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Motivations and self-regulated learning in MOOCs

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Abstract
Massive Open Online Courses (MOOCs) require learners to self-regulate their learning to achieve their goals. Due to MOOCs' learning autonomy, students must develop strong motivations for learning and self-regulated strategies. The aim of the present study is to investigate learners' motivations for learning and their self-regulated learning strategies which led some to successfully complete their MOOC, whereas others not. One-hundred-and-twenty (120) learners in xMOOCs, or Coursera-type-MOOCs, took part in the study by completing the MSL-Questionnaire. The results indicated that learners who had completed their MOOC had developed strong motivations of extrinsic orientation, task value, and high self-efficacy. Furthermore, they had used strategies of elaboration and of metacognitive self-regulation. They were able to manage their time and study environment and felt the obligation to keep on studying even when their learning object did not seem to have any interest on them. Finally, individual differences among the participants, such as gender, year of school graduation, reasons for participating in the MOOC, time for studying, and time dedicated to work per week were found to differentiate both motivations for learning and self-regulated learning strategies.

Keywords
MOOCs, self-regulation, motivations for learning, learning strategies

1. Introduction
The swift progress of educational technology (Allen et al., 2016) reinforces a new model of education that supports learners of all ages from all around the world (Allen & Seaman, 2014) without requiring their physical presence in a classroom (Artino & Jones, 2012).

Massive Open Online Courses (MOOCs) provide such an alternative context of learning and are becoming increasingly popular (Barak, Watted & Haick, 2016), despite the Bates' (2019) view that "*MOOCs are essentially a dead end with regard to providing learners who do not have adequate access to education with high quality qualifications"* and *"the main value of MOOCs is in providing opportunities for nonformal education and supporting communities of practice*".

Research has shown that learners attending online courses are able to learn as much as attending traditional courses, where the physical presence of both teachers and learners is required (Sitzmann et al., 2006). As physical presence is not possible in online learning environments, learners need to put more emphasis on the need for self-regulated learning (Serdyukov & Hill, 2013).

Self-regulation is an exhaustive process for the learners, as it requires time and heavy cognitive effort. Therefore, learners in MOOCs should have developed high motivations to study (Cosnefroy, 2011).

Learning motivations stimulate learners to use a variety of cognitive, metacognitive, and resource management strategies in order to meet their learning goals (Puzzifero, 2008).

The present study examines the learning motivations and self-regulated learning strategies of learners who participated in MOOCs and aims to contribute to the discussion on how students learn in MOOCs' environments.

2. Literature Review

2.1 MOOCs

MOOCs' have rapidly become popular among top universities, spreading around the world (Brahimi & Sarirete, 2015). About 70% of the courses hosted by Coursera and 60% of the courses offered by edX are created by the top fifteen institutions of the world, according to a Shanghai ranking (France Stratégie, 2016).

All MOOCs share common features that differentiate them from other forms of distance education. Unlike other e-courses, a massive number of learners all over the world can be enrolled in MOOCs at the same time through the Internet (Bates, 2019). In most MOOCs, the learners are not obligated to have prior knowledge, experience, or formal qualifications to enroll, and they do not usually pay fees to join classes as they have open. The duration of MOOCs is short, usually a few weeks (Bates, 2019). Jordan (2014) showed that the shorter the duration of a MOOC, the more participants were able to successfully complete it.

MOOCs adopt tools used in online learning communities (Zhang & Ordóñez de Pablos, 2012; Zhuhadar, Yang, & Lytras, 2013; Dascalu et al., 2014), such as online group workplaces, fora, chatting services, online course evaluations, quizzes, virtual reality applications, video conferencing, and video presentations (Shen & Kuo, 2015; Zhuhadar, Kruk & Daday, 2015).

Certification in a MOOC does not have the official character of a university diploma. MOOCs provide only a nonformal certification of skills, due to its low validity in ensuring the evaluation of knowledge in connection with the learners' identification (Bates, 2019), as nobody knows who is really on the other side of the screen.

2.2 Learning motivations in MOOCs

Due to MOOCs' open access, a variety of learning motivations and expectations are present (Kizilcec, Piech & Schneider, 2013; Breslow et al., 2013; Seaton et al., 2014). This study examines the internal and external learning motives, task value motivations,

control of learning beliefs, self-efficacy, and anxiety that may motivate learning of participants in MOOCs.

2.2.1 Internal and external learning motives

According to Littlejohn et al. (2016), students who believe that the learning process is an interesting and important task for them (internal learning motives) are more cognitively involved in the learning process than students with an external goal orientation, such as obtaining a certificate. Participants in MOOCs with intrinsic motivation for learning cope their involvement in MOOC as an opportunity for themselves to develop their own knowledge and proper skills (Littlejohn et al., 2016). Rakes and Dunn (2010) showed that learners in online learning environments with internal learning motives were negatively related to procrastination. Internally motivated learners in Cho and Shen's (2013) research performed demanding learning projects and did not abandon them.

2.2.2 Task value motivations

Task value of a project refers to how interesting, important, and useful the project is to the learner. According to the literature, higher task value motivations lead to stronger engagement in the learning (Steinmayr et al., 2019).

2.2.3 Control of learning beliefs

Control of learning beliefs is referring to learners' beliefs that their efforts to learn will bring positive results (Pintrich et al., 1991). If learners feel that they can control their own learning, they are more likely to adopt appropriate learning strategies (Pintrich et al., 1991).

2.2.4 Self-efficacy

Self-efficacy describes the degree to which a learner feels confident to be involved in the learning process and achieve his/her learning goals (Littlejohn et al., 2016).
Self-efficacy influences the learning strategies a learner adopts in a particular learning environment (Bandura, 1986; Zimmerman, Bandura, & Partinez-Pons, 1992). Learners who report high self-efficacy in using self-regulated learning strategies also demonstrate high academic performance in their online learning (Zimmerman & Schunk, 2004; Caprara et al., 2011).

2.2.5 Anxiety

MOOCs may provide final exams and homework. However, such tasks do not demand the learners to have a high performance or determine whether they will gain a MOOC's certificate. In fact, the certificate is mailed to all learners who have managed to complete MOOC's assignments.
Furthermore, certification in MOOCs does not have the official status of a university degree (Bates, 2019), which releases learners from further stress.

2.3 Self-regulation and learning strategies in MOOCs

MOOCs, unlike traditional courses, disconnect learning process from temporal and spatial contexts (Hrastinki, 2008). Learners determine their time of study, choose the appropriate environment, and set personal learning goals (Milligan & Littlejohn, 2014). Therefore, their ability to self-regulate their learning will determine whether they will manage to complete the MOOC or not (Dabbagh & Kitsantas, 2005; Artino, 2008; Puzziferro, 2008; Cho & Jonassen, 2009; Xu & Jaggars, 2014).

Self-regulated learning is essential for learners in online learning environments, as they lack a teacher's direct instruction (Cho, Shen, & Laffey, 2010; Sun & Rueda, 2012). Learners may adopt different strategies to self-regulate their learning (Barnard-Brak, Paton, & Lan, 2010; Dörrenbächer & Perels, 2016). However, although learners in asynchronous learning environments have the freedom to design and manage their own learning (Broadbent & Poon, 2015), they often report difficulties maintaining their commitment to complete the course (Artino, 2008).

Low successful completion rates is a common problem (Kizilcec, Piech & Schneider, 2013; Perna et al., 2014; Halawa, Greene & Mitchell, 2014; Sinha, 2014; Anderson et al., 2014; Brahimi & Sarirete, 2015; Evans, Baker & Dee, 2016; Seaton et al., 2014). Approximately 10% of the learners manage to successfully complete their MOOC (Nawrot & Doucet, 2014; Zheng et al., 2015).

The present study examines cognitive and metacognitive strategies in learning in MOOCs (rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation) and resource management strategies (management of time and study environment, effort regulation, peer learning, help seeking) that may be used by learners.

2.3.1 Rehearsal

Basic rehearsal strategies include reciting or repeating the names of things from a list (Pintrich et al., 1991; Effeney, Carroll & Bahr, 2013). In an online lesson, the rehearsal is achieved when the learner watches or listens to the online lecture repeatedly.

Few studies have shown a positive relationship between rehearsal in online learning environments and academic performance (Carson, 2011; Chang, 2007), while most of them have shown a negative relationship (Chang, 2010; Hodges & Kim, 2010; Klingsieck et al., 2012; Cho & Shen, 2013) or no relationship at all (Puzziferro, 2008; Wang & Wu, 2008).

2.3.2 Elaboration

Elaboration strategies, such as paraphrasing, summarizing, creating analogies, and note-taking (Pintrich et al., 1991) help learners to keep new information in long-term memory (Pintrich et al., 1991; Weinstein, Acee & Jung, 2011; Richardson, Abraham & Bond, 2012).

Research meta-analyses by Broadbent and Poon (2015) did not show any statistically significant relationship between elaboration and learning performance in online learning environments.

2.3.3 Organization

Organization refers to the learner's ability to distinguish the key points of a text he/she reads in order to facilitate his/her learning (Effeney, Carroll & Bahr, 2013).

Although organization requires the learner to actively participate in his/her learning process (Pintrich et al., 1991), research meta-analyses did not show statistically significant associations between organization and learning performance (Broadbent & Poon, 2015).

2.3.4 Critical thinking

Critical thinking refers to the learner's ability to implement aquired knowledge in new situations in order to solve problems, make decisions, or make critical evaluations (Richardson, Abraham & Bond, 2012).

Research meta-analyses have shown a statistically significant relationship between critical thinking and academic performance in online learning environments (Broadbent & Poon, 2015).

2.3.5 Metacognitive self-regulation

Metacognitive self-regulation describes how learners monitor and control their cognitive processes (Pintrich et al., 1991; Puzziferro, 2008). In that way, learners can experiment with different learning strategies and adopt the most efficient one to achieve their learning goals.
Artino (2009) showed that learners in online learning environments who had set more explicit career goals were more likely to use metacognitive self-regulation strategies. Learners in MOOCs who had pre-defined their learning goals and had carefully selected learning strategies (high metacognitive self-regulation) managed to gain a MOOCs certificate (Kizilcec, Pérez-Sanagustín & Maldonado, 2017).

2.3.6 Management of time and study environment

Time management refers to the learner's ability to plan his study schedule (Effeney, Carroll & Bahr, 2013), dedicating few hours daily, weekly, and/or monthly for studying according to his/her schedule. Study on a daily basis is a typical feature of a self-regulated learner (Mega, Ronconi & De Beni, 2014; Wolters & Hussain, 2015).
Research has shown a positive association between learners' study time management and their performance (Puzziferro, 2008; Carson, 2011; Michinov et al., 2011; ChanLin, 2012). According to the literature, the ideal study environment is free of visual and auditory distractions (Pintrich et al., 1991).

2.3.7 Effort regulation

Effort regulation reflects the learner's obligation to complete his/her study goals regardless of the difficulties or the distractions that may arise during the studying process (Pintrich et al., 1991; Puzziferro, 2008; Richardson, Abraham & Bond, 2012). A learner who adopts the "effort regulation" strategy continues to study even when he/she does not find the studying task interesting.
Research has shown a positive association between effort regulation and learning performance in online learning environments (Puzziferro, 2008; Carson, 2011; Cho & Shen, 2013).

2.3.8 Peer learning

Previous studies have highlighted the benefits of peer interaction in online lessons (Dabbagh & Kitsantas, 2005; Cho & Summers, 2012). Participants in MOOCs who were involved in interactions with other participants were not likely to give up the courses (Halawa, Greene, & Mitchell, 2014; Onah, Sinchair, & Boyatt, 2014; Ferguson & Clow, 2015).
However, online lessons tend to convey the feeling of isolation to their learners (Welsh et al., 2003; Stonebraker & Hazeltine, 2004), who study next to a screen and not next to a classmate. In any case, the ability to regulate social interaction with others, such as peer-to-peer learning, may affect learning (Cho & Jonassen, 2009).

2.3.9 Help seeking

When the learner is dealing with difficulties that he/she cannot handle on his/her own, he/she turns to "help seeking" strategies, which means that the learner seeks for help from other people, such as the teacher or classmates (Pintrich, 1999; Richardson,

Abraham & Bond, 2012; Newnan, 2012). In online learning environments, such as MOOCs, assistance is provided through online tools (Hao et al., 2016), such as chats and forums.
Help-seeking strategies in MOOC environments are limited, as learners often lose the sense of community (Kizilcec, Pérez-Sanagustín, & Maldonado, 2017). Broadbent (2017) showed that learners in online learning environments did not use 'help-seeking' and 'peer-learning' strategies, as they could not feel the human presence in the online course or the feeling of being part of a learning community (Wei & Chen, 2012; Kruger-Ross & Waters, 2013).

2.4 Individual differences in learning in MOOCs

Individual differences may influence the learning motivations and the self-regulated learning strategies (Hood, Littlejohn, & Milligan, 2015). In the research of Kizilcec, Pérez-Sanagustín, and Maldonado (2017), learners' individual characteristics were examined in relation to the use of different learning strategies. Researchers found that older learners used more self-regulated learning strategies (Kizilcec, Pérez-Sanagustín, & Maldonado, 2017). More individual characteristics may outline the profiles of different e-learners.

3. Research Questions

The research questions the study is aiming to answer are:
1. What were the learning motivations of learners who successfully completed their MOOC?
2. Which learning strategies were adopted by learners who successfully completed their MOOC?
3. Do learners' individual characteristics differentiate learning motivations and/or self-regulated learning strategies during studying in MOOCS?

4. Materials and Methods

4.1 Participants

A very large number of participants from various MOOCs courses were invited to take part in this research. However, only a small number responded and participated in the research process. The sample consisted of learners from different xMOOCs or Coursera-type-MOOCs and finally, data collected from one hundred and twenty (120) learners between November 2018 and March 2019. Forty-six (46) of them were men, and seventy-four (74) were women. Most of the learners (96 participants) had graduated from school before 2008. One hundred and two (102) learners had successfully completed the MOOC in which they participated, while eighteen (18) learners had failed to complete it. All participants were asked to complete a questionnaire taking twenty (20') to thirty (30') minutes.

4.2 Research tools - instruments

All participants answered the MSL-Questionnaire (Pintrich et al., 1991). MSL-Q assesses learners' motivations for learning and their use of different learning strategies. The questionnaire was originally constructed for use in face-to-face courses. Previous research has used the MSL-Q to assess learners' motivations and strategies in different online learning environments (Barnard, Paton & Lan, 2008; Littlejohn & Milligan, 2015; Broadbent, 2017; Kizilcec, Pérez-Sanagustín & Maldonado, 2017).
MSL-Q is divided in two (2) sections: a motivations section and a learning strategies section. The motivation section consists of thirty-one (31) statements that assess

learners' goals and value beliefs for a course, their beliefs about their skill to succeed in a course, and their anxiety about tests in a course. The learning strategy section includes thirty-one (31) statements regarding learners' use of different cognitive and metacognitive strategies. In addition, the learning strategies section includes nineteen (19) statements concerning learners' management of different sources. Each statement utilizes a seven-point scale ranging from *1 (not at all true of me)* to *7 (very true of me)*. The questionnaire was posted online (https://goo.gl/forms/6P92cX1wnnGmBGl02) in the English language. Participants' responses to MLS-Q may differ depending on course characteristics, instructors' demands, and individual learners' characteristics. MLS-Q demonstrates strong reliability and validity (Pintrich et al., 1991).

4.3 Ethics

The research was conducted on the basis of the anonymity and under the consent of the participants. The participants volunteered to participate in the present study by completing the online MLS-Questionnaire. The data collection was anonymous, the ethics of the research were fully respected, and the privacy of the participants was maintained.

5. Results

The results of the study are based on the descriptive and explanatory statistical analysis of the data using the SPSS statistical package.

The Kolmogorov-Smirnov normality test was used to identify the distribution of the data for every variable of the study. Based on the results of the Kolmogorov-Smirnov normality test and the type of the data for each variable, the x^2 goodness-of-fit test, x^2 test of independence, student's t-test, and the Mann-Witnney U test, the Pearson correlation coefficient and the Spearman correlation coefficient were used to detect statistically significant differences among the groups and subgroups of the study's sample, as well as correlations among the variables of the study.

The internal consistency coefficient Cronbach's α was used to identify the reliability of the answers of the scales. The internal consistency coefficient Cronbach's α was high for both the Learning motivations scale (α=0.85) and the Self-regulated learning strategies scale (α=0.91).

5.1 Demographics

One hundred and twenty (120) learners in xMOOCs or Coursera-type-MOOCs, took place in the study. Learners joined MOOCs of eleven (11) different topics. Most of the participants (96 learners) had graduated from school before 2008. Their average time of working at their jobs was forty (40) hours per week. Time in work was negatively associated with time devoted to studying for the MOOC (r = - 0.20; n = 120; p < .05). Participants were residents of different countries of the world. One hundred and two (102) participants were residents of European countries, thirteen (13) participants were of American countries, three (3) participants were of Asian countries and two (2) participants were from Australia.

The average time they spent studying was four (4) hours per week. Time studying for the MOOC differed depending on the reasons for the selection of the specific MOOC. Learners who had chosen their MOOC because *"it was an easy course for them"* devoted a few hours per week studying (t(118) = -1.6; p< .05), while learners who had chosen their MOOC *"to improve their academic skills"* devoted more hours studying (t(118) = 2.26; p < .05). Most of the learners (60.8%) stated to have chosen their MOOC because they found its content interesting.

The majority of the participants (102 learners) claimed that they had successfully completed the MOOC which they attended during or just before answering the questionnaire of this research.

5.2 Learning motivations and the completion of the MOOC

Statistically significant differences were found between those who successfully completed the MOOC and those who did not complete it, regarding to their self-efficacy ($U(120) = 1283$; $Z = 2.7$; $p < .05$; $r = 2.5$) and their task value motivations ($U(120) = 1204$; $Z = 2.1$; $p < .05$; $r = 0.2$). Learners who found the learning subject interesting and felt confident to be involved in the learning process were more likely to complete their MOOC. That may be the reason why MOOC completion was not associated with stress ($U(120) = 1133$; $Z = 1.6$; $p > .05$; $r = 1.5$). However, no statistically significant differences were observed between those who completed the MOOC and those who did not complete it regarding to their intrinsic motivations ($U(120) = 991.5$; $Z=0.54$; $p > .05$; $r = .05$) (Table 1).

Table 1
Intrinsic learning motivations, task value motivations, self-efficacy, and stress for exams according to the completion of the MOOC

Completion of MOOC	Yes (Mean±SD) Mean=102	No (Mean±SD) Mean=18	U N=120	p
Intrinsic motivation	14.0 ± 1.8	13.2 ± 3.0	991.5	.59
Task value	30.4 ± 4.0	28.2 ± 4.1	1204.0	.04
Self-efficacy	42.7 ± 5.2	37.5 ± 7.7	1283.0	.01
Anxiety	7.1 ± 3.5	5.6 ± 2.2	1133.0	.11

Statistically significant differences were found between those who completed the MOOC and those who did not complete the MOOC regarding to the external learning motivations ($t(118) = -2.81$; $p < .05$), while no statistically significant differences were found between them concerning learning beliefs ($t(118) = -0.14$; $p > .05$) (Table 2).

Table 2
External learning motivations and learning beliefs according to the completion of the MOOC

Completion of MOOC	Yes (Mean±SD) Mean=102	No (Mean±SD) Mean=18	T	df	p
External motivation	14.6 ± 4.6	11.3 ± 4.9	-2.81		.00
Learning beliefs	17.6 ± 3.1	17.5 ± 2.5	-0.14	118	.89

5.3 Self-regulated learning strategies and the completion of the MOOC

Although no statistically significant differences were found between the completion and the non-completion of the MOOC concerning critical thinking strategies ($t(118) = -1.22$; $p < .05$), statistically significant differences were observed in the use of metacognitive self-regulation strategies ($t(118) = -3.00$; $p < .05$).). Learners who were able to monitor and control their learning process through MOOC, were also able to successfully complete their MOOC. Moreover, no statistically significant differences were found concerning the rehearsal strategies, such as reciting or repeating the online lecture ($t(118) = -0.70$; $p < .05$) (Table 3).

Table 3
Critical thinking, metacognitive self-regulation, and rehearsal strategies according to the completion of the MOOC

Completion of MOOC	Yes (Mean±SD) Mean=102	No (Mean±SD) Mean=18	T	df	p
Critical thinking	21.8 ± 4.1	20.4 ± 5.2	-1.23		.22
Metacognitive self-regulation	56.6 ± 8.2	49.9 ± 11.6	-3.00	118	.00
Rehearsal	14.9 ± 3.4	14.2 ± 4.4	- .68		.50

No statistically significant differences were found between those who completed the MOOC and those who did not complete it, concerning the use of organization strategies ($U(120) = 1041.5$; $Z = .9$; $p > .05$; $r = .08$). On the contrary, statistically significant differences concerning the use of the "elaboration" strategy were stated ($U(120) = 1316$; $Z = 2.9$; $p < .05$; $r = .3$) (Table 4). It seemed that elaboration strategies, such as paraphrasing, summarizing, creating analogies, and note-taking supported the learners to successfully complete their MOOC.

Table 4
Elaboration and organization strategies according to the completion of the MOOC

Completion of MOOC	Yes (Mean±SD) Mean=102	No (Mean±SD) Mean=18	U N=120	p
Elaboration	28.1 ± 5.1	24.1 ± 5.5	1316.0	.00
Organization	16.8 ± 3.6	15.6 ± 4.6	1041.5	.36

Statistically significant differences were found between those who completed the MOOC and those who did not complete it, regarding the use of time management, the study environment ($t(118) = -3.497$; $p < .05$), and the use of effort regulation ($t(118) = -3.951$; $p < .05$) (Table 5). Learners' prudent distribution of time for studying in combination with their persistence in studying seem to lead to the completion of their MOOC.

Table 5
Management of time and study environment and effort regulation according to the completion of the MOOC

Completion of MOOC	Yes (Mean±SD) Mean=102	No (Mean±SD) Mean=18	t	df	p
Management of time and study environment	35.5 ± 5.6	29.8 ± 9.8	-3.50	118	.001
Effort regulation	16.6 ± 3.0	13.4 ± 4.2	-3.95		.000

No statistically significant differences were found between the completion and the non-completion of the MOOC regarding peer learning ($U(120) = 1181.5$; $Z = 1.9$; $p > .05$; $r = .2$) and help seeking ($U(120) = 1169$; $Z = 1.8$; $p > .05$; $r = .2$) (Table 6).

Table 6
Peer learning management strategies and help seeking according to the completion of the MOOC

Completion of MOOC	Yes (Mean±SD) Mean=102	No (Mean±SD) Mean=18	U N=120	p
Peer learning	8.7 ± 4.0	6.8 ± 2.9	1181.5	.53
Help seeking	12.1 ± 5.2	10.0 ± 3.4	1169.0	.65

5.4 Individual differences and the learning motivations

The participants' school graduation year was statistically significant, associated with the external learning motivations ($r = .193$; $n = 120$; $p < .05$). Learners who had recently graduated from school reported motivational external orientation. Many of them reported that the certificate was a motive for them to participate in the MOOC.

Time working was negatively associated with learners' participation in MOOCs due to external motives (r = -0.28; n = 120; p < .05). Learners who were working more hours per week reported fewer external motives.
Personal studying for the MOOC was positively associated with task value motivations ($r_s(118)$ = .201; p < .05) and negatively with external learning motivations (r = -0.230; n = 120; p < .05). Learners who were studying more hours per week seemed to participate in the MOOC because they found it useful and interesting for themselves (task value motivation) rather than because they needed the MOOC's certification (external motivation).
Moreover, different reasons for participating in the MOOC differentiated learning motivations. Learners who participated in the MOOC in order to improve their academic skills reported self-efficacy ($U(120)$ = 1346.5; Z = -2.2; p< .05; r = -0.2). Internally-motivated learners reported that their reason for participating in the MOOC was related to their scientific interests ($U(120)$ = 331.5; Z = 2.6; p < .05; r = 0.2). Learners who had chosen to participate in MOOCs because they found the topic interesting indicated task value motivations ($U(120)$ = 2096.5; Z = 2.1; p < .05; r = .2).

5.5 Individual differences and the self-regulated learning strategies

Statistically significant differences between men and women were detected concerning the adoption of rehearsal strategies (t(118) = -2.181; p < .05). Women were more likely to use rehearsal than men. In a MOOC, rehearsal is achieved when the learner watches the lecture repeatedly.
The learner's school graduation year was statistically significantly associated with the use of "critical thinking" strategy (r = -0.191; n = 120; p < .05). The older the learners were, the more they used "critical thinking" in the MOOC.
Statistically significant differences were found between learners studying for MOOC up to four (4) hours per week and those studying more than four (4) hours per week concerning the use of rehearsal ($t(118)$ = 2.450; p < .05), the use of metacognitive self-regulation ($t(118)$ = 2.726; p < .05), the use of effort regulation ($t(118)$ = 2.652; p < .05), the management of time and study environment ($t(118)$ = 2.535; p < .05), the use of elaboration ($U(120)$ = 2113; Z = 2.7; p < .05; r = .02), the use of peer learning ($U(120)$ = 2029; Z = 2.3; p < .05; r = .21), and the use of help-seeking strategies ($U(120)$ = 2174.5; Z = 3.1; p < ,05; r=0.209) (Tables 7, 8).

Table 7
Self-regulated learning strategies (rehearsal, critical thinking, metacognitive self-regulation, effort regulation, management of time, and study environment) according to the time of studying for the MOOC (hours/week)

Hours of studying/week	>=4 (Mean±SD) Mean=48	<4 (Mean±SD) Mean=72	t	df	p
Rehearsal	15.7 ± 3.2	14.1 ± 3.7	2.45		.02
Critical thinking	22.0 ± 3.9	21.3 ± 4.6	.95		.34
Metacognitive self-regulation	58.3 ± 7.5	53.8 ± 9.6	2.73		.01
Effort regulation	17.1 ± 3.1	15.5 ± 3.3	2.65	118	.01
Management of time and study environment	36.5 ± 5.6	33.4 ± 7.1	2.54		.01

Table 8
Self-regulated learning strategies (elaboration, organization, peer learning, and help-seeking) according to the time of studying for the MOOC (hours/week)

Hours of studying/week	>=4 (Mean±SD) Mean=48	<4 (Mean±SD) Mean=72	U Mean=120	p
Elaboration	28.9 ± 3.9	26.5 ± 5.9	2113.0	.01
Organization	16.8 ± 3.6	16.5 ± 3.9	1883.5	.14
Peer learning	9.3 ± 3.9	7.9 ± 3.9	2029.0	.02
Help seeking	13.4 ± 4.9	10.7 ± 4.8	2174.5	.00

The different reasons that motivated learners to learn through MOOC varied the use of learning strategies. Learners who participated in the MOOC in order to improve their academic skills often made use of the help-seeking strategy ($U(120) = 2155$; $Z = 1.1$; $p < .05$; $r = .1$). Learners who participated in the MOOC because of their personal scientific interests used elaboration ($U(120) = 303.5$; $Z = 2.2$; $p < .05$; $r = .2$), while learners who had decided to participate in the MOOC because it fit into their daily program seemed to use the peer-learning strategy ($U(120) = 1341.5$; $Z = .1$; $p < .05$; $r = .009$).

6. Discussion

MOOCs are a breakthrough in the field of online learning (Pilli, Admiraal & Salli, 2018). The present study investigated learners' motivations for learning and the use of self-regulated learning strategies to outline how they learn. For this reason, one-hundred-and-twenty (120) learners in xMOOCs, or Coursera-type-MOOCs, took part in the present study by completing the MSL-Questionnaire by Pintrich et al. (1991).

In accordance with the literature, learners who had successfully completed their MOOC were likely to indicate self-efficacy (Zimmerman & Shunk, 2004; Caprara et al., 2011) and report task value motivations (Pintrich et al., 1991). Contrary to the literature, the learners did not mention intrinsic motivations for learning, but external motivations (Cho & Shen, 2013; Littlejohn et al., 2016). MOOC's certification (external motivation) could motivate the learners to complete their MOOC. When external motivations were combined with learners' belief that the MOOC was useful for themselves (task value motivation) and the belief that they could complete it (self-efficacy), the learners managed to successfully complete their MOOC. Moreover, unpleasant emotions, such as stress for the exams, were not associated with the completion of the MOOC, taking into consideration that such a certification did not have the official status of a university certification (Bates, 2019).

In accordance with previous studies (Puzziferro, 2008; Kizilcec, Pérez-Sanagustín & Maldonado, 2017), learners who had completed their MOOC claimed to have used metacognitive self-regulation strategies, which means that they monitored and controlled their cognitive processes, and if one strategy did not prove useful for their learning, they used another. Unlike previous studies (Puzziferro, 2008;Wang & Wu, 2008; Broadbent & Poon, 2015; Klingsieck et al., 2012), the results indicated that learners who successfully completed their MOOC were using the elaboration strategy and not the critical thinking strategy. A possible explanation for this may be that the xMOOCs did not require from their learners difficult critical thinking activities, such as problem solving and evaluation, but required simpler cognitive activities such as note-making and paraphrasing (elaboration).

Learners who had successfully completed their MOOC successfully managed their time and study environment (Puzziferro, 2008; Rakes & Dunn, 2010; Carson, 2011; Michinov et al., 2011; ChanLin, 2012; Cho & Shen, 2013). In accordance with previous

studies (Wei & Chen, 2012; Kruger-Ross & Waters, 2013; Kizilcec, Pérez-Sanagustín, & Maldonado, 2017; Broadbent, 2017), learners in MOOCs were not using help-seeking strategies and peer learning, possibly because of the feeling of isolation in online courses and the limited social interaction.

Individual characteristics of the participants differentiated the motivations for learning and the adoption of self-regulated learning strategies (Hood, Littlejohn, & Milligan, 2015; Kizilcec, Pérez-Sanagustín & Maldonado, 2017). Learners' individual characteristics, such as gender, year of school graduation, origin, personal reasons for joining a MOOC, time for studying in a MOOC, and time at work differed their motivations for learning and the adoption of self-regulated learning strategies. For instance, time devoted to studying was positively associated with all self-regulated learning strategies except for critical thinking and organization strategies. Furthermore, time for studying was negatively associated with external learning motivations but positively associated with task value motives.

7. Conclusions

In this study, learners' motivations for learning and the adoption of self-regulated learning strategies were investigated in relation to the learners' successful completion of a MOOC. One-hundred-and-twenty (120) learners in xMOOCs, or Coursera-type-MOOCs, took part in the present study by completing the MSL-Questionnaire by Pintrich et al. (1991).

The results showed that learners who had successfully completed their MOOC were likely to indicate self-efficacy, task value motives, and external learning motivations. Moreover, learners who completed their learning through MOOC had used metacognitive self-regulation strategies, elaboration strategy, and all management strategies except for help-seeking and peer learning. In addition, critical thinking strategies were not found to be used by the learners.

Moreover, learners' individual characteristics (gender, year of graduation, origin, personal reasons for joining the MOOC, time spending on studying in MOOC, and time at work) differentiated the utilization of both learning motivations and self-regulated learning strategies.

Although previous research has investigated learners' motivations and learning strategies in different online learning environments, the literature on learning via MOOCs is limited.

Limitations

The small size of the sample of participants poses an important limitation to the present research. Due to the high learners' dropout and the non-physical presence in MOOCs courses, the response of completing the questionnaire was limited. The response rate was low, as only one hundred and twenty (120) learners from several MOOCs courses completed the questionnaire out of thousands of invitations to participate. So, a future research with larger sample is necessary for more accurate results.

We consider also as a limitation the heterogeneity of the sample; the collected data came from several different MOOCs, with differentiated participants' responses due to the diversity of the courses and their different requirements. Therefore, learners' responses to MLS-Q may differ depending on different course characteristics, instructors' demands, and individual learners' characteristics. Future research is suggested to focus on investigating motivations for learning and self-regulated learning strategies of learners participating in a particular MOOC. In this way, the researchers will be able to reduce the heterogeneity of the sample.

Finally, another limitation was that it was unable to identify the overall completion rate of all MOOCs courses in which the sample participated, and thus it was unable to correlate drop out effects with other parameters in our study.

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