

## **Developing a Culture of Digital Accessibility in the Academic Context – a Guide to Good Practices**

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**Abstract:** A qualitative survey have been conducted during the academic year 2014-2015 in order to find out the good practices to develop in French universities to facilitate the accessibility of digital content and services. The final objective was to create a guide to help the higher educational institutions to improve their digital accessibility. In this paper, we will present results of this study and the main issues addressed in this guide. We also define the notion of “culture of accessibility” that is essential to keep the diffusion and the durability of the accessibility of digital contents and services.

**Keywords:** Digital accessibility – Higher education – Culture of accessibility – Awareness

### **I- Introduction**

During the last five years, the number of students with disabilities in French universities increased by 15 % each year, and to reach the number of 20,500 students in the academic year 2014-2015<sup>1</sup>. The law n°2005-102 February 11th 2005 on equal rights and equality of opportunities and the inclusion and citizenship of persons with disabilities states that « *Les établissements d'enseignement supérieur inscrivent les étudiants handicapés ou présentant un trouble de santé*

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<sup>1</sup> See MENESR annual report on <http://www.handi-u.fr/>

*invalidant, dans le cadre des dispositions réglementant leur accès, au même titre que les autres étudiants et assurent leur formation en mettant en œuvre les aménagements nécessaires à leur situation dans l'organisation, le déroulement et l'accompagnement de leurs études.»* (“Higher education institutions enrol students with disabilities or incapacitating health disorder, according to the regulatory measures regulating their access, as well as any other students and providing their formation by implementing the support measures required according to their situation, in the organization, the progress and accompaniment of their studies.”). This law has also enhanced the success of student with disabilities in secondary education, giving them the opportunity to access to higher education.

In every university, an support centre offers to these students the pedagogical support they need. But, although the number of students has significantly increased, universities do not have the means to increase the workforce of these support centres in the same proportions. Nowadays, each member of the university community has to participate to the accompaniment of students with disabilities, by adapting their work methods to students recognised as needing compensation, as well on the administrative side as on the pedagogical side.

The amount of digital documents and services that have to face students is quickly increasing and the teaching methods are also in constant evolution [1]. Bougie showed that new technologies can have a positive impact on the lives of people with disabilities, especially by reducing their disability in certain accessible environment, but also a negative one if these technologies cannot work with the assistive technologies they need to use [2]. The concept of accessibility can be seen as the set of means necessary to allow assistive technologies to function efficiently.

The evolution of the number of students with disabilities has not only progressed but the typology of disabilities has also been greatly evolving. The fastest progressing group is the group of students presenting language and learning disorders (especially including a large number of students with dyslexia), reaching 20% of students with disabilities at the national level. The specific software used by these students, as well as software used students with visual impairment, need accessible digital documents.

Thus, the question of digital accessibility takes on crucial importance in the academic context. It is clearly a legal obligation (according to the law of e2005 already cited earlier, and a range of accessibility rules have been gathered under the name « *RGAA : Référentiel général*

*d'Accessibilité pour les Administrations* »<sup>2</sup> (General accessibility guidelines for the Administration). Nevertheless this part of the law of 2005 is barely respected as for now, even if progresses have been observed during the last years. The financial matters, to which the university leaders will be interested, can be also of great help there. If the documents and services offered by the university are not accessible, the adaptation costs incurred by the support services may increase dramatically.

Digital documents and services in university have become countless. The most visible part is the institutional website, real showcase for the university. Moreover, it is itself composed of many specific websites for the UFR (Formation and Research Unit), departments, laboratories, certain administrative services. For the University Paris 8 for example, there are more than 100 different websites. Many university services offer students online services, from inscription to access of their results. The university library also has its own website, providing access to the catalogues and many digital contents. Lastly, more and more of pedagogical contents are available on teaching platforms: slide-shows, courses, methodological guidelines, or even online exams.

In order to support universities to make their digital contents and services, we have been carrying out a survey [3], with the help and collaboration of the Ministry for Education, Higher Education and Research<sup>3</sup>, which main aim was to identify the main barriers they were facing and the good practices that some of them had been undertaking. The operational objective was to write a guide addressed to higher education establishments.

As mentioned earlier, the question of disability has to be taken over by everyone in the university, in accordance with their responsibilities. Regarding digital contents and services, there is a need for developing of a culture of digital accessibility, allowing each staff member to understand and to use suitable technologies for her or his responsibilities in the design of the digital environment of the organisation, from the simple writing of headings to be placed on the website, to the writing of lessons and the implementation of online services for students. Numerous works have been published on this subject since the launch of WAI in 1997, mainly on the technical side. Within the last fifteen years, it would be pessimistic to pretend that nothing was done. However, the situation remains mixed, as show the difficulties encountered by students and the transcription services.

Petz et Miesenberger have presented a roadmap for digital accessibility [4], drafted within

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<sup>2</sup> <https://references.modernisation.gouv.fr/rgaa-3-0> these guidelines have been derived from the international recommendations, in particular WCAG – “Web Content Accessibility Guidelines”, published by W3C/WAI Web Accessibility Initiative (see <http://w3.org/WAI>)

<sup>3</sup> <http://www.education.gouv.fr/>

the framework of the European network eAccess+, where they bring to light the need for accessibility training for all students in computer science and not only those whose speciality is about assistive technologies.

Additionally, many members of the academic community, as well from administration than from pedagogical teams, ask for non-technical guidelines. The essential aspect of this study are (1) the identification of the role of each actor, according to their level of technical knowledge, and (2) the need of documents addressing the needs of people who create digital contents, using simple tools as word processing software or online CMS editors.

## **II- National Survey**

### **A. Study protocol**

After a rapid review, we have selected a limited number of French universities, based on a quick evaluation of their websites and on feedback about their accessibility. Indeed, given the number of establishments (more than 80), we did not have the resources for a comprehensive study, and we decided to convey a qualitative study. Then we have selected four sources of digital information present in French universities.

1. The institutional website
2. The support centre pages (often part of the previous one, but some have a specific website)
3. The university library website
4. The main pedagogical platform<sup>4</sup>

A total of seven institutions from different areas have accepted to participate in the study and each of them filled in a comprehensive questionnaire. In each of them, we have identified the persons in charge of these sources and we conducted interviews. The key questions concerned the problems that they had to face and the solutions they had found and implemented.

Globally they responded that about two thirds (of the total of websites) were accessible, but in only one case the accessibility had been checked by an independent external provider. That being said, the costs of external audits are relatively high and depend on the size of the website. The lack of independent evaluation does not mean the content are not accessible.

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<sup>4</sup> Historically, fist pedagogical platforms were developed in a heterogeneous way, independently of one another (some-time by a single teacher). Today, a lot of universities try to homogenise these platforms, which presents an obvious interest for maintenance, but also for accessibility.

## **B. Main obstacles**

Here are the main obstacles reported by the participating institutions :

### **(1) Lack of knowledge and awareness**

It seems that the main problem remains in the lack of knowledge, within the university community as well as in the general public, of how people with print disabilities access digital content, and therefore of the resulting necessity for digital accessibility. Unlike physical accessibility that is easier to understand when a wheelchair cannot cross over a step, issues linked to digital documents are unfamiliar simply because most people have no idea of how assistive technology addressing them function, and even about the existence of these assistive technologies.

This observation also applies to the staff in charge of development and maintenance of websites, online services and pedagogical platforms. Nevertheless, the law of 2005 provides that the persons in charge of digital communication engage in vocational training about digital accessibility. In the participating universities, a few staff members actually did pursue some relevant vocational training. In one case, a website developer did self-train. One of the other issues mentioned is the lack of feedback from students with disabilities, about accessible website as well as badly designed ones.

### **(2) Misconception**

The second big obstacle is the persistence of wrong and preconceived ideas. The followings elements came out of the questionnaires and interviews:

- *“the accessibility recommendations are very technical and hard to implement”*
- *“it would be very expensive”*
- *“this concerns a very limited number of people compared to the required investments”*

On the opposite, the benefits of accessibility, beyond the use by students with disabilities, are ignored.

Another interesting fact is that one of the most commonly cited arguments against accessibility, saying that accessible web sites would be ugly and boring, never rised from the questionnaires and interviews.

### **(3) Lack of political will**

The third obstacle concerns the lack of will from the universities. The manifest unwillingness from public universities to implement at the national level the law of 2005 about accessibility to people with reduced mobility, helps to understand the weakness of university

politicians in such matters.

Additionally if the law provides that digital communication tools from the public sector must be accessible (and designed the conformity criteria, the so called RGAA, see above) but it does not plan anything about its enforcement : there is no real penalty if the rule is not applied. A blacklist has been discussed but its creation and its maintenance were too difficult whereas its relevance was disputable.

### **C. Good practices**

Among the universities having websites that the person in charge qualified accessible, we have been looking at their motivations and methods.

- Concerning their motivations, the three answers given were:

1. To be in conformity with the law (one-third of the cases)
2. It is part of the university policy concerning disability (half of the cases)
3. At least one of the staff member was aware of the subject (from a vocational training, or personal reasons for example)

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Another interesting answer showed up: an external provider advised the university to do so.

- For the websites developed by external provider (one-quarter of institutional websites), requirement of accessibility had been included in the public tenders

- For the other websites, at least one of the technical staff member attended a vocational training

- In every university, numerous members publish information on the website (including as well websites developed internally and externally). In two-third of the cases, contributors received information on accessibility, via a training session or from documents.

Contrary to the previously mentioned preconceived ideas, the cost of creating accessible content was never mentioned as a problem for the institution interviewed. Moreover, it was considered as null in several cases (knowing that vocational training as its own funding scheme).

### **III- Developing A Culture of Accessibility**

Based on these observations, it seems important to implement the concept of “*culture of accessibility*” within universities. Indeed, the awareness of about accessibility must be shared by

everyone, especially the people who have responsibilities in posting or developing online content and digital services, and by those who manage it.

The idea of hiring a specialist of digital accessibility, who would have the responsibility of making all digital contents accessible, appears to be a bad idea. In practice, the diversity of platforms and the amount of documents available make it absolutely unrealistic. On the opposite, every staff member must understand thoroughly the concept of accessibility, must take over her or his share of the task and must share the information with her or his colleagues. This is the only way to make sure that the university websites and all contents are always accessible. This does not not exclude to hire a referent for digital accessibility, if the role of this person must be clearly defined and limited to explaining, to training staff, and to broadcasting information.

This notion of *culture of digital accessibility* can be compared, to some extent, to the physical accessibility of cities. There is still a lot to do, and the delays regarding the implementation of the law of 2005 should not be understated, however, the understanding of the notion of accessibility for person with reduced mobility has become a standard practice and more importantly a slow change in behaviour can be observed. For example, in Paris, the number of disrespectful drivers occupying dedicated parking slots, or blocking the access to side walks or ramp, have seriously dropped within the last decade ago.

We think that the entire university community has to appropriate the notion of digital accessibility in order to improve the situation in an efficient and long-lasting way.

Thus, everyone, according to one's position (programmer, author of curriculum, website contributor, etc.), should be able to understand the rules that could help oneself to contribute to make the digital environment of the institution accessible to everyone. As well as in the urban context, accessibility for person with reduce mobility is making life easier for lots of people, we believe that digital accessibility will profit to everyone in higher education institutions.

In order to spread out this notion of culture of digital accessibility within the academic context, we are preparing a guide of good practices, based on our observations, positive and negative ones. In the subsections, we deliver its essentials points.

## **A. Defining roles**

Since everyone is concerned, and in order not to frighten off people, it is highly important to precisely and clearly define the roles of every one, and what they imply in terms of accessibility.

Today, the large majority of websites and online services are based on Content Management Systems (CMS), whereas it is for universities or other websites. These platforms and

created and maintained by teams of software engineers, with good technical skills. We will refer to them as the “*webmasters*”.

The administration staff and the teachers use these CMS to publish contents. Among these contents, there are information about the university, files, instructions for administrative missions, *etc.* They will be referred to as the ‘*contributors*’’. Finally, teachers drop off pedagogical content: curriculum contents, online lessons, sides *etc.* They will be referred to as the *authors*. For those two last roles, it is important to well understand that they are not expected to have any technical skills, but they only have to follow some simple guidelines.

## **B. Technical training**

Technical training concern the *webmasters*. It is essential that they have a good technical knowledge about accessibility and that they are familiar to RGAA. Even if they use existing CMS, they have to select the ones that will used for each situation (institutional website, pedagogical platform, *etc*), to decide how they will be used, to install and maintain them, to select and install plug-ins, *etc.* and also they often have to develop the front-end. They have to know or to evaluate which plug-in will be more accessibility-friendly. It may not be necessary to give a vocational training to every member of the service but the circulation of information has to be respected. This way, an absence due to holiday or a sick leave will not be a major problem and a transfer will not question the accessibility policy of the establishment. All the team members have to be convinced of the need of accessibility and to have basic technical information.

When the institution outsources these developments to an external provider, the requirement of accessibility must be written down in the technical specification, including the conformity to the RGAA.

## **C. Documentation**

As seen previously, if contributors doesn't need a technical training, they have to follow a set of simple guidelines. As a matter of fact, even if the CMS is carried out with great care, if the contents is not accessible, all the efforts are vain. This concern the contributors but also the authors. The rules to follow are simple. The three key principles are :

- ***To structure***, that is to identify the structure elements using styles,
- ***To give alternatives*** to every non-textual element (according to the context)
- ***To identify*** some element such as languages, main document title, and if possible, to give a resume at the head of every important text divisions.

This information can be delivered during training sessions, where *contributors* are often

required to participate before they can receive a password to drop off online content. The documentation has to be easy to understand and to read, convenient and adapted to the pieces of software the people are using. The *authors* are less often involved in this type of training, and so the documentation is even more important to them.

A set of practical documents dedicated to *contributors* and *authors* will be available with this guide of good practices, including practical sheets. This set is composed of four types of documents:

1. The first one is entitled “*Short reminder for digital accessibility*”. This is a one-page sheet summing the essential points;

2. An explanatory document “*Following this recommendations... why should I do that?*”, in which are presented, for interested readers, how people concerned by accessibility use computers. It also explains the reason of every recommendations, as simply and clearly as possible;

3. A set of thematic sheets giving details on every recommendation:

1. Structuring a document

2. Providing alternatives to images

3. Providing alternatives to audiovisual elements

4. Scientific documents and mathematical expressions

5. Creating accessible PDF documents

4. And finally, a range of practical sheets, explaining how to manage every recommendation with different pieces software, with screenshot illustrations:

1. *How to do with LibreOffice,*

2. *How to do with MS Word,*

3. *How to do with GoogleDocs,*

4. *How to do with Wordpress,*

5. *How to do with SPIP,*

6. *How to do with Latex,*

7. *How to do with HTML (and PHP).*

## **D- Adapting Illustrations**

It is sufficient to provide a simple textual alternative to most images. For instance, buttons

on Web sites, logos and a lot of ornamental images. However, if the image in itself carries information that is part of document content, it is necessary to provide an adaptation of the illustration, which will often be a so-called *long description*. This is often the case for educational documents for instance : graphs, photos, maps or any sort of illustrations. These descriptions must be designed taking the context into account. Indeed the same photo could be used in various courses, and its description would be different in every case. Adaptations can also be tactile diagrams or maps, or any kind of alternative support (including 3D printing for instance).

Adaptations cannot always be realized by the authors themselves, because it requires particular skills, that of adapter-transcriber (nevertheless, the author keeps an important role and exchange with the adapter-transcriber is necessary). We believe that such a specialist should be hired in every university, so that such adaptation can be delivered to all students who need them.

## **E- Mathematical expressions**

As for mathematical expressions, specific recommendations are necessary (which will be available in the corresponding thematic sheet, based on our previous works [5]). Here are the main ideas:

- ONE mathematical expression = ONE mathematical object
  - Never use a picture to represent expression
  - Never group several independent expressions in a single mathematical object
  - Never split an expression into different mathematical objects
  - Consistently identify variables as mathematical objects
- A mathematical object must never be used for an other object (e.g. to put a text bit in Italics).

## **IV- Conclusion**

These guidelines and the practical sheets will be distributed within higher education institutions to contribute to improving digital accessibility and to developing a culture of digital accessibility.

### **A- Benefits**

It is necessary to increase awareness of university authorities. One way can be to value the advantages of accessibility of digital contents and services :

- A better image of the university
- Improving of equality for all students
- A better inclusion

- The respect of the law
- A better referencing by search engines and online databases
- Moderate cost
- It eases the maintenance

## **B- Obstacles**

Nevertheless, some obstacles remain. The first obstacle is the formation of software engineers. Indeed, many of them graduate without any knowledge about digital accessibility. A basic information should be included in all computer courses as well courses in digital communication. This question should be considered at the national level and by every university.

The second obstacle is quite specific. Its concerns PDF document created from LaTeX sources. Indeed, LaTeX generated documents are not very accessible, and it is surprising to whom knows about LaTeX code, as it allows to highly and efficiently structure documents, and also as LaTeX itself is quite used by blind people for scientific documents. Actually they use the LaTeX source code and not the documents generated in PDF by a LaTeX compiler, which do not carry the PDF structure tags!

Moore presented interesting works about generating tagged PDF from LaTeX sources [6] [7] but this is not implemented in main distributions? Also an accessibility package<sup>5</sup> have been developed by Schalitz [8] but its documentation is in German only. Moreover problems remains :

- mathematical expressions
- alternative for illustrations (using the graphicx package)
- tables,
- links between characters which LaTeX over uses

A lot of students who study scientific courses access actually directly to LaTeX sources, but mathematical expressions stay long and difficult to read. And above all understanding of LaTeX sources is very difficult to a most students who are not involved in scientific studies, as well as students with print impairment (like dyslexia).

## **C- Perspectives**

This study had a second observation context about cultural institutions such as museums, that we did not develop in this paper. The comparison shows that if indeed a lot of work remain to

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<sup>5</sup>[http://www.babs.gmxhome.de/download/da\\_pdfTeX/accessibility.sty](http://www.babs.gmxhome.de/download/da_pdfTeX/accessibility.sty)

be done, the situation is generally better in the academic context. Inclusion of students with disabilities sensitized many teachers. Nowadays we have a bit more than 1% of students with disabilities in our universities, which means that most teachers meet some in their courses every year.

This guide and set of documents is being developed to help creating, spreading and perpetuating a culture of accessibility in the academic context, but we hope they can be useful in other contexts.

The document listed in this article (guideline and piratic sheets) are published under the Creative Commons Attribution-ShareAlike 4.0 International license<sup>6</sup> and are available as soon as they are finalised at : <http://chezdom.net/accessibilite-numerique/>

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## References

[1] B. Devauchelle, « *Comment le numérique transforme les lieux de savoirs : le numérique au service du bien commun et de l'accès au savoir pour tous* », ser. Collection “Société de la connaissance ». Limoges : Fyp., 2012.

[2] T. Bougie, « *Impact des nouvelles technologies sur la qualité de vie des personnes handicapées* », ser. Collection « *Intégration des personnes handicapées* ». Strasbourg : Éd. du Conseil de l'Europe, 2002.

[3] M. Carpio, « *L'accessibilité du web pour les personnes en situation de handicap dans le domaine de la culture et de l'enseignement supérieur* », Mémoire de Master , Université Paris 8-Vincennes-Saint-Denis and Université Paris Ouest Nanterre la Défense, June 2015.

[4] A. Petz and K. Miesenberger, “*Roadmap to accessibility,*” in *Computers Helping People with Special Needs – Proceedings of ICCHP 2014, Part I*, ser. Lecture Notes in Computer Science, K. Miesenberger, D. Fels, D. Archambault, P. Penáz, and W. L. Zagler, (Eds.), vol. 8547. Springer, 2014, pp. 324–331.

[5] D. Archambault, “*Maths Content Accessibility,*” in *Proceedings of the DEIMS*

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<sup>6</sup><https://creativecommons.org/licenses/by-sa/4.0/>

<sup>7</sup><http://asso-apaches.fr>

Conference 2012 (The International Workshop on Digitization and E-Inclusion in Mathematics and Science 2012), Nihon University, Tokyo, 2012, pp. 73–80.

[6] R. Moore, “*Ongoing efforts to generate “tagged pdf” using pdftex,*” in DML 2009 Proceedings, “Towards a digital Mathematics Library”, P. Sojka, Ed. Masaryk University : Muni Press, 2009, pp. 125–131.

[7] R. Moore, “Tagged mathematics in PDFs for accessibility and other purposes,” in MathUI, OpenMath, PLMMS and ThEdu Workshops and Work in Progress at the Conference on Intelligent Computer Mathematics, ser. CEUR Workshop Proceedings, no. 1010, Aachen, 2013. [Online]. Available : <http://ceur-ws.org/Vol-1010/paper-01.pdf>

[8] B. Schalitz, “Accessibility-erhöhung von latex-dokumenten,” Fakultät Informatik, Technische Universität Dresden, Diplomarbeit, July 2007.