Designing MOOCs: motivation and interaction issues

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ABSTRACT
This paper analyses the motivation and interaction issues that constitute the core of educational design of MOOCs. In detail, a MOOC course was designed for investigating the influence of MOOC's educational design on enhancing learners' motivation and interaction with the instructor within course's forum. The IMMS questionnaire was chosen in order to measure learners' motivation and course's Learning Analytics, so as to examine interaction. The results indicated that educational design affects learners' motivation and interaction. More specifically, affects the participation within the course and forum, the amount of posts, and the course's completion.

KEYWORDS
Educational design, Massive Open Online Course, motivation, interaction

RÉSUMÉ
Cet article présente des problèmes de conception pédagogique des MOOCs. En particulier, nous examinons l'influence de la conception pédagogique du MOOC sur l'amélioration de la motivation des apprenants et de leur interaction avec l'instructeur dans le cadre du forum du cours. L'outil de recherche pour mesurer la motivation était le questionnaire IMMS. En ce qui concerne l'interaction, les données de l'enquête ont été tirées des Learning Analytics fournis par la plate-forme du cours. Les résultats ont indiqué que la conception pédagogique affecte la motivation des apprenants. De plus, les résultats ont montré que la manière dont les apprenants participent au cours et au forum influence la quantité de messages, l'interaction avec l'instructeur et donc la fin du cours.

MOTS CLÉS
Conception pédagogique, Cours en Ligne Ouverts et Massifs, motivation, interaction

THEORETICAL FRAMEWORK

The technological changes with the development of the Internet have caused an important effect in education, changing the transmission of knowledge. This situation leads to the creation of

many new educational e-learning programs the last decades. The most recent form of e-learning programs is Mass, Open, Online Courses known as MOOCs.

A MOOC is "*an online course with the option of free and open registration, a publicly shared curriculum, and open-ended outcomes. MOOCs integrate social networking, accessible online resources, and are facilitated by leading practitioners in the field of study. Most significantly, MOOCs build on the engagement of learners who self-organize their participation according to learning goals, prior knowledge and skills, and common interests*" (McAuley, Stewart, Siemens & Cormier, 2010, p. 10).

This paper aims to study educational design issues of the Massive Open Online Course (MOOC) "Introduction to Virtual Reality" which has been created using the Moodle platform. Especially, it is researched the influence of the MOOC's educational design on enhancing learners' motivation, as well as interaction with the instructor within course's online discussions.

Motivation within MOOCs

Motivation is an internal state or a condition that directs and engages us in activities (Cheng & Yeh, 2009; Kleinginna & Kleinginna, 1981). It is an important factor in learning and especially in online learning environments, affecting more than a quarter of learning success (Shih & Gamon, 2001). According to Bandura (1994) and Graham & Weiner (1996) through motivation can be explained why people conduct certain activities and the effort they put into doing them. Learners' motivation esteemed by Moore and Kearsley (2011), as a very important component that was affiliated with learners' success in distance education.

Motivation is related to meaningful learning. Although motivation is an individual characteristic of each learner, for a teacher it is important to consider motivation as a major aim of instructional design. According to ChanLin (2009) so as to enhance learning, educators should identify important instructional factors that promote motivation and make the design of the course more appealing to the learners.

In MOOCs, student motivation is very important to encourage learning and to achieve learning goals. Miltiadou and Savenye (2003) indicate that motivation plays a significant role in students' retention in MOOCs. According to Li's research (2015) the educational design of a MOOC based on motivational strategies, affects learners' motivation. Although students in general are not obligated to complete the course, the lack of motivation affects students' low completion rates.

Interaction within MOOCs

Interaction is a complex and multifaceted concept in all forms of education. For Dewey (1916), interaction is "*the defining component of the educational process that occurs when the student transforms the inert information passed to him or her from another and constructs it into knowledge with personal application and value*" (cited in Anderson, 2003, p. 130).

Interaction is a key mechanism by which to promote learning, irrespective of whether or not technological tools are part of the educational experience (Moore & Kearsley 1996). Garrison and Cleveland-Innes (2005) maintain that interaction is also challenging in online learning environments as the dynamics of the traditional learning context are shifted towards (Tawfik et al., 2017).

Interaction and engagement are essential aspects of learning. As McMillan (2006) contended, interactive learning is based on communication between students and their instructors as well as interaction with contents. As about communication, numerous studies demonstrate that dialogue is essential for developing deeper learning (Woo & Reeves, 2007).

Some of the factors that contributed to the improved interaction were the instructional strategies, which led the students to actively participate in exploration and exchange of ideas but also the instructor's presence, who empower the students (Msonde & Van Aalst, 2017).

Several studies have maintain the positive effects of interactions in online learning and in particular in MOOCs (Tawfik et al., 2017). Pappano (2012) and Suen (2014) both mentioned that because of the massive enrollment in MOOCs, course design should be carefully considered to ensure that there are interactions with peers and instructor(s). As Ahn (2012) and Cheng (2013) mentioned, the student-instructor interaction is a predictor of student satisfaction and learning motivation in online learning.

Through this research we explore the impact of the design of the MOOC, based on the ARCS model strategies, on learners' motivation and more specifically on the factors of Attention, Relevance, Confidence and Satisfaction which are motivational components that if they increased through the educational design, they will enhance student motivation. Furthermore, in our study, we examine also the interaction processes within the course's forum, focusing on the interaction between students and instructor. This relationship is an important element of learning for both online and face to-face learners (Chen, Lambert & Guidry, 2010). The analysis of this interaction occurs through the quantitative analysis of the discussion fora evaluating the learning analytics provided the Moodle platform.

The Educational Design of the MOOC "Introduction to Virtual Reality"

In order to create the MOOC "Introduction to Virtual Reality" we used the ARCS Motivation Model, an educational design model, to enhance learners' motivation. This model consists of four elements: attention (A) enhancing and sustaining attention and curiosity to the instructional content; (2) Relevance – relating to learning objectives and usefulness of the learning, personal interests of each learner, (3) Confidence – building confidence in learning and accomplishment and (4) Satisfaction – promoting the potential for learning satisfaction. Each of them encourages learner motivation when designing learning environments (ChanLin, 2009; Pittenger & Doering, 2010). The ARCS model includes strategies which are used to boost incentives during the educational process. Finally, the model involves a systematic design process that includes 10 designing steps for motivational design (Keller, 1987).

The educational design of this MOOC is based on the ARCS strategies which are: 1) Attention strategies: variability and perceptual arousal 2) Relevance strategies: goal orientation and familiarity with educational material, 3) Confidence strategies: learning requirements, success opportunities and personal control, 4) Satisfaction strategies: intrinsic reinforcement and equity among learners.

In addition, two rubrics for the design of online courses were also used: OSCQR (Course Design Review) and TLPDC-course-design-rubric. From the OSCQR rubric we emphasized in the "Interaction" factor so as to promote interaction among learners. Moreover, the "Effective" category of TLPDC-course-design-rubric was used for the overall design of the MOOC. This rubric focuses on six (6) aspects of course design which are "course entry", "instructional design", "evaluation-assessment", "interaction and communication", "accessibility" and "copyright".

Approaches of different learning theories are embedded in the educational design of the course. More specifically, we used course's quizzes, content presentation, modules activities, discussion fora, combining behavioristic, constructivist and connectivist approaches for learning.

Presentation of the MOOC "Introduction to Virtual Reality"

The MOOC "Introduction to Virtual Reality" designed by us though our master program in learning technologies at Aristotle University of Thessaloniki. The course was offered in Greek and lasted almost three weeks (from January to February 2018) .It has been created using the Moodle platform (2.7. version). The course is an introductory lesson about Virtual reality. The main goal is the learners to become familiar with the basic features of virtual reality and in the end to create a three dimensional virtual environment. Specifically, the MOOC was organized into three modules: a) "Introduction to Virtual Reality", b) "Types of Virtual Reality" and c) "Creating 3D Virtual Space with Unity 3D software". Educational material and the learning content are provided in a variety of ways so as to respond to the individual needs and different learning styles of learners. Each module was typically composed of short video-lectures, video-animations, PowerPoint presentations and pdf format. Each module has some activities. Learners must complete all the activities provided in each module so as to pass to the next one. The first two modules have quizzes with multiple choices questions, so as to examine the comprehension of the content and the second module has an extra activity. In this activity, learners had to organize a detailed presentation embedding any type of virtual reality in their everyday life and job. In the third module there is only one activity in which learners can create a virtual space through Unity 3D software. Each module of the course provides learners the opportunity to communicate and collaborate not only with each other but also with their instructor through discussion fora.

RESEARCH QUESTIONS

In order to examine the motivation and interaction in this MOOC, three (3) research questions (RQs) were formulated.

RQ 1: Could the educational design of the course based on ARCS model, has an impact on learners' motivation?

a: Has an impact on learners' attention?
b: Has an impact on relevance between the course content and learners goals?
c: Has an impact on learners' confidence?
d: Has an impact on learners' Satisfaction?

RQ 2: Do learners create more connections into the discussion fora with the instructor or co-learners depending on the engagement style they belong to?

RQ 3: Do learners who belong to the engagement style with most connections to the instructor complete the course?

METHODOLOGICAL FRAMEWORK

The overview of the study

This paper presents a study carried out from 27 January to 17 February 2018 at the e-learning platform of the laboratory "*Education and Research in Learning Technologies*" of Aristotle University of Thessaloniki. The sample consisted of 56 persons, 23 master students and 33

persons who are interested in attending the course. The research questionnaire was answered by 53 out of the total 56 participants. The course was designed for adult learners who were interested in learning about virtual reality.

The research procedure

The research design includes three stages. At first, at stage 1, participants were informed about the research process and the lesson they were invited to attend and evaluate. At stage 2 the attendance of the MOOC was conducted by the learners. This stage lasted almost 3 weeks. Finally, stage 3 was the data collection. The data on motivation was gathered through the IMMS (Instructional Materials Motivation Survey) questionnaire which the MOOC learners completed at the end of the course. This was a 5-point symmetrical Likert scale questionnaire made up of 36 items divided into four categories (attention, confidence, satisfaction and relevance) based on Keller's ARCS motivation model (1987). The scores of each subscale were calculated by One-Sample t-test so as to evaluate each category. In order to collect the data about interaction within the discussion fora of the course, Learning analytics of the course were used to evaluate learners' course's activities and forum activities among learners and instructor. More specific, data about learners activities into the course and the number of posts, views and creates into the fora were collected. It was also used the plug- in "Forum Graph" which visualizes the interactions into the course's discussion fora.

Data Analysis

The data analysis was conducted by using the SPSS Statistical Program. A scale reliability test was conducted to evaluate the IMMS result. Also, one sample t-test was arranged to examine how the educational design of the course has an impact on the development of learners' attention relevance, confidence and satisfaction and consequently their motivation. Furthermore, to evaluate the interaction in discussion fora further statistical analysis was made. In particular, an One Way ANOVA test arranged to check whether there was any difference of learners' posts to the instructor or co-learners in the discussion fora among the various groups of learners' engagement styles. Finally, to examine the affect of interaction with the instructor on learners' course's completion, X^2 analysis was conducted.

RESULTS

IMMS Results-Scale Reliability

The overall reliability of the IMMS questionnaire was 0.927 according to Cronbach Alpha, which suggested a good reliability of the IMMS results. All the four scales demonstrated acceptable levels of internal reliability (Attention a= .853, Relevance a= .751, Confidence a= .757, Satisfaction a= .864)

Participants' Motivation Level

Among 53 participants, the minimum overall motivation level was 3.36 and the highest motivation level was 4.94. According to Pittenger & Doering (2010), a score of 3.5 or greater is considered a successful motivational level. In this study, the average value of the overall motivation level is (M= 4.33, SD= .4249), which indicated that the average level of motivation was high after attending the course. More specifically, it was remarkable that 41 out of 53

participants, (77.35%), have a high level of motivation while 2 participants (3.77%) have a middle level of motivation.

Analysis of Motivation Level (descriptive)

Learners' motivation level was analyzed from four subscales, namely "attention", "relevance", "confidence" and "satisfaction". In the attention dimension, the total mean score was (M=4.345, SD= .47799) which indicates that learners' motivation levels were positive and the attention was enhanced trough the course. In the relevance dimension, the total mean score was (M=4.039, SD= .47944) which shows that there was relevance between content and learners' interests, goals. In the confidence dimension, the total mean score was (M=4.081, SD= .59856) which meant that the learners were confident about themselves. Finally, in the satisfaction dimension, the total mean score was (M=4.232, SD= .48391) which suggests that learners were overall satisfied with the course.

Quantitative analysis of learners' motivation

So as to examine how the design of the MOOC based on the ARCS model strategies has an impact on the development of learners' Attention, Relevance, Confidence and Satisfaction and consequently to their motivation, one sample t-test was conducted.

Results about RQ 1: Could the educational design of the course based on ARCS model, has an impact on learners' motivation?

The One sample t-test for the 4 subcategories of the RQ 1 as mentioned above, showed that the level of statistical significance (p- value) is equal to Sig. = 0.000 <0.05 in all four components (attention, relevance, confidence, satisfaction), the null hypothesis is rejected and the alternative is confirmed. This result indicated that the design of the course based on ARCS model, has a significant impact on learners' Attention, Relevance, Confidence and Satisfaction. The results showed that educational design of the course based on ARCS model has a significant impact on learners' motivation, as the p- value is equal to 0.000 (Sig. = 0.000 <0.05).

Forum analysis- Interaction with the instructor

The participants (56 learners) were categorized into 3 groups of engagement styles depending on their activities in the course. These three categories are a) "Watching the course's videos and doing the course's projects", b) "Watching the course's videos" and c) "Doing the course's projects". To examine the interaction through engagement style within the discussion fora, two research questions had been formulated.

Results about RQ 2: Do learners create more connections into the discussion fora with the instructor or co-learners depending on the engagement style they belong to?

According to the taxonomy of the participants mentioned above, we researched the interaction with the instructor within the fora of the course. Learners of all categories make more posts to the instructor (total 132 posts) than to their co-learners (total 45 posts). Learners' posts also affected by the engagement style they belonged to. The ANOVA analysis found that there are significant differences between the engagement style and posts to instructor (sig: 0.016<0.05) and to co-learners (sig: 0.00<0.05). There are also differences among the 3 engagement styles and their posts to instructor. More specific, learners who belonged to the group: "Watching the course's videos and doing the course's projects" had significant difference among other engagement styles (sig: 0.015<0.05).

Results about RQ 3: Do learners who belong to the engagement style with most connections to the instructor complete the course?
Learners who belong to engagement style "Watching the course's videos and doing the course's projects" attached more with the instructor and complete 100% the course as X^2 analysis indicated. The Monte Carlo significance (sig: 0.00<0.05) indicated that there was also a relationship between engagement style and course completion.

DISCUSSION

The findings of this study support the thesis posed by researchers that "MOOCs indeed need a special instructional design to become valuable for learners and instructors" (Kopp & Lackner, 2014). A literature review conducted by Hart (2012) indicates that learners' motivation is a very important factor enhancing the persistence in e- learning courses. Furthermore, interaction plays an important role in high quality MOOCs (Khalil & Ebner, 2014; Mcauley et al., 2010). Many researches confirmed that the role of interaction and communication in MOOCs is essential to construct learners' knowledge through their personal learning network .

In the case of this study, we see that the design of the MOOC, based on ARCS model and its motivational strategies, has a significant impact on motivation and interaction within the course. More specifically, the design of the MOOC based on ARCS model, attracts learners' Attention, provides relevance between learning content and learners' goals and needs, promotes confidence and enhances the feeling of satisfaction about the accomplishment.

These results are verified by other studies, mentioned that educational design based on ARCS model has an impact on Attention, Relevance, Confidence, Satisfaction and their motivation (Means, Jonassen, & Dwyer, 1997; Song, & Keller, 2001;ChanLin, 2009; Pittenger & Doering, 2010) .

According to this research, the interaction especially with the instructor is affected also by the educational design of the course. The study showed that the way that learners participate in the course, affects the amount of posts and therefore the interaction with the instructor. Finally, we find that the interaction between the learners and the instructor within the course's forum has an impact on the completion of the course. This result is also verified by the survey of Paechter, Maier and Macher (2010) in which the interaction between learners and the instructor has a significant influence on successful learning outcomes. In conclusion, analyzing educational design, monitoring and promoting learners' motivation and interaction within MOOCs, provide another approach that may enhance MOOCs' quality.

The findings of this study represent a starting point for designing MOOCs and investigating motivation and interaction. To expand the generalizability of this research, further studies with a larger sample of learners should be conducted. Moreover, including data from learners who do not successfully complete the course could provide a more detailed assessment of educational design of the MOOCs.

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