REPORT ON WEB SKILLS SURVEY

Support services to foster Web Talent in Europe
by encouraging the use of MOOCs focused on web talent

D1.1 – First Interim Report

May 2014

Contents

Support services to foster Web Talent in Europe by encouraging the use of
Massive Open Online Courses focused on web skills (SMART 2013/N006)

CONTRACT NUMBER 30-CE-0597494/00-12

1   Introduction

This report is aimed at three audiences and it will consequently be structured in response to their needs and considerations:

- Policy makers at the regional / national / European level, who are trying to make sense of the MOOC phenomena and are considering how to leverage it to boost web entrepreneurship and enhance European competitive advantages in this field.

- MOOCs for web talent providers - universities, business schools, commercial providers, NGOs and any other body offering, or considering to offer, a MOOC for web talent.

- Potential participants - aspiring web entrepreneurs, who are considering attending a MOOC to enhance skills and competencies required for their initiatives.

This report presents the preliminary results of a European project which aims to foster web talent in Europe by encouraging the use of Massive Open Online Courses (MOOCs) focused on web skills.

There have been several attempts to coin a definition for Massive Open Online Courses (MOOCs) all of which have been considered when attempting a MOOCs definition for the present project (Cormier & Siemens, 2010, and Sharples et al., 2012). We propose the following definition of MOOCs, based on the following underlying features:

Features
'Massive' in the sense of no limit to attendance
'Open' in the sense that it can be accessed by anyone anywhere as long as they have an internet connection
Free of charge (not including the certificate of completion)
Online
Structured around a set of learning goals in a defined area of study
Executed according to a specific time frame and completion point
Offers possibilities for interaction, such as social media channels, forums, blogs or RSS feeds that contribute to building a learning community
Provides course materials such as videos, readings, and others, are provided free of charge by the course designers, teachers, facilitators or even students themselves (cMOOCs)
Includes assessment or evaluation, self assessment or peer assessment

A MOOC is an online course open to anyone without restrictions (free of charge and without a limit to attendance), usually structured around a set of learning goals in an area of study, which often runs over a specific period of time (with a beginning and end date) on an online platform which allows interactive possibilities (between peers or between students and instructors) that facilitate the creation of a learning community. As it is the case for any online course, it provides some course materials and (self) assessment tools for independent studying.

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There was no consensus amongst the sources we consulted (listed in the end of this document) on whether some type of certification or accreditation should be provided, nor whether the course materials should be open licensed.

The second step has been to narrow down the definition of MOOCs to be able to contain a list of the skills that comprise what we can include as being related to the web. These not only refer to technical skills, but also include non-technical dimension that may be relevant for of some domains, that is, cloud computing, mobile computing, among others.

The skills that we consider as essential to the web skills fall into three main categories:

- core web skills

- extended web skills

- adjacent web skills

Core web skills have to do with web authoring tools such as raw HTML, XML, and CSS (e.g. Dreamweaver), web programming or scripting (java, javascript, html5, python, Drupal, etc.) and website design.

Extended web skills, on the other hand, comprise graphic design, animation, and software engineering, and what we call adjacent skills are domain specific and include e-learning, games and gamification, online-entertainment, and digital art.

These skills map neatly onto the Mozilla Web Literacy Map (https://webmaker.org/literacy). We identified parallels with several categories under 'building the Web' (composing for the web, design and accessibility, coding/scripting, and infrastructure) and we are currently exploring further synergies.

The initial desk research provided a precise mapping of the MOOCs related to the web skills mentioned above that are currently available. Fifty-six European MOOCs and 115 US MOOCs related to web skills were identified. The analysis showed that within Europe, the providers of the MOOCs in question are concentrated in certain countries.

In addition to the desk research, an online survey was carried out amongst students, entrepreneurs, leaders of innovation support programs, developers, and MOOC providers. The survey aimed to identify the web skills which are most in demand and evaluate whether or not these are being covered by the current MOOC supply. The goal of this research component is to reveal insights that could help strengthen and enhance the use of MOOCs for web talent across Europe.

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2   Executive summary

The recommendations made and conclusions contained within this report reflect the findings of initial desk research and a subsequent online survey conducted amongst students, entrepreneurs, leaders of innovation support programs, developers, and MOOC providers.

Initial desk research showed that the USA boasts more than twice as many MOOCs related to web skills than are currently offered in Europe. Of those offered in Europe, it is clear that these are not evenly distributed - with Germany, Spain, and Switzerland being the three main providers in contrast to the UK and the Netherlands.

The survey, completed by over 2,800 respondents from 121 different countries, aimed to help identify the web skills which are most in demand and evaluate whether or not these are being covered by the current supply of MOOCs.

The key findings showed that:

- The majority of the respondents were already aware of what a MOOC is (only 1 in 4 did not) with over 64% claiming to have previously taken one.

- MOOC participants are most interested in acquiring or improving web design skills.

- Over half of students claimed that taking a MOOC helped them develop the skills they needed but they also claimed that developing these skills did not ultimately help them to find job.

- MOOC providers expressed their interest in the extra dissemination opportunities that MOOCs bring, as well as the fact that MOOCs can help improve blended learning pedagogy. They also stated however that cost remains the biggest barrier for the provision of MOOCs.

- Most potential MOOC participants are not seeking a university degree (because they already have one), but instead wish to simply upscale specific skills needed for current or future jobs.

- Developers, entrepreneurs and innovation leaders stressed the fact that in the current market it is especially difficult to find employees with domain specific skills (especially, iOS, Android and HTML5 experts). Similarly, they think that especially MOOCs and 'on-the-job' training could be the most effective training methods in providing those skills and closing any skills gap.

Besides the findings of the desk research and the survey, a set of recommendations are put together for policy makers, providers of MOOCs for web talent, and potential participants.

- MOOC providers need to address the concerns of students regarding recognition of MOOCs as valuable learning practices.

- Potential MOOC participants are struggling to find the MOOCs they need, which represents another factor policy makers should consider going forward.

- Policy makers should consider offering MOOC providers specific mechanisms that can help them reduce the cost and raise the quality of the MOOCs they produce, in order to better meet the demand for courses based around specific areas of content.

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3   Recommendations: policymakers

The responses to the survey suggest that we have passed the "early adopters" phase. Among the survey sample, MOOCs are a well-known phenomenon, both to people who are involved in them (providers and students) and also to people in other sectors, such as leader of innovation support programs, corporate managers, and human resource personnel. Consequently, and due to their media exposure and the marketing efforts of MOOC platforms, there is no need for generic promotion and awareness raising campaigns.

However, there is a need to facilitate better mapping of the supply and demand, and to ensure a better fit between them.

- Entrepreneurs and potential learners would like to see more hands-on, practice / project based offerings which develop specific skills. These should be suitable for on-the-job professional development. The supply does not always fit this model.

- There seems to be an abundance of provision, yet learners are struggling to find the MOOCs they need.

Since provision of MOOCs does not seem to be sufficient by itself, different measures should be implemented to make the MOOCs accessible as proper training possibilities to a wider population beyond the one surveyed under this project. Additionally, better search mechanisms are required, along with course metadata exchange standards to support these. An example for course data exchange standards can be found here: http://www.xcri.co.uk/.

Most current providers do not see MOOCs as profit bearing activities – the leading motivations for conducting MOOCs were public image, philanthropy, and experimenting with new pedagogies and technologies. Yet at the same time, they cited cost, quality assurance and institutional culture as the main barriers to provision. While institutional culture is likely to change as MOOCs become the norm, so will their impact on public image. If we want to sustain and grow the MOOC phenomenon, we need to offer providers mechanisms that will help them reduce the cost and raise the quality of the MOOCs they produce.

Regarding the issue of the institutional cultures, professor Pierre Dillenbourg, one of the members of the advisory board of experts which reviewed this report, noted that universities might not the best agent to produce MOOCs for the basics skills surveyed in this study. These skills are orthogonal to the curriculum of computer science departments, which focuses on foundational and theoretical aspects of computing, such as algorithms and data structures, as well as advanced specialist topics such as cryptography and signal processing. Professor Dillenbourg also suggested a "pyramid" of skills required to stimulate the European market: at the broad base level are elementary skills which could enhance any business, by opening up access to web and mobile channels. At the next level are web and mobile design and development skills required for web-centric companies, at the narrow top end are advanced skills such as security and data-mining required by specialist companies. The first two can be provided by MOOCs but the last are only covered by formal academic education.

Another critical issue is the availability of suitable certification schemes. The vocational focus of learners and entrepreneurs suggests that MOOCs are not, and should not, be modeled on the basis of academic programs. Most MOOC participants either have a degree or are not seeking one. However, they would like to acquire skills that will help them to get a job, or to progress in their

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current job. Furthermore, they would like to have these skills accredited in a form that would be recognized by their current or future employers. Again, this relates to the design and quality control of MOOCs: providers need to point their MOOCs to vocational objectives, need mechanisms to ensure their constructive alignment with these objectives, and need authorities to approve their certification. An open badges system, such as Mozilla's Open Badges, could be another possible way of solving this, much more aligned with the open education philosophy than recent developments in the MOOC ecosystem. Both Udacity's certification system and Coursera's one offer certification possibilities that are available for a fee. Whereas the latter ones mirror the traditional university system in the manner they have of assessing the knowledge gained through MOOCs (by tests, exams, exercises), the open badges system offers students the possibility of displaying skills their acquired by showing evidence to back them up.

As the MOOC phenomenon goes beyond the initial hype, one interesting element is emerging: MOOCs are being used by providers as a "techno-pedagogical laboratory", and the lessons learnt inform their main practice in paid courses. This dynamic should be condoned, celebrated and encouraged. It suggests that the impact of MOOCs can potentially go far beyond their immediate domain, as a catalyst for change across educational systems.

The concern of the students and interest on the recruiter's side about recognition of MOOCs as valuable, albeit informal, learning practices should not be taken lightly. Current policies should seek to implement measures that grant that these are in fact put in place in the near future.

3.1   Further research

Web entrepreneurship in Europe is thwarted by a twofold gap between young Europeans' (particularly women's) attitudes, skills and competencies, and the requisites for instigating new innovations in web and mobile technologies.

- The first gap concerns the potential innovators self-efficacy and attitude, and requires the promotion of an entrepreneurial mind-set.

- The second gap regards the specific technical, design, business and management skills necessary to initiate and sustain a successful enterprise.

The first challenge is a matter of market intelligence: there is a need for a clear mapping of needs, both of the entrepreneurs and their potential workforce, in terms of skills, competencies, qualifications, and experience. This needs to be mirrored by mapping the current and projected provision, to identify the critical gaps and channel efforts towards their resolution.

The second challenge arises from the lack of clarity in provision in terms of business models, pedagogical models, quality standards, and respective technological platforms. At a first glance, it may seem that there are ample MOOCs, OERs and other educational opportunities to address the skills that young people need to enter the world of web and mobile enterprise. But what if learners accomplishments in these opportunities cannot be verified by employers, or they cannot prepare participants sufficiently for the roles they will assume? Then, this provision is ineffective.

The ultimate decision should be though to decide whether the purpose of using MOOCs to enhance web skills of young adults in Europe is about preparing a "silicon generation" so that these youngsters can work in web companies across Europe or whether a more ambitious goal should be achieved, that is, improving the efficiency of IT practices in any company or business so that web

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components are widespread in all businesses in Europe. In other words, one should have a clear idea about who needs specific training and for what purpose before embarking in deciding what the best training option could be. However, and as this report reveals, MOOCs offer a potential solution in both cases. The question of whether MOOCs should mimic university courses or rather offer some practical training directed towards fulfilling specific needs would remain to be addressed, as well as the institutions that should design, develop and deliver them.

4   Recommendations: MOOCs for web talent providers

The responses from potential employees and employers in the web development sector indicate a clear role for innovative educational institutions, to address existing skills gaps and respond to new needs as they emerge.

Universities, technical colleges and business schools can play a vital part in this provision, and also stand to gain significant benefits from their activity in this domain. However, it is important to dispel some potential misconceptions.

The first issue providers need to consider is the learner profile for MOOCs for web skills. Most of the potential participants are not seeking a university degree, they wish to upscale specific skills needed for current or future jobs. The responses to the survey indicated that they are much less interested in theoretical content, and are keener on practical, hands-on learning experiences. This has implications in terms of the appropriate business and pedagogy models.

In terms of the business model, universities should not base their case on expectations for recruiting paying students from MOOC participants. On the other hand, some participants would be willing to pay modest sums for certification or personal support. Existing providers noted that their key motivations for providing MOOCs are philanthropy, institutional image, and the opportunity to experiment with new pedagogies and technologies. Other possible models could be based on supplementing existing study programs by offering MOOCs on niche or emerging topics which cannot be covered by formal academic programs. This can be presented as a service for both existing students and alumni.

In terms of the pedagogical model, it is clear that neither the standard formulas of academic courses nor the prevalent MOOC format of short video – quiz – forum are optimal. Developers, entrepreneurs and innovation leaders, noted the importance of practical training and learning-by-doing. MOOC providers and academics were also concerned about whether or not MOOCs succeed in providing the practical, interactive and hands-on learning required for teaching web skills. The Nand2Tetris course is an interesting example to study (http://www.nand2tetris.org). Although it is not a MOOC, and does not address web skills directly, it opens up interesting possibilities in terms of pedagogy and supporting technology.

There are other examples that fall within the MOOC realm that address the aforementioned issues: The Webmaker Training uses different modules to teach mentors on how to teach the web (http://training.webmakerprototypes.org) or as they put it themselves "creative ways to teach web literacy, digital skills and open practices". Another interesting example that can serve as an illustration of the synergy between MOOCs and other open educational formats is the Mechanical

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MOOC which operates without a professor is built on existing open educational resources and open courseware.

The second most common recommendation that students, MOOC providers and academics offered was the need for collaboration between peers, to do team work and the possibility of interacting and obtaining feedback from both instructors and peers. Most current MOOCs offer opportunities for learner interaction, through discussion forums – but supporting actual group work and project-based interaction is a challenge.

Finally, both students and providers raised concerns about the quality of the learning experience, in terms of clarity, usability, and appropriateness of content and activities. This is an issue of learning design, which is a direct projection of classroom practices, multiplied by the difficulty of transition into a new teaching medium: the same complaints students have regarding online courses are probably true for many off-line courses. The difference is that classroom blunders remain in the classroom, whereas online mistakes are exposed for the world to see.

All these observations highlight the fact that educational providers should not take the move into the MOOC world lightly: the teachers and designers assigned with the task need clear guidance and support to achieve a high standard of quality, in terms of pedagogy, resource production, user experience, and a variety of other factors.

Another point of concern that came up in many of the comments of each group of respondents was the possibility of providing some sort of certification upon course completion that would be recognized in the job market. Even the possible recruiters (entrepreneurs and innovation leaders) were concerned about the fact that no official recognition was offered for this kind of training that they value. MOOC providers and academics claimed that the employers' real needs should be considering when offering a MOOC, and the students stressed the importance of real-world situations, examples and needs being taken into account and addressed in MOOCs.

5 Recommendations: potential participants

MOOCs are clearly not a substitute for a university degree, and it is important to dispel any possible illusions. Anyone aspiring for a high-competence engineering job should choose a suitable academic programme. However, when it comes to a wide range of specific skills required for a particular task – most often "there's a MOOC for that". The first problem most potential participants encounter is identifying the skills they need and the possible MOOCs addressing these. Luckily, we are witnessing the emergence of directories and search engines for MOOCs and other educational opportunities, such as Mooky Skills and gradberry.

Some of the issues that potential participants need to consider when selecting a MOOC is the fact that MOOCs can be used to obtain specific skills provided that the student manages to obtain some sort of certificate or some other way of proving or showing the knowledge they gained through this type of training. The option of building e-portfolio can be an interesting possibility to explore. The good news is that there is a strong interest from employers and recruitment entities in exploring and acknowledging the training possibilities of MOOCs and other informal learning practices, so that makes MOOCs one viable training option if a person is interested in getting specialized in a specific area of web skills.

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On a different note, potential MOOC participants should be aware that programming and web development skills were not the only skills in high demand according to entrepreneurs, leaders of innovation support programs and developers. These indicated their concern about the lack of other skills such as domain specific and adjacent web skills within their sectors.

Similarly, even though MOOCs provide valuable training opportunities for potential participants, one of the recommendations that both from several survey respondents and members of the advisory board pointed to are other initiatives or open online training opportunities such as Code Academy, which recently reached 24 million users.

6   Methodology

6.1   Desk Research

This research was conducted as a result of establishing close working ties in the field of MOOCs with over 200 European universities. Through phone conversations and emails, follow-ups alliances were established major European universities and Business Schools, all existing European MOOCs related to web talent were gathered. The desk research relies on true cross-European scope and takes advantage of main players in the field of MOOC development and provision to study and assess their current scope, role and success.

The MOOCs were selected according to the defined criteria (see the sections below), and further subcategorized according to the institution providing the MOOC, the country, the subject, the key words, and the web talent category. There will be comparison with the US offering on MOOCs for web talent coming soon.

Please, refer to the institution's page for the complete list of the sources of information that will be consulted to create both databases as well as the identified European MOOCs for web talent as of January, 2014.

For the purpose of this project, it is important to establish a working definition of MOOCs which will take into account already existing definitions whilst proposing a list of common features that a MOOC must have. Similarly, a definition of the skills that fall under the web talent category will also be made clear in the section below. Both definitions will be taken into account when determining whether an existing online course can be considered a MOOC that addresses web skills.

6.2   Survey

The online survey was carried out with the aim of providing insights and data to help strengthen and enhance the use of MOOCs for web talent across Europe. The objective of the survey was to identify the web skills which are most in demand and evaluate whether or not these are being covered by the current MOOC supply.

The survey was launched on February 26th 2014 and was closed on April 13th 2014. This report is based on 2,371 complete responses, coming from students (731), developers (315), entrepreneurs (306), academicians (443), leaders of innovation support programs (103), corporate managers (90), MOOC providers (39) and venture capital investors (11). The survey was offered in 4 different

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languages: English (1,939 not complete responses), German (406 not complete responses), French (332 not complete responses), and Spanish (193 not complete responses).

As an opt-in survey, the findings from this study can only be generalized to a limited extent. The respondents that volunteered to complete the survey may not make up a representative sample of the target populations (as mentioned in the paragraph above) due to the nature of online surveys.

7   Key findings

7.1   Key findings: desk research

The first results provide a precise mapping of the available MOOCs existing in Europe in the area of web developers and set the ground to define the essence of the survey to be carried out. Through the desk research carried out we were able to identify 56 European and double the amount of US MOOCs (115) related to web skills as you can see in the table below.

The current offering of European MOOCs related to web talent across European countries is not evenly distributed as shown on the map: Germany, Spain, and Switzerland were the three main providers of MOOCs for web talent with 18, 13 and 9 MOOCs respectively. The other major players in the field were France, the UK, Finland and the Netherlands with 6, 5, 4 and 1 MOOC related to web talent. The above-mentioned listing of MOOCs for web talent was provided by 23 European and 41 US higher education institutions.

Appendix 1 shows the list of MOOCs that is updated by our team on a regular basis.

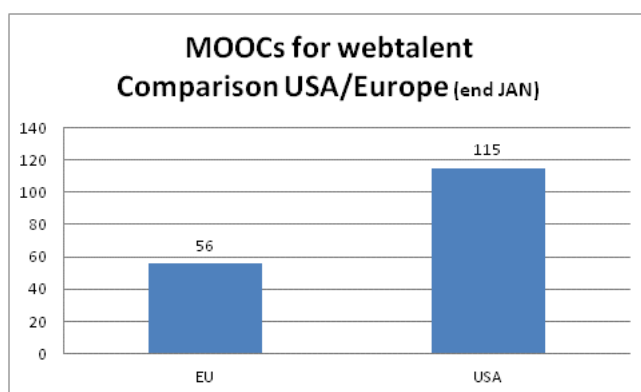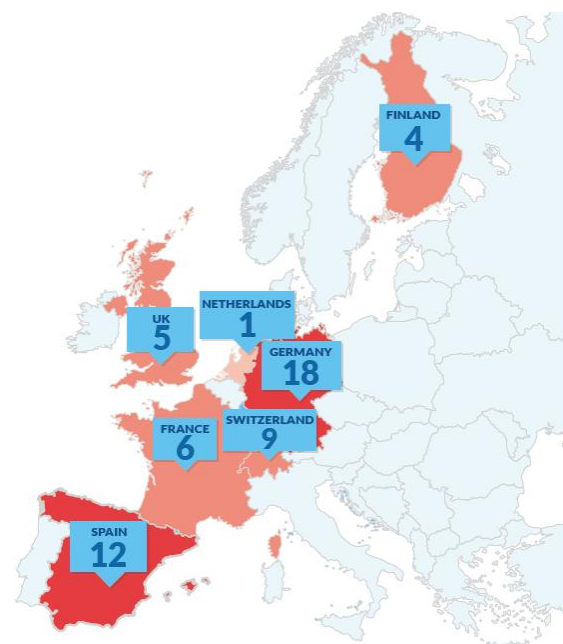**Figure 1. USA vs. European MOOCs for web**

Figure 2. MOOCs for web talent live-map

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7.2   Key findings: survey

This section presents the results of an online survey (see Appendix 2) which was carried out amongst students, entrepreneurs, leaders of innovation support programs, developers, and MOOC providers. The survey aimed to identify the web skills which are most in demand and evaluate whether or not these are being covered by the current MOOC supply. The goal of this research component is to reveal insights that could help strengthen and enhance the use of MOOCs for web talent across Europe, one of the objectives of the European project Foster Web Talent by Encouraging the Use of Massive Open Online Courses Focused on Web Skills.

The following sections are divided according to the information provided by each of the targeted groups in the survey, namely students, MOOC providers, and developers, entrepreneurs and innovation leaders. The survey was designed in such a way so that each target group would respond to different questions.

Students were asked questions as experts in taking MOOCs, MOOC providers were asked another set of questions regarding the MOOCs they provided and the model of their institutions regarding MOOCs, and finally, the group formed by developers, entrepreneurs and innovation leaders were asked yet another set of questions regarding the training potential of MOOCs for the specific (web skills) they think their potential employees and aspiring entrepreneurs are missing.

Personal information

Most of the respondents were between 23 and 42 years old (56%), were male (61.5%), and held a graduate (49%) or post-graduate degree (33%). The survey was widely disseminated to the 5 continents, and as a consequence, there were 121 different countries represented. The top countries of residence of the respondents were Germany (339 respondents), France (231), followed by Spain (174) and Italy (103).

The survey also revealed that MOOCs are a very well known phenomenon since most of the students (63%), developers (70%), and entrepreneurs (67%) had some previous knowledge about them or had even taken one (61% of the students, 67% of the developers, and 61% of the entrepreneurs).

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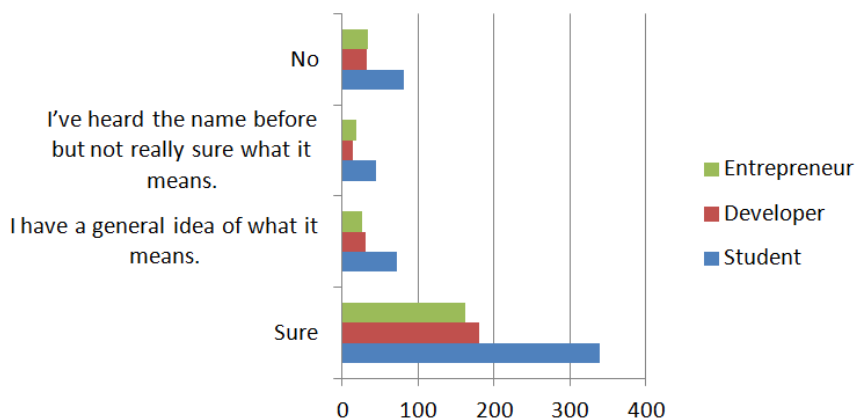
Do you know what a MOOC is?

Figure 3. General knowledge about MOOCs

Students insights

Most of the students taking the survey were interested in acquiring or improving web design skills (42%), HTML5 (36%), Android (32%), Java Script (30%), CSS (29%), and PHP (25%). The majority knew about MOOCs (only 1 in 4 did not), and most of them (64%) had previously taken one.

The most common subjects students claimed they had taken a MOOC on were HTML5 (15%), web design skills (12%), CSS (10.4%) and Phython (10.4%). The preferred platforms were iversity (65%)[1], Coursera (43%), and edX (22%).
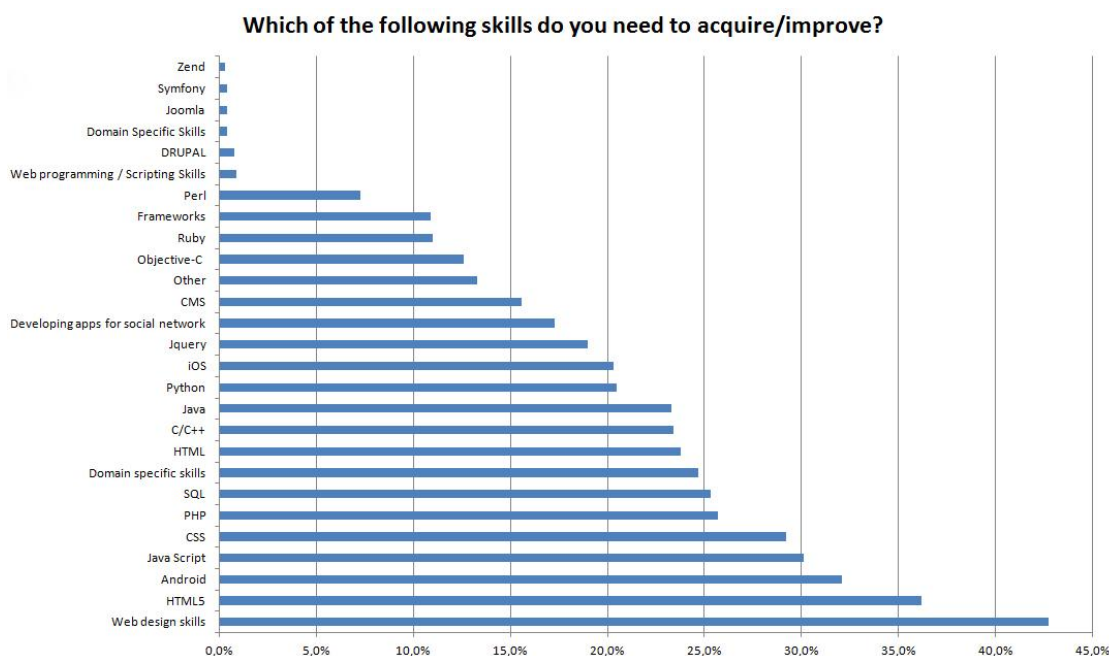

Figure 4. Skills students need to acquire

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[1] The survey was advertised through iversity's mailing list, which may account in part for iversity being the preferred platform

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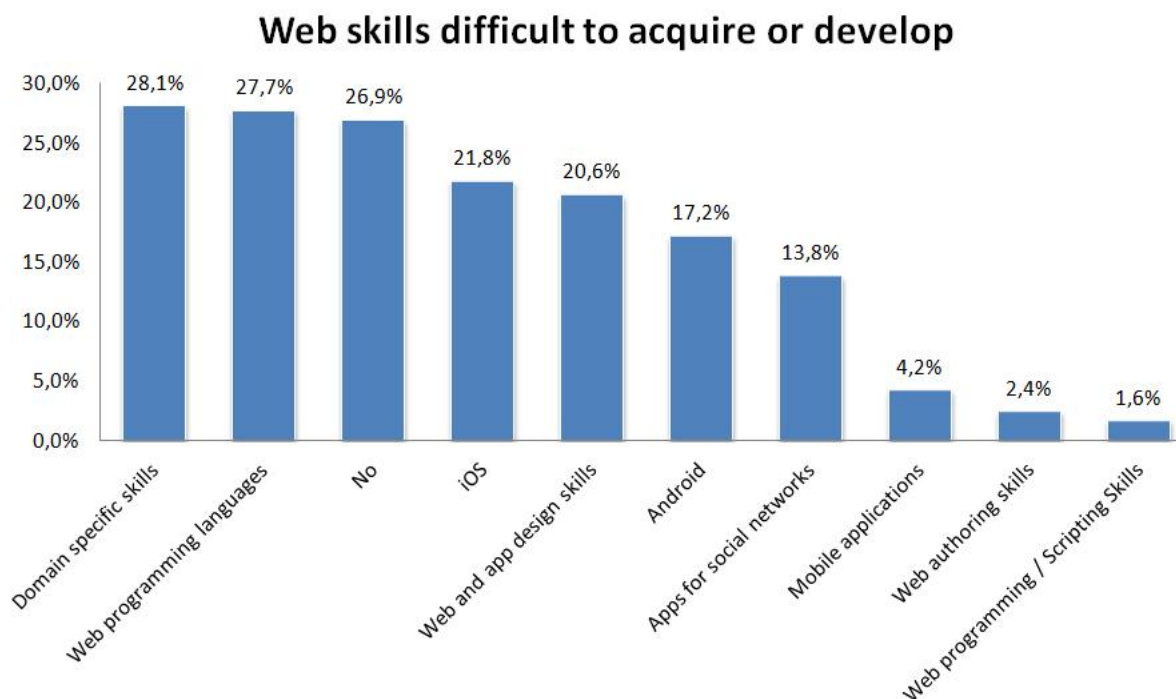
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Most of the respondents claimed that taking a MOOC helped them develop the skills they needed (51%) to some extent (42%) but they claimed that developing these skills did not help them finding a job (70%). Nonetheless, most of the students say they would still recommend taking a MOOC because it's cost free (71.8%), it can be taken anywhere (66.9%) and because it helps learning subjects outside one's main area of study (64.4%).
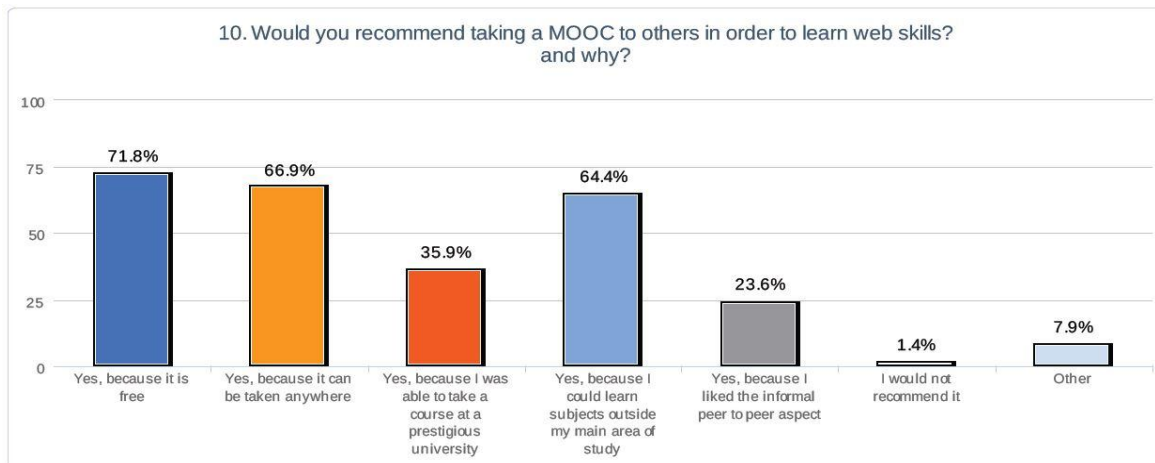
Figure 5. Students recommending MOOCs

In addition, most of our respondents would be willing to pay for a MOOC, provided that they receive a certificate that is valued in the job market (60%). The great majority (70%) would also be interested in taking a MOOC to develop, improve or learn the skills that the survey inquired about.

Regarding the web skills that are more difficult to acquire/develop given the current MOOC supply, domain specific skills (audio/video authoring, game design, animations, and so on) came on the top of the list (28.1%), closely followed by web programming languages (28%), iOS apple native programming skills (22%), and web and mobile applications design skills (21%). However, it must also be stressed that over 1 in 4 respondents claimed that there were no particular web skills that they thought were more difficult to acquire/develop considering the current MOOC supply.

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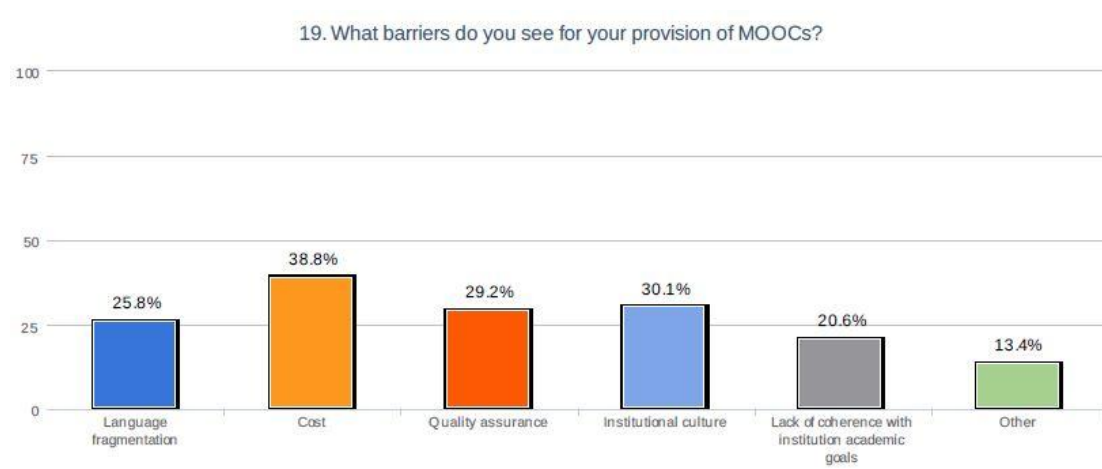## Web skills difficult to acquire or develop

Figure 6. Skills students think are more difficult to acquire

MOOC providers' insights

Even though most of the MOOC providers who responded to the survey were involved in developing MOOCs in fields or subjects not related to web skills, some did claim to be involved in Web design MOOCs (20%), HTML (11%), domain specific skills (11%), and developing apps for social networks (10%).
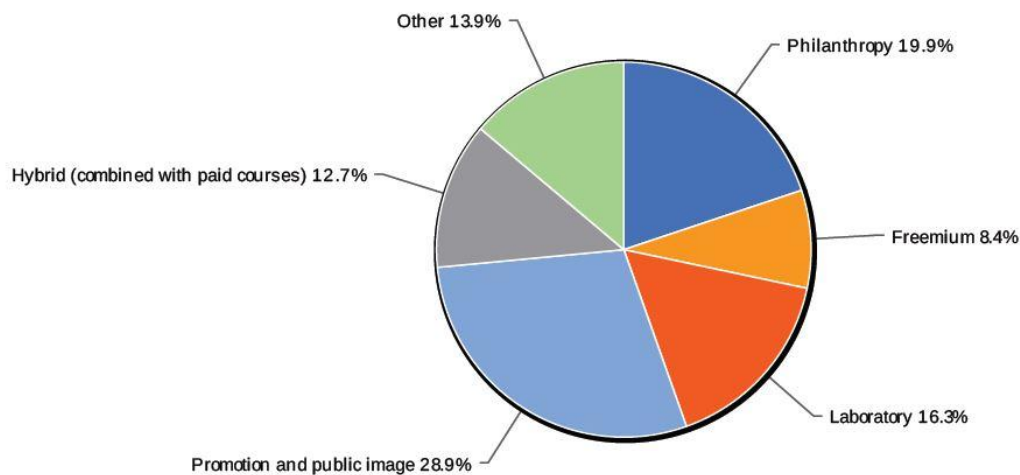
MOOC providers expressed their interest in the extra dissemination opportunities that MOOCs bring, as well as the fact that MOOCs can help improve blended learning pedagogy, and also provide large data samples that can help improve teaching methods. On a different note, they stated that costs are still the biggest barriers for the provision of MOOCs, along with the current institutional culture, and issues around quality assurance.

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Figure 7. Barriers for MOOC provision according to MOOC providers

In the end, MOOC providers agree that MOOCs aid in promoting the public image of the their institutions, and that they are mostly interested in them for philanthropic motivations and due to the fact that they offer large amounts of data that can help develop digital pedagogies (and thus serve as pedagogical laboratories). Other business models, such as hybrid or freemium models, are chosen by fewer institutions. , Hybrid MOOCs would be combined or even used as additional resources within regular paid courses.   In the freemium model, the basic course would be offered for free, but with optional paid features, such as certification, to name just one.

18. What is your typical business model for MOOCs?

Other 13.9%
Philanthropy 19.9%
Hybrid (combined with paid courses) 12.7%
Freemium 8.4%
Laboratory 16.3%
Promotion and public image 28.9%

Figure 8. Business models for MOOCs

Insights from developers, entrepreneurs and innovation leaders

Entrepreneurs, leaders of innovation support programs, corporate managers, human resources personnel and developers agreed that potential entrepreneurs and web developers should improve their web and application design skills, domain specific skills (such as audio/video authoring, game design, and animations), and web programming languages. They should specifically focus on Android native programming skills and developing applications for social networks.

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21. Which of the following skills do you think potential entrepreneurs and web
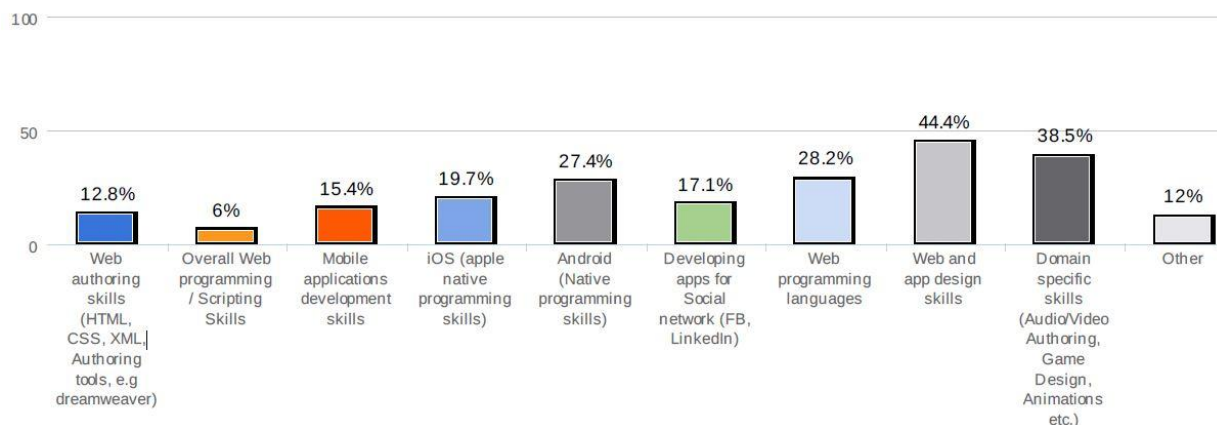developers should improve in general?

Figure 9. Skills entrepreneurs and web developers need to improve

They stressed the fact that in the current market it is especially difficult to find employees with
domain specific skills, iOS, Android and HTML5 experts.

Similarly, they think that especially MOOCs and 'on-the-job' training could be the most effective
training methods in providing those skills and closing any skills gap. It is interesting to notice that
MOOCs are the first preferred option in most cases and for all the targeted respondents, which
implies that entrepreneurs, leaders of innovation support programs, corporate managers, human
resources personnel and developers are all familiar with the MOOC phenomenon.

23. Which kind of training do you feel could be most effective in providing those skills and closing any skills
gap?

	MOOCs	Higher Education	Further Education	On-the-job training	No need for special training	Responses
Web authoring	46.2% 18	7.7% 3	17.9% 7	23.1% 9	5.1% 2	39
Web and app design	34.2% 13	21.1% 8	26.3% 10	15.8% 6	2.6% 1	38
Overall Web programming / Scripting Skills	33.3% 13	17.9% 7	25.6% 10	20.5% 8	2.6% 1	39
iOS (apple ative programming skills)	33.3% 22	9.1% 6	16.7% 11	33.3% 22	7.6% 5	66
Android (native programming skills)	39.4% 26	7.6% 5	21.2% 14	28.8% 19	3.0% 2	66
Developing apps for Social network (FB, LinkedIn)	36.4% 24	13.6% 9	19.7% 13	27.3% 18	3.0% 2	66
Web programming languages	29.4% 20	25.0% 17	22.1% 15	19.1% 13	4.4% 3	68
Domain Specific Skills (Audio/Video Authoring, Game Design, Animations, Mobile apps, etc.)	27.2% 28	19.4% 20	21.4% 22	30.1% 31	1.9% 2	103
Web and app design skills	37.3% 25	17.9% 12	22.4% 15	19.4% 13	3.0% 2	67

Figure 10. Effective training methods for each skill

The average per column of the table above indicates that MOOCs (34%) are regarded as preferred
training option for closing any skills gap, followed by on-the-job training (24%), further education
(21%), and higher education (15%).

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Additionally, over half of them note they place a great amount of value (60%) or some value (35%) to skills acquired through informal learning practices.

Conclusions

The results of this survey confirm that MOOCs are well-known and valued learning practices. The survey also revealed that there is a strong interest from employers and recruitment entities in exploring and acknowledging the training possibilities of MOOCs and other informal learning practices.

Contrary to what we expected, programming and web development skills were not the only skill sets in high demand. Entrepreneurs, leaders of innovation support programs and developers are also concerned about the lack of other skills such as domain specific or adjacent web skills (see the definition in the introductory section) within their sector.

Overall, students would be interested in obtaining some more information on where to find MOOCs that are related to the aforementioned web skills. The current provision of MOOCs seems to be sufficient, but the students do not necessarily know where they can easily find the MOOCs they are looking for.

MOOC providers also value highly the benefits of MOOCs for their institutions and for their research, although they struggle with the amount of resources required to develop MOOCs within the current (higher education) educational system. The fact that cost, institutional culture and quality assurance are among the greatest barriers potential providers face in developing and delivering new MOOCs implies that these concerns need to be addressed if we want to support the growth of European web entrepreneurship through this promising new educational instrument.

The concern of the students and interest of the recruiter's about recognition of MOOCs as valuable (albeit informal) learning practices should not be taken lightly, and current policies should seek to implement measures that grant that these are in fact put in place in the near future.

It must be noted as well that the results of recently released poll conducted by Northeastern University to business leaders, besides highlighting the continuing gap between the skills employers are looking for and those recent college graduates actually have, they point out to similar conclusions to our study: there are increasingly more positive attitudes towards online informal learning practices.

8   Summary and Conclusions

The main conclusion that can be inferred from the research and survey presented in this report is that MOOCs offer a viable solution for the training of aspiring entrepreneurs in Europe. Both MOOCs participants and potential recruiters claimed that the current MOOC offering covers the skills demands they are interested in developing for themselves or their workforce. It should be noted though that entrepreneurs, leaders of innovation support programs and developers expressed their concern about the lack of other skills such as domain specific and adjacent web skills in their potential employees.

What remains to be seen is which are going to be the best providers for these MOOCs and other related open learning experiences. It is not clear at this point, as pointed by the members of the

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advisory board, whether universities as they are understood and managed today have the capability of offering MOOCs in these areas.

Another point that should be made clear is whether the goal of training potential web entrepreneurs in web skills is preparing a silicon generation so that young adults can work in web companies across Europe or rather whether it would make more sense to just improving the efficiency and capability of IT components in any business.

Lastly, as already indicated beforehand, there is a general interest about the possibility of offering some sort of recognition for taking MOOCs as valuable learning practices, and current policy makers should seek to implement policies that provide a roadmap for this to become a reality.

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10   Appendices

Appendix 1 – Desk research results table (updated every month)

https://docs.google.com/spreadsheet/ccc?key=0AgHHC2ws5AE_dDFnUEdBLWdneFJtSjdCN3dOM281aGc&usp=sharing

Appendix 2 - Survey Questions

http://tools.paueducation.com/MoocsWebSkills/survey_questionsAnnexI.pdf