

Towards a design framework of MOOCs for teacher development: Theoretical issues and analysis of teachers' achievements about Web 2.0 in language instruction

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Abstract

This paper reports on the development of a hybrid framework for designing and implementing teacher professional development MOOCs. The theoretical foundations were rooted on combining features of cMOOCs and xMOOCs that promote teachers' learning through active engagement, peer interaction, mutual support, and collaborative creation of educational artefacts. The framework was applied in a MOOC designed to enhance language teachers' technological and pedagogical knowledge in order to integrate Web 2.0 tools in their instruction. Using research data from a) a post-survey and b) the MOOC platform, we revealed important information regarding teachers' outcomes as well as their perceptions of using the specific Web 2.0 tools in Greek language learning. The findings provided supportive evidence that the blended and collaborative features of this professional development MOOC were effective towards enhancing teachers' achievements and strengthening their ability to design suitable educational interventions with Web 2.0 regarding language instruction in secondary schools.

Keywords: MOOCs, TPD-MOOCs, e-learning, Teacher Professional Development, Web 2.0

Introduction

The dynamic growth of online technologies and mobile devices, over the last few years, has fundamentally changed the ways of delivering e-learning programs. By harnessing the features of online platforms, people have enhanced opportunities for flexible participation in quality education from distance, mainly through open learning experiences, collaborative learning environments, interconnected groups, networking and communities of learning. Currently, the adoption of open resources and open educational practices is considered a priority for education and lifelong learning. For example, the European Union has adopted a policy for open education with the objective to achieve an education and professional development for all, which is considered as the pillar to promote competitiveness and growth for European citizens (European Commission, 2013, p.2).

In this perspective, *Massive Open Online Courses (MOOCs)* constitute the most popular form of e-learning. They were growing very fast while they received enhanced educational and research interest (Conole, 2014; Milligan & Littlejohn, 2017). During 2020, more than 950 universities around the world offered approximately 16300 open courses while about 180 million individuals enrolled in at least one MOOC (Class Central, 2020). It appears that the pandemic of COVID-19 produced increased interest about online education. Compared to the pre-COVID period, MOOC providers offered more than double numbers of courses, from top universities around the globe, thus attracting many new learners (Class Central, 2020).

The key features of MOOCs, i.e. massiveness, openness, flexibility and e-learning practices are expected to improve the delivery of quality online programs, in order to meet the growing demands for education and lifelong learning for large numbers of people with different experiences and backgrounds (Jimoyiannis, 2017). On the other hand, the development of MOOCs was disruptive and

a major challenge for higher education institutions (Weller & Anderson, 2013). Recently, a new trend has been emerged regarding the ways in which MOOCs are provided by many universities around the world. MOOCs are currently more integrated into institutions' formal curriculum and on campus education while, in many instances, they yield results in the form of credits (Bralić & Divjak, 2018; de Jong et al., 2020; Milligan & Littlejohn, 2017; Perez-Sanagustin et al., 2017).

MOOCs have also gained enhanced interest as a new form for on-line learning and professional development. In the last few years, they were also applied as an alternative mode for Teacher Professional Development (TPD) programs (Kennedy & Laurillard, 2019; Koukis & Jimoyiannis, 2017; Koutsodimou & Jimoyiannis 2015; Laurillard, 2016; Yildirim, 2020). In response to the needs of researching important issues related to the design of *Teacher Professional Development MOOCs (TPD-MOOCs)* and the achievements of the participant teachers, this paper reports upon a MOOC designed to prepare Greek language teachers in secondary schools toward integrating Web 2.0 tools into their instruction.

The remainder of this article is organised into four parts. First, we present the key findings concerning MOOCs that revealed in our literature review. Following, the theoretical underpinnings of a new design framework for TPD-MOOCs are presented. This MOOC was relied on four dimensions that determine the participation of learners in individual and collaborative activities: a) active participation and creativity, b) interaction between colleagues-peers, c) mutual support, and d) cooperation among teachers as members of a team and members of the MOOC community. We then describe the context of the present study as well as the methodological approach used. Finally, the findings highlight teachers' performance in MOOC learning experience along three types of important indicators using: a) data from the platform that represent teachers' active engagement in the online discussions of the MOOC forum; b) thematic analysis of teachers' views and comments about Web 2.0 applications in Greek language instruction in the discussion forums; and c) teachers' perceptions and personal estimations regarding the affordances of Web 2.0 apps in language instruction.

Literature review

Exploring the existing literature showed that educational research was addressed to MOOCs from the initial stages of their appearance. It seems that the majority of the MOOCs use similar platforms and xMOOC standards. A range of research findings (for example, Bonk et al., 2015; Eriksson et al., 2017; Gasevic et al., 2014; Hew, 2016; Koukis & Jimoyiannis, 2019b; Littlejohn et al., 2016; Milligan & Littlejohn, 2017; Veletsianos & Shepherdson, 2016) provided important information regarding issues related to a) participants' motivation, values and expectations, personal, cognitive or psychological barriers they face, b) patterns of learners' engagement and self-regulation in MOOC learning activities, c) learning outcomes and achievements of the participants, and d) pedagogical designing and MOOC pedagogy.

Despite the growing rates of applying MOOCs in teacher professional development (Kellogg & Edelman, 2015; Koukis & Jimoyiannis, 2017; 2018; 2019a; Koutsodimou & Jimoyiannis, 2015; Laurillard, 2016), this topic is still an under-researched field. Only a few studies were identified and the published results were mainly directed towards three research dimensions:

a) Factors determining *teachers' motivation and interest* in continuous professional development through MOOCs with the aim to improve their instructional practices (Koukis & Jimoyiannis, 2019; Mabuan et al., 2018; Shangying & Jing, 2017; Trust & Pektas, 2019).

b) *Effectiveness of TPD-MOOCs* with regards to the professional development of the participants and teachers' learning outcomes. Recent studies revealed optimistic research findings and showed that collaboration among participants in TPD-MOOCs is very important for their professional development

(Bonafini, 2018; Fuller et al., 2016; Koukis & Jimoyiannis, 2019a; Laurillard, 2016; Philipson et al., 2019; Yildirim, 2020).

c) *MOOC pedagogy and design factors*: The pedagogical design factors that promote openness and flexibility of participation are considered by the teachers as the most important feature of TPD-MOOCs (Castaño-Muñoz et al., 2018; Donitsa-Schmidt & Topaz, 2018; Karlsson et al., 2014; Laurillard, 2016). In addition, teachers believe that the topics in a TPD-MOOC should be relevant to the educational reality in the schools and support them towards developing new skills that can be applied in new teaching practices that enhance students' learning outcomes (Falkner et al., 2017; Kennedy & Laurillard, 2019; Koukis; & Jimoyiannis, 2019a; Shah et al., 2018; Trust & Pektas, 2019; Yurkofsky et al., 2019).

In conclusion, literature review has shown that MOOCs for teacher professional development is a research topic open for further exploration. Previous studies indicated that research on MOOC instructional design and the delivery of TPD-MOOCs that promote teachers' self-directed, peer-reflection and collaborative learning is limited. In addition, it appears that little research has explored the potential of MOOCs to enhance teachers' abilities towards integrating ICT in their instruction as well as what specific outcomes teachers themselves value as important, including changes in their instructional approaches, classroom culture and relationships between teacher and his/her students in Greek language lessons.

Aim and research questions

The aim of the present study was twofold: a) to contribute to the existing literature by providing an integrated framework for designing and implementing TPD-MOOCs; we thus present a new, hybrid framework which embodies features of both modes, cMOOCs and xMOOCs; b) to apply this framework in a TPD-MOOC with the aim to prepare Greek language teachers to integrate Web 2.0 tools in their instruction. Therefore, the following research questions were addressed:

- Was this hybrid framework effective in terms of promoting teachers' active engagement in MOOC activities and collaboration among peers?
- What are teachers' perceptions and achievements about the specific Web 2.0 tools and their affordances to enhance students' learning in Greek language and literature courses?

Theoretical underpinnings of the design framework for TPD-MOOCs

In relation to the theoretical-pedagogical principles adopted in MOOC design, the most general classification proposed by Siemens (2013) who identified two main formats of MOOCs:

a) *cMOOCs*, which follow *connectivist* design principles while the core pedagogical approach is peer and collaborative learning. This mode put emphasis on social learning, which considers knowledge as a social construct (distributed over connections in various forms) through participants' active engagement, communication, self-direction, collaboration and social networking.

b) *xMOOCs*, that considered as an extension of the traditional on-line courses; they are mainly based on the approach of *knowledge transfer* through the provision of learning material to the learners while the emphasis is on individual and isolated learning.

Traditionally, teacher professional development is considered as the key policy, for the educational systems around the world, aiming to improve teaching practices, student learning outcomes, school life as well as the relationships between school and parents. TPD includes a wide range of teacher supporting activities with the aim to enhance their professional skills, to improve their teaching practices and to help them toward adopting new instructional methods that, ultimately, can improve students' learning outcomes and achievements (Borko, 2004; Kyriakides et al., 2017).

Over the last decade, online TPD has become a promising alternative to overcome many of the constraints associated with traditional in-person training programs, since it offers enhanced opportunities to the teachers for a) flexible learning from distance, b) communication and interaction with other teachers, c) sharing expertise and ideas among peers, d) engaging teachers in collaborative work and reflection about new practices, and e) creating teacher communities of learning (Dede et al., 2009; Hurlbut, 2018; King, 2002; Jimoyiannis, Gravani & Karagiorgi, 2011; Prestridge, 2017; Prestridge & Tondeur, 2015; Tsiotakis & Jimoyiannis, 2016).

By adopting a constructivist view, Jimoyiannis, Gravani & Karagiorgi (2011) thought teacher learning and development as an active, intentional, contextualised, reflective and collaborative process. They proposed a model for online teacher professional development programs guided by a fundamental principle, i.e. teachers should actively participate in goal-oriented activities that provide them multiple opportunities to construct new knowledge, addressed by a meaningful context of classroom reality. This context is determined by specific learning objectives, teaching actions and students' learning activities. Based on existing literature, which suggests that successful teacher professional development should be a gradual, participatory, and interactive process (Borko, 2004), this model was further developed upon Salmons' (2004) e-moderating model by including five dynamically evolving stages of professional development:

- Teachers' access and motivation
- Teachers' online socialization
- Course activities, information exchange and experience sharing among teachers
- Knowledge construction, activity-oriented learning and group learning
- Developing a teacher community of practice.

Harnessing our long-standing research experience with regards to online teacher professional development (Jimoyiannis, Gravani & Karagiorgi, 2011; Jimoyiannis et al. 2013; Tsiotakis & Jimoyiannis, 2016) and taking account of the need to emphasize on active, self-directed and collaborative learning (McLoughlin & Lee, 2010; Shea & Bidjerano, 2010), we created a hybrid mode of MOOC design. This schema combines features of xMOOCs and cMOOCs and was firstly applied in a TPD-MOOC with the aim to support primary education teachers to integrate Web 2.0 tools in their instruction (Koutsodimou & Jimoyiannis, 2015). The new idea in designing this framework for TPD-MOOCs was to embody aspects of cMOOCs in order to create a community of teachers who share common interests and concerns about using Web 2.0 tools in their classroom practices.

From the pedagogical perspective, the design of the course units was directed by TPACK 2.0, which proposed as an integrated framework to guide learning design and teacher preparation programs aiming to support integration of Web 2.0 apps in education practices (Jimoyiannis, 2015; Jimoyiannis et al., 2013). The key idea, upon which the theoretical foundations of TPACK 2.0 are built, is to consider Web 2.0 tools not as simple technologies but as a learning attitude to be cultivated by both, teachers and students. In other words, teachers were expected to understand that Web 2.0 incorporates a wide range of educational affordances that also transform a) Pedagogy to Pedagogy 2.0 (i.e. self-directed, reflective and community learning) and b) Content to Content 2.0 (i.e., shared and learner-generated content). The ultimate objective for the teachers is to adopt new pedagogical ideas and social learning approaches and, most important, new perceptions regarding the role of the educational content when they design interventions based on Web 2.0 applications.

Therefore, the design and the implementation of this TPD-MOOC were addressed by two equally important dimensions that combine features of both types of MOOCs, i.e., cMOOCs and xMOOCs (Figure 1). More specifically:

- The *core (obligatory) part* was designed following the xMOOC format. It was structured on weekly basis with respect to the topics under study, the course schedule, the educational material provided as well as teachers' assignments and learning activities. In order to achieve the intended

knowledge and skills, the participants had to individually create five digital artefacts (one per week by using a different Web 2.0 tool) and to contribute to the main discussion forums. The subject and the content of each artefact were open to be selected by the teachers themselves, in connection to current subject topics in their class or their instructional interests/choices.

- The *optional part* was expected to be dynamically shaped, on voluntary basis, around participants' interaction, creativity and collaboration with the aim to collaboratively create new artefacts (i.e., instructional material, learning activities and scenarios applicable in classroom practice). In particular, between the fourth and sixth week of the course, the teachers were encouraged to spontaneously create common interest groups and reshape forward their interaction and collaboration by co-creating new artefacts that could be used in language instruction practices.

We expected thus to establish an authentic context of learning community among the participant teachers. Therefore, teacher development is expected to appear as both, an individual and a collaborative process addressed along three, mutually related, dimensions of teachers' participation: a) creativity, b) communication and interaction, and c) collaboration. The ultimate objective was to provide an online environment cultivating a sense of belonging in a learning community of peers who share common understanding of using Web 2.0 tools in Greek language instruction.

Implementation of the TPD-MOOC

The objective of this particular TPD-MOOC was to enhance teachers' a) technical skills and abilities to use Web 2.0 tools in language instruction and b) pedagogical knowledge and learning design skills necessary to implement in Greek language classrooms proper educational interventions based on Web 2.0 tools. Considering the potential of online tools to support students' constructivist and collaborative learning, five Web 2.0 apps were selected in this course, namely concept mapping, timeline artefacts, collaborative writing, online virtual wall, and digital storytelling. The MOOC workflow and the teachers' learning activities were structured into seven thematic units, organized on weekly basis as shown in Table 1. Individual and collaborative coursework were properly interwoven and expected to contribute towards achieving the objectives of the course.

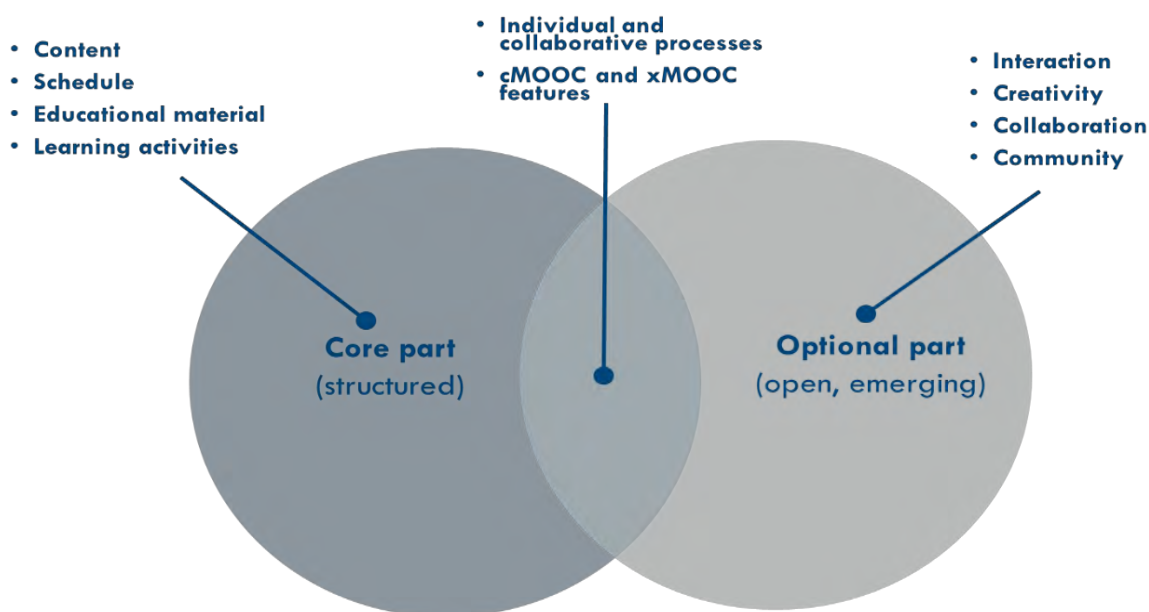


Figure 1. Hybrid design and implementation framework of the TPD-MOOC

Table 1. MOOC units and workflow

Week	Learning topics and e-tivities
	Introduction
1	<ul style="list-style-type: none"> • Course introduction (general information, course description, tasks and work schedule) • Educational material: Tutorial videos (on-line platform, Web 2.0 tools), presentations and articles about ICT in education, technical guidelines • Teachers' familiarisation with the MOOC platform (registration, profile update etc.) • Discussion forum: Teachers' self-presentation • 1st assignment: Discussion forum (ICT in education and contemporary pedagogy)
	Timeline (Tool: TimeToast)
2	<ul style="list-style-type: none"> • Discussion forum: dialogue and support about technical and learning design issues • 2nd obligatory assignment: individual creation of a timeline artefact • 2nd optional assignment: collaboration to create an educational scenario based on a timeline
	Concept mapping (Tool: Mindomo)
3	<ul style="list-style-type: none"> • Discussion forum: Questions and discussion about technical issues of Mindomo • 3rd obligatory assignment: individual creation of a concept map • 3rd optional assignment: collaboration to create an educational scenario about concept mapping
	Collaborative writing (Tool: Google Docs)
4	<ul style="list-style-type: none"> • Discussion forum: Questions and discussion about technical issues of Google Docs • 4th obligatory assignment: individual creation of an online document • 4th optional assignment: group work to create a collaborative online document
	Online virtual wall (Tool: Padlet)
5	<ul style="list-style-type: none"> • Discussion forum: Questions and discussion about technical issues of Padlet • 5th obligatory assignment: individual creation of an online virtual wall • 5th optional assignment: collaborative creation of an educational virtual wall
	Digital storytelling (Tool: StoryBird)
6	<ul style="list-style-type: none"> • Discussion forum: Questions and discussion about technical issues of StoryBird • 6th obligatory assignment: individual creation of a digital story • 6th optional assignment: collaborative creation of a digital story
	Reflection and conclusions
7	<ul style="list-style-type: none"> • Integration of knowledge and skills, connection with classroom practice • 7th assignment: Concluding discussion forum, teachers' reflection on critical topics and the impact of the MOOC to their professional development

The fundamental principle determining the design and the implementation framework of this particular MOOC was that teachers' development was not thought as an outcome of isolated efforts of individuals. It is rather considered as both, individual and collaborative, processes based on teachers' dialogue, reflection and collaboration within a community of peers. In this perspective, the participants were exposed to detailed on-line discussions in the MOOC platform, about the affordances and the pedagogical uses of Web 2.0 tools in the Greek language classroom. They had the opportunity to exchange instructional ideas and experiences with peers, to share educational resources and to collaboratively design new artefacts, applicable in Greek language instruction. Thus we expected to diffuse technical knowledge and skills, to enable teachers' creativity and, finally, to connect new pedagogical and technological knowledge with classroom practices.

The screenshot displays the main page of a MOOC platform. On the left is a dark sidebar with the 'open eclass' logo and a search bar. The main content area features a course title in Greek: 'Διαδικτυακά εκπαιδευτικά εργαλεία στη διδασκαλία των γλωσσικών μαθημάτων' (Digital Educational Tools in Language Teaching) by Athanasios Tzimogiannidis and Nikolas Koukias. Below the title is a word cloud with 'Φιλολόγοι' (Linguists) as the largest word, surrounded by terms like 'Ψηφιακά Εργαλεία', 'Νεοελληνική Λογοτεχνία', 'Εξ Αποστάσεως Εκπαίδευση', 'Διαδικτυακές Εφαρμογές', 'Νεοελληνική Γλώσσα', 'Αρχαία Ελληνική Γλώσσα', 'ΤΠΕ', 'Λατινικά', and 'Ιστορία'. A description follows, stating the course is for secondary school teachers. Below this are sections for 'Θεματικές Ενότητες' (Thematic Units) and a 'Ημερολόγιο' (Calendar) for March 2020. The calendar shows a grid with dates 1-31, and a legend for 'Προβλεπόμενα' (Forecasted), 'Γεγονότα μαθήματος' (Course events), 'Γεγονότα συστήματος' (System events), and 'Προσωπικά γεγονότα' (Personal events).

Figure 2. The main page of the MOOC platform

The MOOC entitled “Web tools in language instruction” offered for free by the eLearning Research Group at the Department of Social and Educational Policy, University of Peloponnese, in Greece. It lasted seven weeks, from March to May 2016. After an open call, a total of 589 Greek language teachers in secondary schools were enrolled, coming from various regions of the country. One tutor and two assistants were the moderators-facilitators of teachers’ e-tivities, according to the Salmon’s e-moderating approach (Salmon, 2004).

The course was hosted and delivered through the Open eClass learning management system (Figure 2). The teachers were encouraged to acquire the expected knowledge and skills through active engagement in the learning tasks, peer support and discussions, using the educational material available in every course unit, and reflecting on their achievements. Short tutorials in the form of video-lessons were also produced by the authors and provided in the MOOC platform.

Participants were asked to systematically participate in the specific unit discussion forums. The discussions covered various issues regarding the subject of each unit, e.g. technical issues related to the use of the specific Web2.0 tools, practical ideas and experiences of using these tools in language instruction, learning design issues, topics raised by the teachers or the tutors etc. Both the compulsory and the optional (group) assignments, in every unit of the course, were oriented to the exploitation of the specific tools with regards to the Greek language classroom and students’ involvement. Figure 3 shows a screenshot of the platform with the obligatory and the optional assignments in the 5th week of MOOC implementation.

Obligatory task

ΒΑΣΙΚΗ ΕΡΓΑΣΙΑ

Δ Δημιουργία ψηφιακού πίνακα ανακοινώσεων (με τη διαδικτυακή εφαρμογή Padlet)
 Δημιουργήστε έναν ψηφιακό πίνακα ανακοινώσεων, χρησιμοποιώντας τις δυνατότητες της εφαρμογής Padlet. Η επιλογή του θέματος είναι ελεύθερη αλλά πρέπει να σχετίζεται με ένα μάθημα που μπορεί να υλοποιηθεί στην τάξη σας. Για παράδειγμα, μπορείτε να τοποθετήσετε ένα video ή ένα κείμενο ως έναυσμα κατάθεσης απόψεων και να καταγράψετε κάποιες πρώτες οδηγίες για τους μαθητές σας (όπως θα κάνατε σε πραγματικές συνθήκες τάξης).

Στον ψηφιακό πίνακα ανακοινώσεών σας είναι απαραίτητο να γίνει χρήση ανάλογα με τις επιλογές σας των εργαλείων μορφοποίησης του ψηφιακού πίνακα ανακοινώσεων Padlet (αλλαγή ταπετσαρίας, προσθήκη εικόνας, εισαγωγή video, εισαγωγή εγγράφου κ.α.)

Επιθυμητό αλλά όχι υποχρεωτικό είναι στο πλαίσιο της Βασικής Εργασίας να προσκαλέσετε κάποιον/ους από τους συμμετέχοντες στο μάθημα «Διαδικτυακά εκπαιδευτικά εργαλεία στη διδασκαλία των γλωσσικών μαθημάτων», προκειμένου να γράψει/ουν πάνω στον πίνακα ανακοινώσεών σας.

Καλή επίδοση!

Optional task

ΠΡΟΑΙΡΕΤΙΚΗ ΕΡΓΑΣΙΑ

Δ Δημιουργία συνεργατικού ψηφιακού πίνακα ανακοινώσεων (με τη διαδικτυακή εφαρμογή Padlet)
 Προσκαλέστε (στο αντίστοιχο forum της 5ης εβδομάδας) κάποιον/ους από τους συμμετέχοντες στο μάθημα «Διαδικτυακά εκπαιδευτικά εργαλεία στη διδασκαλία των γλωσσικών μαθημάτων», προκειμένου να προχωρήσετε στη συνεργατική δημιουργία ενός ψηφιακού πίνακα ανακοινώσεων.

Οι ομάδες μπορούν να αποτελούνται από δύο (2) έως τέσσερα (4) μέλη.

Το θέμα πρέπει να είναι σχετικό με τα φιλολογικά μαθήματα.

Στη συνέχεια, μοιραστείτε (στο αντίστοιχο forum της 5ης εβδομάδας) με την ευρύτερη ομάδα μας την εμπειρία σας («τι πήγε καλά» ή/και προβλήματα που αντιμετωπίσατε) κατά την πορεία της συνεργασίας στη δημιουργία του συνεργατικού ψηφιακού πίνακα ανακοινώσεων.

Η παρούσα εργασία είναι προαιρετική και δεν αποτελεί αντικείμενο αξιολόγησης.

Educational material

Υλικό μελέτης

Παρατήρηση: Πιέστε πάνω στο όνομα του video που επιθυμείτε να παρακολουθήσετε. Επιβεβαιώστε ότι στην επιλογή Settings (γρανάζι) στο Quality είναι επιλεγμένο το 720HD. Επιλέξτε επίσης πλήρη οθόνη (Full Screen).

VideoΜαθήματα για τη διαδικτυακή εφαρμογή Padlet

- Δημιουργία λογαριασμού padlet
- Δημιουργία πίνακα ανακοινώσεων padlet

Πώς θα αποστείλω την εργασία μου προς αξιολόγηση;
 Για να αναρτήσετε την εργασία σας (**ΒΑΣΙΚΗ ΕΡΓΑΣΙΑ**), παρακολουθήστε το παρακάτω video.

- Ανάρτηση εργασίας Padlet στην πλατφόρμα

Discussion forum (5th unit)

Χώρος συζητήσεων (Forum) 5ης Εβδομάδας

- Συζήτηση για τη διαδικτυακή εφαρμογή Padlet
 Στο σημείο αυτό περιγράφουμε πιθανά τεχνικά προβλήματα που αντιμετωπίσαμε κατά την ενασχόλησή μας με τη διαδικτυακή εφαρμογή Padlet), διατυπώνουμε τις απορίες μας και προτείνουμε τρόπους αξιοποίησης της συγκεκριμένης διαδικτυακής εφαρμογής χωρίς να παραλείψουμε να προσφέρουμε τη βοήθειά μας στα υπόλοιπα μέλη της ομάδας, όταν μας ζητηθεί.
- Συζήτηση για τη συνεργατική εργασία με τη διαδικτυακή εφαρμογή Padlet

Figure 3. A screenshot of the MOOC platform showing the structure of the 5th course unit

Research method

Participants

Completely responded questionnaires and data for analysis received from 372 Greek language teachers (46 males, 326 females). 162 teachers were teaching in lower secondary schools, 47 in upper secondary schools and 61 teachers were serving in various types of schools (vocational, music, night and adult schools) or administration positions. The majority of the participants (80.6%) reported that they attended the official teachers' training program about ICT in education. In addition, 65.3% of the teachers reported that they had previous e-learning experience from distance, before attending this particular MOOC. Detailed demographic information of the participants' is presented in Table 2.

Table 2. Demographic profile of the participants

Variable	Value	Frequency	Percentage (%)
Gender	Male	46	12.4
	Female	326	87.6
School type	Lower secondary	162	43.5
	Upper secondary	147	39.5
	Other	61	16.4
Teaching experience (years)	0-7	63	16.9
	8-14	144	38.7
	15-21	90	24.2
	22-28	62	16.7
	> 29	13	3.5
ICT in education	First level	300	80.6
	Second level	139	37.4
	No training	72	19.4
Previous e-learning experience	Yes	243	65.3
	No	129	34.7

Collection and analysis of research data

In this study three main data sources were used for analysis. Firstly, log data were gathered from the MOOC platform that show individual participation and engagement along the seven weeks of the course activities (e.g., individual artefact creations, contribution with postings to the main forum topics, discussion postings related to the collaborative activities within teacher groups etc.)

Secondly, quantitative data were collected using an anonymous online questionnaire, one week after MOOC completion. The research tool was hosted and distributed to the participants through the LimeSurvey installation, held by the e-Learning Research Group. It included four questions-statements in the five-point Likert scale (1 = I completely disagree, 5 = I totally agree) with regards to the features and the affordances Web 2.0 tool in language instruction (20 statements in total). The quantitative data were analysed using SPSS ver. 23.

Finally, extensive transcripts of teachers' written comments, which uploaded on the weekly discussion forums in the MOOC platform, were also gathered. Thematic analysis was conducted with the aim to reveal the features of Web 2.0 applications that determine teachers' adoption and their beliefs about using those tools in the language lessons. In addition, teachers' abilities to design and implement educational interventions with Web 2.0 apps were also explored.

Results

Participants' active engagement

Teachers' active engagement to the various activities with Web 2.0 tools was continuous during the seven weeks of the course. Their creations were directly related to language instruction in the form of additional learning material, students' learning tasks, exercises or assignments. Table 3 shows the results of teachers' rates with regards to the individual assignments and their digital artefact creations with Web 2.0 tools. They depict an overall view of teachers' active engagement and personal achievements. Finally, 368 enrolled teachers (62.5%) completed the course successfully, since they responded effectively to the obligatory assignments (i.e., creating at least four individual and one collaborative artefact). This MOOC achieved high completion rate of the enrolled participants contrary to existing research findings that indicated fairly low completion rates for the majority of MOOCs (Vivian, Falkner & Falkner, 2014).

Table 3. Teachers' response to obligatory creations

Obligatory tasks	Web Tool	Participants	Percentage %
1	Timeline (TimeToast)	377	64.0
2	Concept mapping (Mindomo)	376	63.8
3	Collaborative writing (Google Docs)	364	61.8
4	Online Virtual Wall (Padlet)	365	62.0
5	Digital storytelling (StoryBird)	348	59.1

Table 4. Participants' presence in discussion forums

Week	Discussion theme	Threads	Topics	Posts
1	On-line platform and course organization	2	31	98
1	Teachers' self-presentation	1	230	440
1	ICT in Education	1	87	410
2	Timeline (TimeToast)	2	129	601
3	Concept mapping (Mindomo)	2	107	646
4	Collaborative writing (Google Docs)	2	168	625
5	Online Virtual Wall (Padlet)	2	118	472
6	Digital storytelling (StoryBird)	2	141	572
7	Pedagogical issues, learning design and ideas for practice	2	75	1504
7	MOOCs in teacher professional development	4	66	1089
Total		20	1152	6457

Teachers' active participation and interaction

The participants were encouraged to communicate and interact with each other, to discuss technical problems, to mutually offer guidance and support to their peers. Discussion forums were spontaneously and dynamically created with regards to organizational, technical or instructional problems. Table 4 summarises the results of teachers' participation in the weekly discussions. Overall, 1152 discussion topics were raised and 6457 posts were uploaded by the participants. This shows that the teachers were effectively engaged in exchanging ideas, supporting their peers, and co-creating artefacts with Web 2.0 apps in their groups. It is quite interesting to be noticed that the intervention of the moderators was necessary only in very few cases; this is a strong indicator that peer assistance and support is a critical design factor for teacher professional development MOOCs.

Descriptive statistics

Table 5 presents the results of the descriptive statistics regarding teachers' views of the usability and the potential of the MOOC online tools, as well as their ability to design suitable learning activities with the specific tools that promote students' participation. The internal consistency of the items in the questionnaire (Cronbach's $\alpha = 0,913$) was very good (DeVellis, 2003). As shown in Table 5, the teachers were very positive about the Web 2.0 tools in this MOOC, in terms of easiness of use for the teachers (mean 4.55), friendliness to the students (4.46), enhancing language teaching (4.52). In addition, teachers' appeared to be confident in relation to their abilities to design learning activities with Web 2.0 tools (4.45). Overall, the participants provided high rates for all items in the scale regarding online tools of this course; the mean values ranged from 4.09-4.76 with an average of 4.50.

In relation to demographic factors, no statistically significant difference in teachers' responses was found for the majority of the items. However, applying the non-parametric Mann-Whitney test, we identified statistically significant differences among men and women for the items concerning the virtual wall and digital storytelling tools. More specifically, female teachers showed higher values in

Table 5. Descriptive Statistics

Statement	Mean	SD
The Web 2.0 tools (in this MOOC) are easy to be used for the teachers	4.55	
Timeline (TimeToast)	4.63	0.550
Concept mapping (Mindomo)	4.57	0.586
Collaborative writing (Google Docs)	4.76	0.467
Online Virtual Wall (Padlet)	4.72	0.483
Digital storytelling (StoryBird)	4.09	0.963
The Web 2.0 tools are friendly to the students	4.46	
Timeline	4.51	0.634
Concept mapping	4.36	0.700
Collaborative writing with Google Docs	4.50	0.638
Online Virtual Wall	4.62	0.568
Digital storytelling	4.34	0.830
The Web 2.0 tools can enhance language teaching	4.52	
Timeline	4.59	0.569
Concept mapping	4.59	0.582
Collaborative writing with Google Docs	4.63	0.581
Online Virtual Wall	4.62	0.559
Digital storytelling	4.19	0.893
I am able to design learning activities with Web 2.0 tools that promote students' participation (engagement)	4.45	
Timeline	4.54	0.551
Concept mapping	4.44	0.591
Collaborative writing with Google Docs	4.50	0.608
Online Virtual Wall	4.55	0.564
Digital storytelling	4.26	0.828

the variables regarding: a) Padlet is easy to be used for the teacher ($U=5972.00$, $Z=-2.931$, $p=0.003$), b) Padlet is friendly to the students ($U=5843.00$, $Z=-2.932$, $p=0.003$), c) Storybird is friendly to the students ($U=5451.50$, $Z=-3.316$, $p=0.001$), and d) I am able to design learning activities with Storybird that promote students' participation/engagement ($U=5735.00$, $Z=-2.813$, $p=0.005$).

Teachers' views and comments in the discussion forum

Several issues have been also revealed through the thematic analysis of teachers' comments in the discussion forum of the various course units. The majority of the participants were positive and appeared willing to adopt the specific Web 2.0 apps in their instructional practices. Critical parameters were also identified and organised along three dimensions: a) features of the Web 2.0 apps; b) use of Web 2.0 apps in language teaching; c) added value of Web 2.0 tools in language instruction. Table 6 presents an overview of the key factors revealed in our analysis.

Features of the Web 2.0 apps

From a general perspective, the majority of the teachers recognized both, the technical and the learning features of the Web 2.0 apps that they got familiar with, during the course activities of this MOOC. The following quotes are representative of teachers' views and perceptions as they were reflected in the course forum (the number corresponds to the order of the specific forum post as it was counted by the Open eClass tool):

Table 6. Teachers' perceptions of Web 2.0 tools

Dimension	Themes
Features of the Web 2.0 apps	Technical features <ul style="list-style-type: none"> • Easy to be used by the students • Easy to be used by the teachers • Easy to create multimedia artefacts embodying text, images and links • Creative tools and funny for the students
	Learning features <ul style="list-style-type: none"> • Multimodality of information, interactivity • Promote students' creativity and collaboration • Promote students' interest and imagination • Support remote communication and collaboration among students • Support remote communication and interaction between teacher and students (GDs)
Use of Web 2.0 apps in language teaching	Teachers' pedagogical views of Web 2.0 apps <ul style="list-style-type: none"> • A teaching tool • A repository of educational material (virtual wall) • A tool for constructive and meaningful learning • A tool for the students to let their imagination run and create • A tool for assessment of students' learning outcomes
	Educational activities in the language class <ul style="list-style-type: none"> • Enriching of teacher's lecture/presentation in the classroom • Group tasks and activities (using various tools) • Creating a timeline in history lessons • Creating a concept map • Collaborative writing (using Google Docs) • Visualizing a prose text or a poem (using storytelling)
Added value of Web 2.0 tools in language instruction	Traditional view of digital technologies <ul style="list-style-type: none"> • A tool for the teacher to organise his work in the context of traditional instruction • Complementary to the language book, add-on tasks and activities • Helpful to school activities (e.g. school events and ceremonies, informal educational programs)
	Technology enhanced language learning <ul style="list-style-type: none"> • Tasks and activities based on active and creative learning approaches • Collaborative learning activities (cultivating a culture of collaboration among students) • Remote collaboration between students and teacher (e.g. using GDs) • Collaborative writing using GDs • Authentic, cross-thematic activities and projects

#4448: *Timeline is a simple and easy to use tool, suitable for the students to work with.*

#4379: *I found the timeline tool easy to use, helpful and very fun.*

#7408: *Online virtual wall is an attractive and easy to use tool for our students. I think they will like the whole process of posting and interacting with their classmates.*

#4195: *Concept mapping is actually an interactive tool, easy to be used by both, teachers and students. I was also excited with Padlet; it was very easy to insert text, images and links. It will be very useful for the students to use this tool.*

#4134: *Online virtual wall incorporates important features for language instruction, such as interactivity, multimodality, and hypertext.*

#9872: *I got excited with digital storytelling. It is a very interesting, easy to use and creative tool!!!!*

#5527: *I have to admit that I was not aware that Google Docs have so many features and possibilities. It is quite easy to use this tool, especially for those who are familiar with MS Word. The great advantage is that students have opportunities for remote communication and collaboration (e.g. from their home).*

Use of Web 2.0 apps in language teaching

The second dimension of the factors that revealed in our analysis represents teachers' views and perceptions about using Web 2.0 apps in language teaching. Those factors were classified in two main categories: a) teachers' pedagogical views of Web 2.0 apps, and b) proposed educational activities that could be applied in the language class.

According to their forum postings, the participants appeared divided in two main groups. The first group consisted of some teachers who keep a more traditional view of Web 2.0 apps, i.e. as a tool for the teacher to support classroom lectures, to provide additional educational material and assign tasks to the students. For example

#4870: *Concept mapping is an excellent teaching tool that helps teachers to organise and clarify concepts that are difficult for the students to be understood.*

#4653: *Timeline is an extremely useful tool in History lessons; it can enrich my instruction and make it more interesting for the students. I can also assign the creation of a timeline to the students themselves.*

Some other teachers perceive Web 2.0 tools as environments to provide additional educational material to the students, to assign tasks and exercises as well as to support other school activities and events.

#8228: *I liked Padlet; it is quite impressive and more fun than the other Web 2.0 apps (in the MOOC). It can be used as a repository of additional material on a variety of topics. Students can study at home and respond to exercises or assignments.*

#12805: *These tools can be also useful for other activities, such as school events and ceremonies, as well as for informal educational programs.*

On the other hand, many teachers were able to recognise the affordances of the Web 2.0 tools to support constructive, collaborative and meaningful learning and, additionally, to promote students' imagination and creativity. The following quotes are representative of a wide range of similar responses:

#5226: *Engaging students in the process of creating a concept map is an effective strategy to enhance constructive and meaningful learning.*

#7217: *Online virtual wall (Padlet) is particularly useful in cases that we ask students to collect digital information and material, and work in groups!*

#5480: *Google Docs is, perhaps, the most important and easy-to-use tool for supporting, on daily basis (why not?), teacher-student interaction.*

#5762: *Google Docs is an excellent tool for language instruction. I discussed with third grade Lyceum students (i.e. K-12) possible ways of using GDs in Ancient Greek language lessons. We came up with two main ways: 1) to give students a text with bolded parts that they need to comment or correct; and 2) to give students an opinion or various arguments about an issue and ask them to provide their comments or evaluation.*

#8683: *Digital storytelling is a tool that raises students' imagination and allows them to create their own stories.*

It is also notable that a teacher focused on using concept mapping as an assessment tool:

#5226: *Concept mapping can be used for the assessment of students' cognitive-learning outcomes; I can ask them to create a concept map.*

Added value of Web 2.0 tools in language instruction

From a general perspective, the majority of the teachers' postings in the discussion forum seem to reflect their knowledge of the affordances of Web 2.0 technologies as well as their pedagogical perceptions of implementing collaborative and creative learning activities in the Greek language class. Many teachers recognized the importance of an open pedagogical context, created by the Web 2.0 apps, within which language learning should be designed and promoted. In addition, they showed enhanced awareness of the benefits of Web 2.0 technologies to extend in-class learning activities and improve students' learning. Indicative are the following quotes of teacher arguments:

#12841: *In relation to traditional lesson plans, I believe that Web2.0 tools offer enhanced opportunities to the students to develop their creativity and collaboration skills. Students are are faced at new challenges that help them to learn through active processes of exploring, searching, analysing, creating, reflecting and collaborating with classmates.*

#12803: *These tools are very interesting and easy to use. They promote and cultivate students' collaboration and creativity. In addition, they can activate all students regardless of their level of knowledge.*

#12276: *The added pedagogical value offered by Web 2.0 tools is mainly focused on active learning and the cultivation of team working and collaborative learning.*

#13213: *All these Web2.0 tools are very useful in language teaching. Undoubtedly, they give another dimension in language lessons and enhance students' interest.*

#5536: *Actually, both teachers and students can benefit from Google Docs, since this tool promotes collaboration and teamwork. Many problems can be solved with GDs thus making possible the introduction of collaborative activities in language lessons. The students can meet online with the other group members and collaborate with classmates to create a common artefact.*

#6526: *I think that Google Docs could enhance active participation in language lessons for those students who face difficulties in writing and responding to written assignments. In collaborative writing activities, they could feel safe to undertake responsibilities, to express their ideas and receive help and support from classmates in their team.*

#5667: *TimeToast is an excellent tool to be used by the students themselves to create their own timelines.*

#8683: *Digital storytelling is a process that definitely raises students' imagination because it gives them the opportunity to easily create their own stories. We can give students a literary text or a poem and ask them to collaborate and create digital stories using photos and sketches!*

However, some teachers keep a more traditional view of Web 2.0. They perceive Web 2.0 tools as a means for personal purposes (i.e., to organise their work in the context of teacher lecturing and content-centred instruction) rather than a tool to be used by the students themselves in a context of meaningful, creative and collaborative learning activities. Indicative examples of teachers' statements and argumentation in this dimension are as following:

#5247: *Concept mapping is a useful tool that enriches teacher's presentation (lecture) in ways that promote students' interest.*

#12843: *Due to its nature, conceptual mapping can overcome the limits of the blackboard in the classroom in order to help students widen and deepen into a variety of information.*

#7145: *I think that the teacher could create a virtual wall for every lesson. Usually the teaching time is not enough to present in the classroom all the material related to a unit. Padlet can be used as an additive to the textbook, i.e., to provide to the students additional material, exercises, online resources, multimedia etc.*

#12382: *Digital storytelling can be used in Greek literature lessons but, mainly, in the lower secondary school. It does, however, help students to cultivate their imagination.*

Discussion and conclusions

This paper presented a hybrid framework for designing and implementing MOOCs for teacher professional development. The theoretical foundations harnessed and embodied features of cMOOCs and xMOOCs with the aim to promote teachers' active engagement and peer collaboration in learning activities tightly related to the classroom reality. This framework was applied in a TPD-MOOC designed to enhance language teachers' technological skills and pedagogical knowledge in order to integrate Web 2.0 tools in the instruction of Greek language in secondary schools. The findings provided supportive evidence that the blended and collaborative features of this TPD-MOOC were effective towards teachers' ability to complete this course and to enhance their achievements through individual engagement, peer interaction, mutual support, and collaborative creation of suitable educational artefacts for language instruction with Web 2.0 applications.

Contrary to existing research findings that show high dropout rates in MOOCs (Eriksson et al., 2017; Vivian, Falkner & Falkner, 2014), in this specific MOOC teachers' completion rate was actually high (62.5% of the enrolled participants). Confirming previous findings, this study has also shown that teachers' active participation, peer interaction, group-work and collaboration are critical factors towards achieving their professional development goals (Koukis & Jimoyiannis, 2017; Koutsodimou & Jimoyiannis, 2015; Laurillard, 2016). Discussion forum appeared to be very effective in this MOOC, since the majority of the teachers were very active with detailed postings in the weekly discussions. This finding is different to the results reported by Tseng et al. (2016), who recorded that only 8% of the participants were active in the MOOC forum. It seems that the teachers took advantage of the weekly discussions in the forum and the benefits of communication, interaction and mutual support among the peers.

The results of the descriptive analysis showed that the majority of participants had a positive view of the specific Web 2.0 tools, in terms of a) easy apps to be used by both, the students and the teachers, and b) promoting students' active participation, creativity and collaborative learning in the class of Greek language and literature.

Teachers' individual and collaborative creations helped participants to understand the technological and pedagogical features of Web 2.0 tools and outline specific ways of using them in Greek language teaching with the aim to enhance students' outcomes. Overall, our results confirm existing literature that that teachers' professional development should focus on teachers' in-depth reflection and co-reflection about critical issues, pedagogical strategies and new ideas applicable in instructional practice (Falkner et al., 2017; Kyriakides et al., 2017; Taranto & Arzarello, 2019).

Finally, the thematic analysis of teachers' views and comments about Web 2.0 applications in Greek language instruction identified three main groups of teachers: a) the majority of teachers recognised Web 2.0 apps as a means to transform traditional instruction and support student-centred learning practices; b) the teachers that perceive Web 2.0 tools as online environments to remotely provide additional educational material and assign tasks to the students; and c) those teachers who understand Web 2.0 apps as tools to support their traditional instruction. It appears that the majority

of the participants expressed their willingness to adopt and use Web 2.0 in their classroom expecting thus to enhance their students' learning.

Despite that this study could be limited by the specific sample and the context of implementation, the findings are of value, internationally, for those involved in designing and researching large-scale online professional development programs for teachers. The new idea that this study contributes to the existing literature is that a balance between structure (xMOOC mode) and openness-collaboration (cMOOC mode) is required and effective to enhance the outcomes TPD-MOOCs. Our future research will be directed to the comparative analysis of both quantitative and qualitative data extracted from a second TPD-MOOC on integrating collaborative writing with Google Docs in language instruction. We expect thus to identify effective patterns of interaction, self-regulation and collaboration used by the teachers to enhance their abilities about integrating ICT in language learning.

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