Relevance of MOOCs for Training of Public Sector Employees

Enrollment, Completion and Web Accessibility Challenges

Sandra Sanchez-Gordon, Tania Calle-Jimenez
Department of Informatics and Computer Sciences
National Polytechnic School
Quito, Ecuador
sandra.sanchez@epn.edu.ec
tania.calle@epn.edu.ec

Sergio Luján-Mora
Department of Software and Computing Systems
University of Alicante (Spain)
Visiting teacher at the National Polytechnic School
Quito, Ecuador
sergio.lujan@ua.es

Abstract— **A massive open online course (MOOC) is a type of online course that can be taken for a huge number of participants. Originally, MOOCs scope was to provide introductory university level courses to students worldwide. Currently, the MOOC model is expanding is scope to training in both private and public sectors. There are more than 30 million of public sector employees only in Latin American and Caribbean Region. Given the huge number of public employees that need to be continuously trained at regional, national, and local range, using MOOCs for training in public sector is not only a valid option but also a necessity. Among the government topics that public employees need training are public service culture, national political constitution, government structure and policies, national development plans, institutional strategy, macroeconomics, monetary and fiscal policy, sovereign debt, regulatory and legal frameworks, and tools for public administration such as management for results. Also, in recent years, government and private organizations have recognized the importance of training their employees on space technologies that manage geographic information for the primary purpose of increase development through getting knowledge of the territory and its behavior. This paper presents four cases of use of MOOCs for public sector training. It also presents strategies to address three major challenges: enrollment, completion and web accessibility. Finally, it states some conclusion and future research.**

Keywords— Massive Open Online Courses; MOOCs; Training; Public Sector; Government; GIS; Enrollment; Completion; Web Accessibility

I. INTRODUCTION

Training processes are planned by national and local governments to generate knowledge, develop skills and lead to changes in attitude on public employees. With these processes, public sector organizations seek to increase individual and collective capacity to contribute to the fulfillment of the institutional missions, to better serve citizens, to improve job performance, and contribute to the integral development of the public employees [1].

Normally, training in the public sector is delivered face-to-face or in a traditional e-learning environment. Nevertheless, there is a need to improve the way training is delivered to public sector employees to reach a greater number of employees in less time and with less cost, improving also the quality of the training. Massive open online courses (MOOCs) might be the answer, provided that current challenges to deliver MOOCs are successfully addressed.

This study focuses in the emerging use of MOOCs in training of public sector employees, presenting as examples courses about government topics and use of geographic information with spatial technologies. It also proposes strategies to address three main challenges: enrollment, completion and web accessibility.

II. MOOCS

The term MOOC refers to a relatively new category of online courses that can be taken by huge number of students at no-cost (or low cost). The main features of a MOOC are [2]:

- Massive, a MOOC is designed to enroll tens of thousands of learners at the same time.

- Open, a MOOC allows free enrollment with no requirements to get open access to content, learning and assessment activities at any place, from any device although not always any time (often there are fixed start and end dates).

- Online, a MOOC is cloud based, which means Internet access is required.

- Course, a MOOC has learning objectives, contents, and learning and assessment activities, same as any course.

In 2008, the first MOOC was set up by Stephen Downes and George Siemens at the University of Manitoba, Canada. In 2011, the MOOC "Introduction to Artificial Intelligence", offered by Sebastian Thrun of Stanford University and Peter Norving of Google, had an enrollment of 160,000 participants. The success of this course promoted the development of more MOOCs. By July 2015, if current

tendency continues, there will be around 2400 MOOCs available worldwide, as illustrated in Figure 1.

Growth of MOOCs
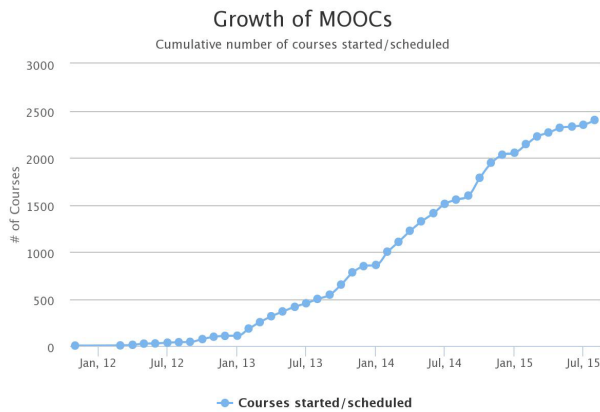Cumulative number of courses started/scheduled

Figure 1. Growth of MOOCs [3]

At the beginning, the MOOC scope was focused on providing introductory university level courses to students around the world. Pioneer higher education institutions in this field were Stanford, MIT, and Harvard. Figure 2 shows the steadily growing tendency of students to enroll in online courses as an alternative to face-to-face courses.
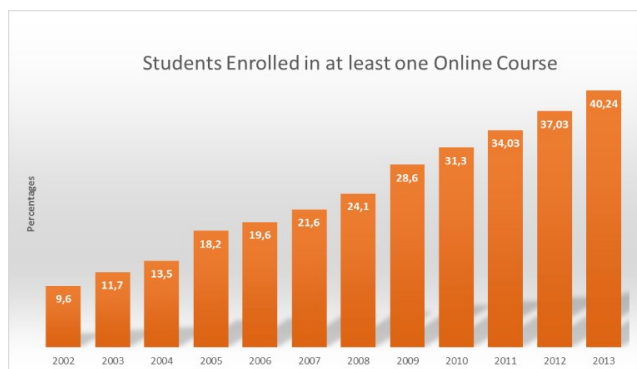

Figure 2. Percentage of Students Enrolled in at least online course [4]

Currently, the main MOOC platforms are Coursera (10.5 million students), edX (3 million students), Udacity (1.5 million students), MiriadaX (1 million students) and FutureLearn (800.000 students), summing up around 17 million students [3].

MOOCs are rapidly expanding their scope from higher education to secondary education and to training in both private and public sectors.

III.   CONTEXT OF TRAINING IN PUBLIC SECTOR

Regarding training of public sector employees, the challenge is significant. To have a perspective, only in Latin American and Caribbean Region there are more than 30 million of public sector employees. Many of them have limited or no access to training due to lack of resources in their national or local governments. Within this group, there are approximately 9 million managers and professionals who could be the target population for training in spatial technologies for development and decision making issues [5].

At country level, in Ecuador, for example, only the executive branch consists of around 480,000 employees and there are around 6,000 public sector institutions throughout the country [6].

Given the huge number of public employees that need to be continuously trained at regional, national and local range; using MOOCs for training in public sector is not only a valid option but also a necessity.

IV.   PUBLIC SECTOR TRAINING NEEDS

In any organization, it is necessary to continually train employees in all organizational levels to keep their knowledge up to date. At operational and support level, it is important to cover general government topics. Whereas, at management and decision making level, it is important that government officials and decision makers have knowledge of geographic information management using spatial technologies.

Among the government topics that public employees need training are public service culture, national political constitution, government structure and policies, national development plan, institutional strategy, and tools for public administration, such as management for results.

Public service culture is defined as a set of values, attitudes and behaviors to develop in public employees to better serve the needs of citizens. Knowledge of the political constitution and national development plan by the public servant is essential in its civic culture. Also, the public employee should know about the organisms that conforms the state and the relations among them; giving especial emphasis on the strategy of the institution to which the employee belongs to. Public employees need to know how to use tools for public administration such as macroeconomics, monetary and fiscal policy, sovereign debt, regulatory and legal frameworks, strategic planning, budgeting, and management for results [1].

Additionally, government officials and public decision makers should know about geographic information management. Geographic Information Systems (GIS) are widely used technologies for manipulate and transform geographic information with the aim of supporting decision making in the public and private sector management level. GIS helps public decision makers to understand the geographic characteristics of a territory and become problem solvers at social, economic and political levels. Hence, government and private organizations have recognized the importance of training their employees on GIS technologies.

MOOCs can support the design and implementation of regional and national training programs adapted to the particular needs of governments. These training programs must include government topics and management of geographic information.

V. MOOCs AND PUBLIC SECTOR TRAINING: STUDY CASES

This section presents four study cases regarding use of MOOCs in public sector training. To elaborate these study cases, authors registered in them as students and analyzed their contents.

A. IDBx

In March 2014, the Inter-American Development Bank (IDB) became the first international organization in Latin America and the Caribbean Region to offer MOOCs. In partnership with edX –the MOOC platform provider founded by Harvard and MIT. IDB created IDBx and extended its offering of online and face-on courses to a much wider audience of public officials, decision makers and other key actors in the region and the world. The three initial IDB MOOCs are being prepared by IDB specialists and future ones will be developed in cooperation with leading universities in the Americas and will be available in Spanish [7].

The first MOOC offered by IDB is IDB1.0x "Introduction to Management for Development Results", started September 2014. It is a six-week course with 6 hours per week commitment. At the time of writing this article, IDB1.0 had 2.942 active participants of 8,606 registered participants from 110 countries. From the registered participants, most reside in Peru (17%), followed by Colombia and Mexico (13.4%). In 2015, IDB will be offering a second edition of IDB1x, IDB2x "Better Pensions, Better Works" and IDB4x "Leading the Sustainable Development of Cities" [8].

B. IMFx

In June 2013, the International Monetary Fund announced a partnership to use edX platform to deliver economics courses to government officials of 188 member countries. The IMF has eight training centers around the world and delivers courses to thousands of central-bank, finance-ministry, and other officials per year. The Fund adopted the MOOC model to expand its reach to a wider audience promoting greater understanding of economic policy issues [9].

The first course offered by IMFx was FPP.1x "Financial Programming and Policies: Macroeconomic Accounts and Analysis", offered in June 2014. It is a six-week course with eight hours per week commitment. Two additional courses were offered in October 2014: ESRx "Energy Subsidy Reform" and DSAx "Debt Sustainability Analysis" [10].

C. FORMAx

In February 2014, the Ecuadorian National Institute of Advanced Studies (IAEN) implemented its own MOOC platform called FORMAx (formerly UPEx) based on Open edX. The IAEN aims to provide massive online training with little or no cost for citizens. According to IAEN, FORMAx will both quantitatively and qualitatively revolutionize training of thousands of public sector employees across the country, at a much lower cost and with unlimited reach, in topics such as structure and functioning of the state, legal frameworks and tools used in public administration [6].

The first MOOC offered by IAEN is CNE02 "Constitution for Public Employees". This course has been designed to help Ecuadorian public employees to learn the issues and general guidelines of the Political Constitution approved in 2008. This MOOC is supported by a certificate issued by the Continuing Education Center (CEC) of IAEN valid throughout Ecuador and other countries. CNE02 started in November 2014. It is a five-week course with ten hours per week commitment [11].

D. OOAC

In November 2013, the Open Online Academy (OOAC) launched its MOOC platform based on Open edX. OOAC mission is to offer free online education about relevant topics to anyone in the world, anywhere, at any time.

In October 2014, they offered the course "Introduction to GIS and its Application to the Management of Natural Disasters" in a joint effort with the University Network for Architectural and Urban Sustainability (UNAUS) from Spain. One of the main topics presented in this course is global natural disasters increased greatly by climate change. This MOOC course aims to analyze the effects of climate change in different regions of the world and involves the management of natural disasters using GIS technology. It is targeted to an audience in public sector, private entities, and community organizations, with the goal of supporting decision making in the management level [12].

VI. CHALLENGES AND STRATEGIES FOR SUCCESSFUL USE OF MOOCs IN PUBLIC SECTOR TRAINING

There are several challenges to improve the use of MOOCs for training in public sector. In this section we propose strategies to address three of them: enrollment, completion and web accessibility.

A. Enrollment

Enrollment rate is defined as the total number of participants that register for a course. Although some MOOCs have reached enrollments as massive as 370,000 students ("Circuits and Electronics" offered by edX in 2012, the largest MOOC to date [13]), a typical university led MOOCs enrollment range is usually from 20.000 to 230.000, but in most cases it is below 100.000 [14].

Nevertheless, to adequately interpreter these massive enrollment numbers, it is important to consider emerging behaviors in MOOC registrants [15] [16]:

- No-shows, people who enroll but never log in once the course opens. This could be as much as 50% of enrollment.

- Lurkers, people who enroll but just to observe or sample a few items at the most. Many of these participants do not complete week 1.

- Drop-ins, students who become active participants only for a select topic within the course, because they do not intend to complete the entire course. Some of these students are focused participants who use the MOOC to meet external goals.

- Passive participants, students who view a course as content to consume and expect to be taught. These students typically watch videos, perhaps take quizzes, but tend to not participate in activities or class discussions.

- Active participants, students who intend to fully participate and complete the MOOC, including consuming content, taking quizzes and exams, taking part in activities such as writing assignments and peer grading, and actively participate in discussions via discussion forums, blogs, and social networks.

Strictly, enrollment rate should not include no-shows, lurkers, and drop-ins. Maximizing enrollment of public sector employees in MOOC related to government topics and use of GIS will allow accomplishing the goal of massive training at low cost for the government and no cost for participants. Reportedly, IAEN had to extend the registration period of CNE02 for an extra month to make sure advertising reached a greater number of Ecuadorian public institutions, and postponed the course until more public sector employees joined [11].

We propose the following strategies to maximize enrollment of public sector employees in MOOCs:

- Offer preliminary free training in developing the necessary digital literacy skills and being an independent learner. This is necessary because in public sector some employees lack of the necessary skills in using information and communication technologies. Also, this would help to minimize the stress associated with enrolling in a new endeavor [17].

- Use multiple channels to advertise the MOOC such as national and local government communication systems, social networks, mass media, and human development departments.

- Offer course contents of high interest for improving public employee's knowledge in the workplace.

- Offer courses in the employees' native language.

- Define some of the courses as mandatory according to institutional needs.

- Keep the MOOC cost-free for the public employee and low cost for the government.

- Give incentives in the workplace.

- Have the sponsorship of prestigious international universities and organizations [17]. This will help to guarantee the quality of the course contents and make them more attractive.

- Provide a formal certificate of completion endorsed by the sponsor institutions [17].

- Point out additional benefits for public employees such us enhancing their professional network and becoming part of a social learning community [15].

B. Completion

Completion rate is defined as the proportion of enrolled participants who actually earn a certificate of completion. Although some MOOCs have reached a completion rate of 40%, current average MOOC completion rate is around 13% [18]. Since there are often several thousand registrants in a MOOC, this average completion rate still translates to a high number of participants completing the course. In public sector, it is important to increase completion rates to ensure employees training goals are successfully met.

We propose the following strategies to maximize completion of public sector employees in MOOCs:

- Working adults—particularly those in the public sector—have difficulty following an 8 to 12-week course, which is the norm for MOOCs led by universities. Reducing the length of the MOOCs, to two-week up to six-week long, will increase completion rates [13].

- Keep the weekly time commitment in the range of 2 to 6 hours.

- Provide Internet access to take the course in the workplace.

- Design a clear syllabus.

- Create a social learning community.

C. Web Accessibility

Web accessibility is defined as the capacity of a web content to be accessed and used by both disabled and non-disabled users [19]. Also, web accessibility means that persons with disabilities can perceive, understand, navigate, and interact with the web; as well as contribute with web content [20]. According to a 2011 United Nations Report, more than 1000 million people live with some form of disability [21]. The United Nations Convention of the Rights of Persons with Disabilities recognizes the right of people with disabilities to work, on an equal basis with others; and promote the employment of people with disabilities in the public sector [22]. Based on this, several countries have laws that enforce the inclusion and labor protection of people with disabilities in the public sector. Hence, it is necessary that MOOCs used for training in public sector have adequate levels of accessibility.

We propose the following strategies to improve accessibility of MOOCs:

- Design the MOOC to comply with web accessibility standards such as WCAG 2.0, including accessibility of spatial data.

- Test the level of accessibility of the MOOC web pages using automated tools such as ACheker, eXaminator, TAW, TotalValidator, and WAVE [23].

- Perform accessibility evaluations of the MOOC with accessibility experts and users with different types of disabilities.

VII. CONCLUSIONS AND FUTURE WORK

The massive and low cost nature of cloud based MOOCs have a potential role to play in contributing to training of public sector employees. Regional organizations, national and local governments should take advantage of MOOCs to train public sector employees massively and with quality.

Complementary, MOOCs have also the potential to help reduce nations´ unemployment rates through training and skills development. In this line, in May 2015, France announced that it would provide access with certificates of achievement to MOOCs on OpenClassrooms platform to its unemployed citizens [24].

MOOC courses about government topics and management of geographic information can potentially facilitate the greater social participation of both public employees and local citizen groups, involved in local government decisions.

A key component in public institutions for the development of geographic projects is the appropriate training of employees to help unifying criteria in analyzing and designing geographic maps to support decision making.

It is necessary to offer MOOCs with the goal of get more public employees trained in spatial technologies. Therefore, they can better manage geographic information and make decisions that do not affect the public or the environment.

We are currently working on obtaining data through workshops, interviews and surveys in different Ecuadorian government institutions. These data will be statistically processed to obtain results to quantitatively measure the real impact of the strategies proposed in this study.

To complement this study, we plan to assess the level of web accessibility using WCAG 2.0 of the study cases referenced in this article to identify accessible MOOCs for public sector employees with disabilities.

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