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Rethinking the Conventional Learning Paradigm Towards MOOC Based Flipped Classroom Learning

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Abstract— The recent proliferation of Massive Open Online Courses (MOOCs) has initiated a plethora of research endeavors revolving around new pedagogical methods in higher education. Integrating MOOCs in blended learning can be beneficial in different ways for both learners and instructors. In this position paper, we aim to provide a brief and comprehensive review about the challenges that higher education institutions in Macedonia and Kosovo face while coping with the new trends of flexible or blended learning. Moreover, after describing some real cases of MOOC based flipped classroom learning, we also provide some recommendations in order to enhance and enrich learning experience by employing innovative pedagogies.

Keywords—MOOC, blended learning, higher education, open educational resources, flipped classroom.

I. INTRODUCTION

We are living in a dynamic world where the only constant is change. Digital media, digitization and e-learning changes our behavior, transforms the way we do and experience things, work life and also education [1]. As new disruptive and innovative web technologies are introduced more and more into the educational landscape, they have resulted in profound changes on how students learn and make knowledge. Educational technologists are now considering the web as a massive information system that exposes the growing world population to learning resources for the purpose of creating richer learning experiences. Furthermore, the emergence of online Open Education Resources (OER) has made substantial changes by offering great opportunities to the traditional bricks-and-mortar higher education institutions (HEI) and by moving high quality educational content closer to the students throughout the world. Therefore, colleges and universities have made ongoing calls for innovation on courses' delivery in higher education, where for decades knowledge has been transmitted mainly through traditional lectures, despite continuous quality concerns [2].

Since 2012, Massive Open Online Courses or MOOCs provided by established universities using web platforms (e.g. Coursera, edX, Udacity, etc) have penetrated to the educational ecosystem and have raised unprecedented discussions between instructional designers, education researchers, technologists

and policy makers about the future of higher education in a globalized online setting. In [3] authors refer to MOOC phenomenon as the fourth stage in the evolution of online education, following the third stage where the Learning Management System (LMS) was a central element. As stated by [4], in their initial stage, MOOCs were considered to be an ultimate way to deliver educational content, due to their ability to reach the farthest corners of the globe and cut costs to promote sustainability.

In parallel, there are emerging concerns that suggest that MOOCs could threaten faculty jobs in some institutions and the challenges they face when it comes to examining and determining the best pedagogical approaches that they should be based on. Nevertheless, MOOCs have the disrupting potential to the educational system by introducing a new wave of technological innovation in learning. Thus, developing countries are given immense opportunities not only to follow the modern trend of education, but also become a part of global community with access to a vast amount of open, online and low-cost high quality learning resources from leading higher education institutions around the world. In this way, MOOCs bring new opportunities, by moving high quality educational content closer to the students throughout the world. This can be beneficial especially to the states with developing economy like Macedonia and Kosovo, which can gain a lot from these educational opportunities.

Inspired from these global trends and with the reference to local challenges when it comes to educational sector, in this position paper we aim to provide some insights on how the global trends manifested with MOOCs and OER can provide new opportunities for HEI in Macedonia and Kosovo. We outline and discuss the strategies and challenges of applying the principles of MOOC based educational content with flipped classroom activities to be used effectively in order to transcend the boundaries of conventional learning and revitalize higher education.

This rest of the paper is structured as follows: Section 2 describes educational challenges in emerging economies, with a special focus on Macedonian and Kosovo higher education, while section 3 shed some lights on MOOCs characteristics and opportunities as learning content delivery platforms. Section 4

describes the new method of aligning MOOCs with flipped classroom learning by providing also a case study and some recommendations. Section 5 highlights some challenges encountered while applying this flexible approach, and lastly section 6 concludes this paper and proposes some future recommendations.

II. CURRENT SITUATION

The Balkan countries as middle-income region have experienced significant growth since the late 1990s; however, this region is still facing challenges in many areas including the education, which represents the backbone for a sustainable and competitive economy. In a fast-changing world, competitiveness of a country is highly dependent on a well-educated workforce and on fostering innovation capability through entrepreneurship. Therefore, HEIs should design and implement strategies for being an instrument for regional innovation policy. As in most of the HEIs around the world and in Macedonia and Kosovo, there is a need for further intensification of the cooperation with the local industry.

The current higher educational landscape in these two states is characterized by increasing number of universities, limited number of labs, and usually overcrowded courses, which makes teachers to lack time for spending with students. These large classrooms are particularly unsuitable for science and technology courses, where learning more complex notions and topics requires higher degree of interaction and more in-class time for student engagement and discussions with the instructor. Moreover, due to Government restrictions of new employments in Macedonia, introduced to reduce the massive public administration, student-teacher ratio is rapidly increasing, and it currently approaches 60:1. In Kosovo, student-teacher ratio in HEIs has worsened considerably since 2010/2011, mainly due to increasing number of students, but promised by the government to get improved to at least 40:1 due 2021. Currently, there are 39 accredited and licensed HEI operating in Kosovo, of which 9 are public and 30 private institutions. Thus, Kosovo has 20 higher education institutions per 1 million inhabitants that greatly exceed the EU average. The number of students in Higher Education in Kosovo has increased from about 40,000 in 2004 to 122,000 in 2015. Kosovo has 6,669 students per 100,000 inhabitants, which is nearly double the EU average. Calculations have been made based on data from EUROSTAT and MEST [5], [6]. The education system has low access to information and communication technology (ICT) and contemporary technology is not integrated appropriately in curriculum, teaching or education system management.

As shown in Figure 1a, traditional teaching methodology with low degree of alignment and interaction with local industries is omnipresent in the higher educational landscape of Macedonia and Kosovo; with few exceptions, such as the Faculty of Computer Science and Engineering in Skopje, which is the biggest technical faculty in Macedonia with currently more than 5000 students, and University of Prishtina, with some 40000 active students, being the pioneering university in Kosovo when it comes to teaching provision methodology.

Despite initial progress in bridging industry and academia in both countries, special concerns yet remain content of studies, teaching methodology, and more importantly lack of practice for students.

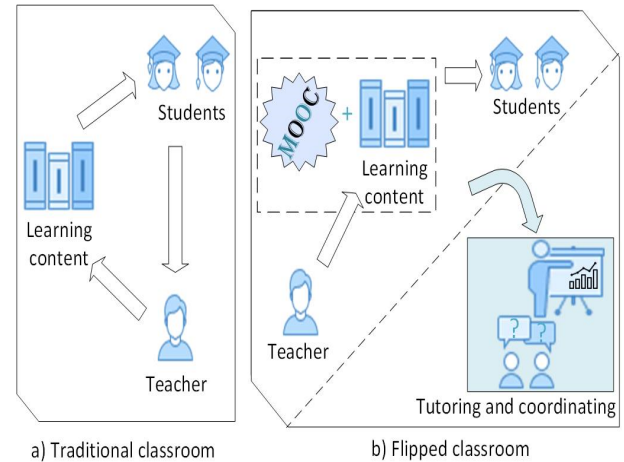


Fig. 1 Traditional vs. Flipped classroom learning with MOOCs

All this points out the great challenges that universities are facing for alignment between academic development within degree curricula and the requirements that industry demands for their specific needs [7]. This brings a need for innovative and flexible teaching methods that bridge the educational journey from theory to practice.

As far as the OER and MOOCs are concerned, the authorities of both countries have thus far not recognized the benefits and advantages that MOOC can provide to universities to develop a more strategic and flexible approach to online learning and to improve reputation by enhancing classroom teaching practices and developing new revenue models. Furthermore, it is critical to note that OER movement and integration in HEI is in the very early stage. At the moment, a few pioneers mostly drive this movement. Consequently, OER are not yet an integral part of academic teaching in both countries.

III. MOOCs AS AN OPPORTUNITY

We are now in the sixth year of the MOOCs era, which started in 2011 with the Artificial Intelligence course developed and conducted successfully by Stanford faculty Sebastian Thrun and Peter Norvig. One year later, Coursera, edX and Udacity arrived on the scene. Due to the unsustainable business models combined with higher education's resistance to change, many researchers at that time considered MOOCs as a temporary phenomenon. However, MOOCs are here to stay, the courses are growing at a rapid rate, numerous universities and private institutions have launched their own MOOCs, and subsequently millions of learners worldwide now participate in the courses. Additionally, they have attracted and stimulated the interest of higher education research, providing unique opportunities for researchers to study student engagement with learning resources and to generate hypothesis of practical impact.

The most typical learning technologies used in MOOCs include short videos, learning analytics, automatic grade exercises, and communication tools. External tools such as social media platforms, i.e. Twitter or Facebook or game-based learning tools to motivate students are also present. MOOC enable self-paced and user-independent learning and several studies like [8], [9], [10] have been conducted to analyze and prove the effectiveness of MOOCs, which is measured as “meeting the user’s learning goal”. Moreover, MOOCs platforms such as edX, Udacity and Coursera have been created to adapt better to these new necessities [9], by claiming they are committing their best resources to making education freely available to anyone who seeks it. The MOOC approach, when complemented with a flipped classroom instructional strategy would bring also benefits towards improving substantially the learning experience of students in both countries.

Research on implementation of flipped classrooms pedagogy is plentiful, but flipping the classroom with MOOCs technology is quite a new and relatively unexplored approach. Recently, there exist several successful studies [11], [12], [13], [14], [15], [16]. According to these works, MOOC based flipped classroom methodology has improved substantially the learning experiences of students compared to traditional classroom and can successfully be integrated with conventional learning. These research results could serve as a catalyst for authorities and institutions to initiate discussions in national level for integrating MOOCs in blended higher education courses or by offering courses of each university freely and into own national language.

When it comes to Macedonia and Kosovo, MOOCs and open education have received insufficient attention and are not yet a hot issue among educational policymakers. Macedonia appears more active in the open education movement, enforced lastly by the new Law of Higher Education in Macedonia from 2016 (article 94), which obliges universities to have at least 80% equivalence of the study programs and curricula with the top 50 universities worldwide [17]. Namely these universities are the pioneers in MOOC and flipped classrooms, thus the usage of new paradigm is institutionally stimulated. Even prior to this law, compulsory courses on the technical faculties were adjusted to the best US or UK universities, by offering the lectures of the publicly available MOOCs, Open Educational Resources (OER), or free courses, such as Microsoft Virtual Academy as supporting tutorials [18]; by reorganizing the study packs to be compatible with these courses, and in some occasions, by completely relying on the courses from Coursera or Udacity.

Kosovo has commenced early enough with promoting the importance of open education resources most notably in 2009 via its first open source conference held at University of Prishtina with invited talks from MIT OpenCourseWare, as well as on licensing policies of open source. MOOC materials are still only sporadically used as integral part of teaching, predominantly among computer science and engineering courses, although students stand well advanced in their usage as to them more intuitive sources of learning than traditional teaching materials (slides and textbooks).

IV. TOWARD NEW TEACHING STRATEGY

The utilization of MOOCs as a content delivery platform outside of class time can free face-to-face sessions for meaningful conversations and interactive problem solving activities that achieve deeper understanding and integrate knowing with doing (see Figure 1b). In such circumstances, the principles of integrative pedagogy and technology enhanced learning could be perfectly applied to combine theory and practice, which can encourage the learners to enrich the learning experience and develop the abilities to connect skills and knowledge from multiple sources and experiences, to foster creativity and promote integrative thinking. Furthermore, this method of aligning conventional learning with flipped classroom learning also emphasizes personal learning, as the learner can self-organize the participation.

A. Macedonian Case

Faculty of Computer Science and Engineering (FCSE), belonging to the oldest, and the best University in Macedonia is a pioneer institution when it comes to using flexible form of education in which MOOCs are used as course content delivery platforms. The Faculty offers 8 undergraduate, 15 graduate and 2 PhD study programs. More than 80 undergraduate courses are activated each semester, with an average more than 150 students attending each. In parallel, approximately 50 courses are offered to graduate students.



Fig. 2 Example of compiled slides created using MOOC lectures

Each academic year, several new courses are launched, and the study packs for many courses are completely renewed. The time-consuming and exhaustive preparation of completely new lectures, exercises and student assignments is significantly facilitated by the MOOCs, predominantly belonging to Stanford Online, Coursera and Udacity. Some of the new lectures are completely original, particularly those which are directly connected with the area of expertise of the teachers, some lectures are compiled by one of several MOOC lectures (like the lectures presented on Fig. 2), and in very few cases, the complete lecture is adopted from other university. Since FCSE is an academically responsible university, with no exceptions, the credit to original sources is always given.

1) MOOC, OER and Flipped Classroom

Recommended exam exercises inspired by MOOC courses are solved by the assistants and younger teachers, and then embedded in the Faculty automatic assessment system to enable efficient and reliable grading of hundreds of students [19]. A great asset of this system is the possibility of students to prepare their own assignments at home, and to immediately check their correctness by comparing the proposed solutions with their own result. Broader projects are sometimes also inspired by MOOC courses, they are suitable to students from more advanced courses, and the teachers supervise them, in many occasions on flipped classroom bases [20]. These projects start with online presentations of solved tasks related to the project, explanations done by the teachers and assistants, and supervised preparation of the solution, constantly monitored in the cloud environment shared by the project participants and supervisors. Open educational resources (OER) are another valuable source for some courses, particularly the hardware-based ones, which require active working on hardware equipment during laboratory exercises, which are very demanding for both, the students and the teachers [18]. Again, the flipped activities are encouraged, reinforcing remote execution of the assignments from home. In all three case studies, the results of implementing MOOC, OER courses, and flipped classroom activities proved that the results of students are much better compared to those, which were earlier obtained using the traditional learning.

2) Flipped Classroom + Cooperative and Collaborative Learning + Gamification

Flipped classrooms learning is frequently used, implementing various learning approaches. While the software and hardware related courses stimulate the preparation of individual or small group projects at home, rather than in the faculty laboratories, the social based courses merge flipped activities with cooperative and collaborative learning, adding elements gamification. For example, the course Multimedia and Communications has a lecture without prepared presentation. The teacher initiates a discussion about the topic by simply presenting the introductory words, and then motivates students to reveal their personal experience and impressions about the challenges that might arise from it. The lectures are very well prepared in advance, so the discussions always converge towards the goal planned by the teacher. Activities outside the classroom are collaborative. Students prepare their assignments by researching a topic defined by the teacher and do real research by exploring the world they live and work in. In many occasions, they include other teachers in their projects, and with no exceptions, they are very enthusiastic by the obligation they do. Completely different approach is implemented in the Computer Ethics courses, which promote the cooperative work performed by creation of a broad LMS embedded Wikis and collaboration facilitated by the private discussion forums, which are again part of the same LMS [21]. Gamification, realized through tabletop role-playing is another element that highlights the necessity of intensive individual and group online

activities at home, which culminate with the public presentation of the joint effort, and usually very vigorous in-class discussions [22].

All of them lead towards education 3.0, the new educational Web-based and mobile technology trend inspired by the interoperable technology [23]. In the near future, it will probably really bridge the gap between formal and informal learning. As current students are rather digital natives, they learn more from social media than from their educators.

B. Kosovo case

Kosovo with its currently 39 higher education institutions almost doubles the EU average on the number of students per inhabitants. This in addition to the low student-teacher ratio puts a real challenge for the academic staff to deliver teaching in typically huge classes. That especially in technology related subjects which are characterized by the necessity to frequently change their syllabuses in order to keep pace with latest trends. It often happens that a teacher is required to introduce new courses, and most probably, to annually update the existing ones to a large extent, which puts a real challenge for teachers to reach quality assurance. That quality teaching at all levels is conditioned by the ability of teachers and students to acquire modern teaching technology has been outlined in the evaluation report of Kosovo education [5]. Hence, the mid-term strategy 2017-2021 in Kosovo [6] has set-up a strategic objective to maximize learning by preparing and using high-quality teaching resources including electronic teaching materials. MOOCs and open educational resources could considerably aid to accomplish these expectations [24], [25].

1) Towards MOOCs, Flipped Classrooms Learning, and the Virtual Reality Issue

As a good practice in using virtual and remote laboratories in Kosovo schools, there is evidence enabled by a donor project of usage of an online virtual physics lab that simulates 30 experiments in which students can manipulate variables and observe outcomes [26].

In terms of raising the awareness of the academic community on the benefits of new teaching methodologies, a hands-on flipped classroom teaching experience has been transmitted to the faculties of the American University in Kosovo by a teacher of Rochester Institute of Technology Croatia on a freshman level financial accounting course [27].

Again, through the support of a donor project, teachers from Norwegian University of Science and Technology, the main higher education institution responsible for technology in Norway, has shared their experience on technology-based teaching to students and staff of University of Prishtina as part of a joint Erasmus+ mobility project. New forms of teaching as practiced by teachers in Norway and New Zealand [28] including flipped classrooms, asking good questions by students in an online platform via their mobile devices for a maximized interactive class, and digital quizzes like through the Kahoot! (<http://getkahoot.com>), a free game-based learning platform for interaction of students in the classroom through their laptops or mobile phones, were exemplified

during lectures held to University of Prishtina bachelor and master students of Computer Engineering. The teaching included lectures on Game Development, Serious Games, Digital Innovation and Entrepreneurship. Furthermore, a public lecture was held on Gamification and Virtual Reality to a wider audience from academia and businesses in IT in Kosovo. Virtual Reality devices have become consumer ready, but they may open a new world of possibilities for education; their potential and risks associated were presented and demonstrated via tools in the Vive. In addition, a round table session Café Scientifique (<http://www.cafescientifique.org>) was organized on the future of education to incorporate teaching styles from Norway with staff, students, and local businesses.

Apart from experiences brought from partner institutions abroad, to the best of our knowledge, there are no institutional measures taken with a focus on adapting MOOC resources and flipped classroom platform in teaching at university or pre-university level education in Kosovo. There are only individual examples of adopting new forms of teaching like the usage of MOOC materials like MIT OpenCourseWare, Stanford Online, Coursera, Udacity, Udemy, or openHPI as external teaching and learning resources by mostly young enthusiastic staff at universities in Kosovo, predominantly in computer and engineering related subjects. Worth to mention are the setting up of a LCMS platform Moodle (<https://moodle.org/>) for a Computer Science master study program developed as part of an EU Tempus project in 2007 jointly with Institute of Carlow in Ireland and University of La Rochelle in France [29], with partial implementation of the flipped classroom model of teaching through publication of teaching materials ahead of teaching in the class on the topics, and then examination and a plenty of in-class quizzes and project works. Or lately the usage of a Wiki style format of collaboration and discussion forum with students in Web programming courses like with Piazza (<https://piazza.com/>), as well as of a conversational style of presentations like with Prezi (<https://prezi.com/>) to motivate more interaction in the classroom.

Finally, if not explicitly referring to flipped classroom models, the reverse learning platform is already being implemented in certain seminar forms of lectures, like in Research Methodologies as well as in Seminar in Information Systems courses at University of Prishtina. These are premises of teaching tending to adopt new methodologies of more active involvement of students in the class rather than outside it, which shall serve as good examples of dealing with the challenge of quality assurance in Kosovo due to overwhelming classrooms with students, as well as with the global challenge of ever-changing technologies and keeping pace with the concurrent HEIs in the region and world-wide.

V. CHALLENGES AHEAD

The benefits of using MOOC and OER based learning for both countries are obvious. They enable quick access to many educational resources, which are very helpful to teachers, who should not prepare their courses from scratch by exhaustively searching the related books and references; and for the students, who can always find at least some additional information about

the topic they learn, and at least one solution for their assignments and practical problems. Flipped classroom activities, particularly the extended ones enable smooth collaboration and cooperation, flipping of typical in-class and home activities, sometimes allowing playing of various games. If not honestly used, MOOC educational resources can cause serious property infringement. Unfortunately, such examples exist in the region. Student blogs reveal that some teachers make their own “original” slides by patching the MOOC slides with the translation labels in their native language. There are examples of “original” books that are also a patchwork of literal translations of several open resources. There is still no consequence for this property violation, apart from the moral responsibility.

Commercial resources are a double-edged sword. They disable the information access to students from the countries with low income. Macedonian and Kosovar students can't afford them, so usually teachers buy the resources and then share them with the students via password protected learning management systems. The disposal of copyrighted resources on the Deep Web is again a property infringement. Another obvious problem connected with the intensive online activities performed in the flipped classroom environment is student privacy. In the software and hardware projects, they can reveal the technical incompetence of some students, which can sometimes become a starting point for further bullying. In the social related courses, under the cover of the Deep Web, students tend to overtly expose their private lives, without worrying about the counter effects. Teachers should always be ready to react, relax the atmosphere, remove the compromising posts, and increase the awareness about privacy problems.

In spite of the enormous effort (or “taxiing”) to prepare flipped classroom activities, most young and enthusiastic teachers find this new teaching and learning approach superior to traditional one. Their personal feeling is that students acquire more and that their knowledge lasts more [18], [21], [30]. In general, most students appreciate it as well. However, there are still some students who are extremely against it [21]. They prefer to be spoon-feed and refuse any additional obligations. Hopefully, the best students prefer the active learning approach, and their positive feedback is the greatest motivation of teachers to persist implementing it.

VI. CONCLUSION

MOOCs platforms and OER can serve to ideally supplement the learning environment. Nowadays, numerous blended learning programs enriched with MOOC online content are transforming traditional courses by enhancing learning experience. Macedonia and Kosovo as emerging economies should take advantage of this innovation, which enables not only to have access to high quality course materials offered by elite universities, but also to close the gap between the skills required by the industry and the skills that students obtain at the universities. By utilizing MOOCs and OER teachers in HEI in Macedonia and Kosovo can gain valuable time that they traditionally need to spend on preparing lecture materials. In this way, the teachers can invest more time on planning and

executing in classroom activities and bridge them closer to the actual industrial needs. In this way, it will create a far more dynamic learning environment for the students, and they will also get a closer experience to the actual needs in industry.

In the global time we are living, there will not be long time ahead when the content of the courses will not differentiate the HEI, but instead it will be the engagement of the teachers that will make the difference. In this aspect, finding a balance of combining MOOCs and OER with flipped classroom pedagogy will create the possibilities where the engagement of the teacher in the classroom settings is a key success factor of a learning experience.

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