for research purposes.

Problem statements will be continually improved according to usage data. For example, some of the questions expect a short answer, therefore new correct solutions may be added to the system, using approaches such as the Divide and Correct framework developed by [1].

Based on the performance of the citizens, new adaptive models will be calibrated. For the first administration, we developed a model similar to item response theory [3] and knowledge space theory [2], described in the work-in-progress paper for Learning at Scale 2017 “A Heuristic Method for Large-Scale Cognitive-Diagnostic Computerized Adaptive Testing”.

ABOUT THE PROJECT

This project was funded by the National Council of Education and Economy, part of the French Ministry of Education. It has been designed since March 2016 and developed as a State Startup since June 2016 within the incubator of the SGMAP³

³<https://beta.gouv.fr>

(General Secretariat for the Modernization of Public Action), similar to task forces such as 18F⁴ or the United States Digital Service⁵.

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⁴<https://18f.gsa.gov>

⁵<https://www.usds.gov>