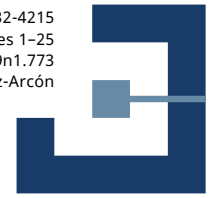
Regular Paper

The JALT CALL Journal ISSN 1832-4215
Vol. 19, No.1 Pages 1–25
https://doi.org/10.29140/jaltcall.v19n1.773



Castledown

The significance of instructional design: analysis of content in Language MOOC forums

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Language MOOC research has evolved over the last three years to a more mature stage in which researchers have gained a deeper comprehension of the theories that enable effective language learning in this format. The application of these theoretical advances should be reflected in the instructional design of the courses. This study is based on this premise and monitors the quality of the design of communication and discussion forums considering the different levels of engagement in a LMOOC, the accessibility, ease of navigation, assessment of learning processes, and support to participants in in the development of self-determination strategies. This is done by analysing the content of the forums and applying two instruments created upon the research needs. The results show the relevance of the instructional design of the forums in LMOOCs, and subsequently a suitable analytical framework is put forward, which can be easily replicated due to its simplicity and concreteness. This is the main contribution of this paper, since the elaboration of common analytical frameworks in LMOOC research strengthens the field and reinforces the significance of instructional design in successful language learning in these online courses.

Keywords: Language MOOC; analysis of content; forums; analytical framework

Introduction

Discussion forums are essential resources in Language Massive Open Online Courses (LMOOCs, henceforth) since they permit the practice of the target language and have the capacity to create learning communities as part of social learning theories postulates, which are closely linked to how learning occurs in LMOOCs (Sallam et al., 2020). LMOOC structures do not particularly favour the necessary interaction to develop language skills, so resources available need to be optimised to the maximum extent to this end (Sokolik, 2014). Monitoring

of the quality of forums as an important resource of LMOOCs turns out to be necessary (Conole, 2013) because quality indicators reflect their positive use (Liu et al., 2016).

The monitoring of discussion forums in LMOOC has been approached by reviewing the design and organisation of interfaces as they determine how participants interact with information (Olivier, 2016), since it is widely accepted that knowledge building and information sharing mainly occur through language and discourse in digital contexts (Joksimovic et al., 2020). It is assumed, therefore, that efficient organisation and structured categories, subcategories and subject threads are conducive to more intuitive interfaces, to interaction, and language development (Castrillo, 2015; Zheng & Warschauer, 2015). Participation in these spaces is generally low (Liu et al., 2016; Martín-Monje et al., 2017; Onah et al., 2014), and this reality usually overshadows the fact that those participants who post messages actually interact intermittently or do not interact with other participants at all (Anderson et al., 2014; Liu et al., 2022; White & Le Cornu, 2011). It becomes necessary to propose inclusive designs and analyses assuming heterogeneity in the engagement with these spaces, since LMOOCs effectiveness cannot be fully observed without considering passive sup-populations (Poquet et al., 2020).

The connection with existing learning theories is another feature to be considered for the design and organisation of LMOOCs. In this sense, various authors (Agónacs et al., 2020; Beaven et al., 2014) have shown that self-determination may condition learning processes in LMOOCs. Self-determination in MOOC context refers to the development of concrete skills such as autonomy, self-reflection, consciousness about one's learning needs, and the development of digital and participatory skills for learning online (Agónacs et al., 2020). Self-determination and a learner-centered methodology rely on spontaneity and self-management to successfully perform the dynamics in LMOOCs. However, the low self-regulation capacity of LMOOC participants clearly needs to be improved (Agónacs et al., 2020). This limitation makes it necessary to subtly guide participants to train their self-determination skills from the design which will consequently enable them to cover linguistic content more efficiently.

This study has first analysed the language production reflected in the forums of a LMOOC to understand the nature of intentions and their purpose. This way, it was intended to reveal whether the forum structures were efficient in terms of the development of meta-learning strategies and ease to navigate. Secondly, it observed whether learning processes occurring are meaningful for participants. Therefore, the quality of learning and the instructional design were assessed by the utilization of two analyses frameworks based on the categorisation of the speech acts encountered. In this way, neither the volume of participation was considered as an indicator of quality, nor the fluctuations of activity that responded to specific participants' behaviours (Tang et al., 2018), but rather the significance of these interactions for both the active and passive participants.

The analyses in this study are considered dynamic processes (Schrire, 2006) that obey the objectives of the research. Analyses of the content were carried

out by the categorisation of speech acts in the forum contributions. Speech acts were identified and categorised to observe if they were coherent with the structured threads proposed aimed to contribute to develop participants' self-determination capacities, to make navigation easy and intuitive, and to reach a significative learning. To this end, the units of meaning (themes or ideas) of the forum postings were taken as a reference to cover the need to reflect different communicative intentions that the same intervention may contain. The first objective was to interpret the coherence between speech acts and the specific linguistic needs occurring in each thread. Observation was carried out from a naturalistic approach and classification criteria was established by the creation of a measurement instrument. The second objective was intended to identify the mental skills stimulated using forums. The instrument used, unlike the first one, was created out of a theoretical basis (de Wever et al., 2006). It identified speech acts in the corpus which were scaled to more abstract concepts following the hierarchical relationship developed by Díez-Arcón et al. (2021).

State of the art & theoretical framework

Content analysis in discussion forums

Forum content analysis is a technique commonly used to analyse asynchronous discussion group transcriptions (De Wever et al., 2006). According to Anderson et al. (2001) as cited in de Weber et al (2006), content analysis is "a research methodology that builds on procedures to make valid inferences from text." Research on content analysis evidence that this technique is applied by the use of different measuring instruments for different purposes. This lack of standardisation leads to significant variations in the level of detail provided and the labelling in the emerging categories generated. According to De Wever et al. (2016) the creation of new instruments is a common practice in this area, although the authors find three common features in the instruments used for content analysis in the literature; 1) they are based on a solid theoretical basis; 2) their quality is justified by indicators such as validity and reliability and 3) the selection of the units of analysis is justified. Also, the disparity of objectives pursued in each investigation complicates the replicability of methodologies, that, however, are normally based on three main axes, namely: the research objectives, the learning theories underlying the didactic use of forums, and the units of analysis selected. It is relevant to exemplify, therefore, how researchers have adapted methodologies and analysis tools according to their research objectives.

Related researched has looked at how learning occurs through the use of forums. Brinton et al. (2014) try to understand whether the functioning of the forums is in line with the postulates of social learning theory, and Palmer et al. (2008) examine whether the Community of Inquiry elements (social, cognitive, and teaching presence) concur in the educational experience. At the level of units of analysis, it is found that qualitative labelling of interventions mostly aims to differentiate between content-related publications and the ones which

are not (Brinton et al., 2014; Cui & Wise, 2015; Poquet et al., 2020; Son, 2003; Tang et al., 2020; Wise et al., 2017). Some of the labelling explicitly highlights the content-based nature of the categories, such as "course logistics," "course specific discussion," or "content related questions" (Brinton et al., 2014; Cui & Wise, 2015). Content related threads are considered as positive indicators of the use of forums and influence the learning process because they have identifiable linguistic patterns (Wise et al., 2017). This tendency is also noted in Tang et al. (2020) Son (2003), and Zhong & Norton (2018) who group interventions to understand their link with the subject matter.

Another avenue of related research is represented by the analysis of linguistic input in the forums. Arguello & Shaffer (2015) explored linguistic patterns in terms of speech acts or communicative intentions, and Moreno-Marcos et al., (2018) drew positive or negative emotions based on the lexicon used. The analyses of emotions have been motivated by the need to understand the experience of course participants (Moreno-Marcos et al., 2018), to find possible explanations for dropout rates (Wen et al., 2014), and to determine participant's profile based on the discourse produced (Poquet et al., 2020) Furthermore, Díez-Arcón et al. (2021) have analysed forum content to measure the effect of a dynamic figure in participation rates and the relevance of the interventions for the learning process. Finally, research has also considered the appropriateness of structures for organising discussions for a smooth and simplified navigation (Wise et al., 2017).

(L)MOOC forums and the quality of learning

Forums have been defined as "long-lived places built around topic, goals, or communities where coherent threads deal with particular issues" (Dave et al., 2004. p. 232) and are the main tool for interaction to occur in MOOCs (Almatrafi & Johri, 2019; Arguello & Shaffer, 2015; Huang et al., 2014; Liu et al., 2016; Onah et al., 2014; Tang et al., 2020; Wise et al., 2017). According to Conole (2013) the essence of good learning is based on elements such as the promotion of reflection, dialogue and collaboration, and forums can fulfil this function. These spaces favour collaborative learning and knowledge construction, allow the formation of learning communities, promote motivation, reflection and commitment, and foster higher thinking skills (Brito, 2006; Faiz & Lin, 2016; Jose & Abidin, 2016; Olivier, 2016; Onah et al., 2014). Conole (2013) explains that technology offers many alternatives for these elements to come together, but that in the case of MOOCs it is necessary to monitor the quality of the courses at the design level, as this determines the participant's experience.

The configuration of discussion forums, how they are structured and divided into relevant threads, constitutes an important element in effective MOOC design. Onah et al. (2014) understand it as essential in the measurement of the quality of learning in MOOCs, since the pedagogy used in these courses is often based on peer-to-peer work. Collaborative learning is therefore expected to emerge in these tools, although there are barriers mainly associated with the high number of participants that hinder communication by making it difficult

to follow a discussion, find relevant information, or achieve effective interaction. This fact also hampers the detection of participants who need support from instructors (Arguello & Shaffer, 2015; Brinton et al., 2014; Fu et al., 2017; Onah et al., 2014). The lack of mechanisms formally defined to measure quality indicators to understand how participants interact provokes that the expectations raised about forums have not been fulfilled (Conole, 2013).

Sustainable and effective design must be able to avoid communication difficulties (Son, 2003). According to Liu et al. (2016) the importance of the design and organisation of interfaces determines in many cases how participants interact with the information, and Olivier (2016) emphasises the importance of reviewing the quality of discussion in forums, as this is a positive indicator of their use. In online environments, and consequently in MOOCs, knowledge construction happens through language and discourse, so it is necessary to understand what kind of discourse prevails in the production of the reflected language (Joksimovic et al., 2020). Understanding the nature of the intentions and purposes expressed in communicative acts is essential for interpreting their link to the learning process. It is consistent, then, to determine the quality of designs through discourse analysis in structures that have defined functionalities and respond to specific learning objectives.

Impact of forums on meaningful (language) learning

Meaningful learning can be defined as the correct interpretation of knowledge schemata acquired in the initial and intermediate cognitive phases of the learning process, so performance becomes automatic, unconscious, and effortless (Shuell, 1990). Theories for language learning rely, primarily, on meaningful learning, which involves building cognitive structures by systematically and cognitively relating new input with their existing knowledge (Brown, 2000). Existing theoretical frameworks on distance learning and language learning (Ellis, 2005; Gorsky & Carspi, 2005) perceive communication as an essential element (see Table 1) in the learning process. Gorsky & Carspi (2005) propose a theoretical framework for "viewing elements of distance education instructional systems in terms of dialogue" (p. 137) in which five assumptions are underlined and directly related to the functions of forums. With a focus on foreign language acquisition, Ellis (2005) formulates ten general principles for instruction in language learning, five of which are perfectly applicable to the role of forums as contributors to the effectiveness of instruction and understood as a means of interaction, but also of language production and reception. The remaining principles, although not directly related to the forums, benefit from their existence.

Table 1. Distance learning and language learning principles related to communication and forums

Gorsky & Carspi (2005)	Ellis (2005)
"Learning is an individual activity characterized by internal mental processes"	"Instruction needs to ensure that learners develop both a rich repertoire of formulaic expressions and a rule-based competence"
"Learning is mediated by intrapersonal dialogue"	"Successful instructed language learning requires extensive L2 input"
"Learning is facilitated by interpersonal dialogue"	"Successful instructed language learning also requires opportunities for output"
"Dialogue is enabled by structural and human resources"	"The opportunity to interact in the L2 is central to developing L2 proficiency"
"Dialogue and learning outcomes are correlated"	"In assessing learners' L2 proficiency it is important to examine free as well as controlled production"

Educational forums are, therefore, potentially drivers to meaningful learning understood as the transition from basic to higher mental skills (Garrison, 1992), These spaces, therefore, need to show evidence of meaningful learning indicators (higher mental skills), but also of other that allow to see the evolution necessary for this to be achieved (basic mental skills). Knowledge building in the forums occur by participative, interactive, and cognitive processes (Saade & Huang, 2009), so these aspects related to with mental skills development need to be identified to determine if these communicative spaces fulfill the expected objectives Different authors have delved into the ways interaction and learning occurs in forums. Collison (2000) identified the forms of dialogue in relation to these actions, namely: social, argumentative, and pragmatic. Also, Rovai (2003) classified forum contributions, accordingly, resulting in the following categories: social-based interventions, raising new questions, explanation of ideas, problem identification, solutions proposal, and critical evaluation of the problems. Díez-Arcón et al. (2021) aimed to verify whether the students achieved meaningful learning considering the needed concurrence between the development of basic and higher order skills. They proposed a hierarchical analysis model where the textual indicators proposed by Rovai (2003) were the basis for scaling up to more abstract concepts, which made possible to link the indicators to, first, Collison's (2000) forms of dialogue, and finally to Garrison's (1992) mental skills development. This model is used in the present research and further developed in the methodological section.

Forums have been, consequently, associated with improved academic performance also due to their potential ability to increase motivation, dedication, and engagement which are reflected in lower dropout rates (Cheng et al., 2011; Koç, 2017; Liu et al., 2016b; Martín-Monje et al., 2017; Olivier, 2016; Yukselturk, 2010). Although there are few empirical studies that have investigated how forums are used in language learning (Zhong & Norton, 2018), their utilisation is widely assumed in the case of LMOOCs and they represent a robust communication system for language learning (Martín-Monje & Borthwick, 2021).

This is because the target language can be practised through the forums and they can correct errors in written expression voluntarily and spontaneously (Barcena et al., 2015). It is assumed that language learning is skill-based and requires the practice of functional receptive, productive and interactive skills (Bárcena & Martín-Monje, 2014).

In LMOOCs, forums take on a new dimension by enhancing the mastery of the target language and the confidence in using it (Faiz & Lin, 2016; Pinto-Llorente et al., 2016). Written communication and expression involves decoding and understanding a text and generating ideas to be organised and finally expressed (Duke & Pearson, 2009; Pinto-Llorente et al., 2016). Forums can improve the target language because they allow observation and the planning of interventions through the search for resources to elaborate more complex responses than those allowed by oral expression, and they can also reduce the anxiety associated with these actions (Meskill & Anthony, 2008; Ntourmas et al., 2021; Schrire, 2006; Zhong & Norton, 2018). Negative effects are related to inhibition of interaction due to learners' lack of confidence in their abilities (Faiz & Lin, 2016; Ntourmas et al., 2021), although self-efficacy training can remedy these situations by applying mechanisms to overcome these barriers (Bárkányi, 2021).

Activity and interpretation of participant behaviour in (L)MOOC forums

Forum participation in (L)MOOCs is normally represented by a small group of active participants (Liu et al., 2016; Martín-Monje et al., 2017; Onah et al., 2014). Peer interaction is found to be scarce and superficial (Wise et al., 2017), which is not conducive to meaningful discussions (Almatrafi & Johri, 2019). According to Lui et al. (2016) the key is to understand the voluntary nature of forum participation assuming that a significant number of participants are not engaged by their use. Hence, attention also needs to be paid to participants who do not interact and those who participate intermittently (Anderson et al., 2014; Liu et al., 2022; White & Le Cornu, 2011). According to the latter authors the effectiveness of community development in MOOCs cannot be observed through the analysis of the entire forum population, as analyses need to include both those who are always present and those who have peripheral participation.

The neglect of non-active participants in research can be considered a gap which needs to be tackled through the consideration and conceptualisation of the sub-populations (Poquet et al., 2020), and the assumption of heterogeneous engagement with the activity in the forums. Research has mainly focused on active participants as contributors to the whole forum activity. These are referred to as "vocal" (Mazzolini & Maddison, 2003), "residents" (White & Le Cornu, 2011), "superposters" (Huang et al., 2014), "e-Leading students" (Barcena et al., 2015), or "key participants" (da Silva et al., 2019). Even these types of participants play an essential role in the creation of communities of inquiry by their participation and interaction (Garrison, 1992; Saade & Huang, 2009), they are by no means representative in the massive context. Therefore, greater

efforts need to be made towards the inclusion of participants with different levels of engagement in these spaces.

Evidence on forum sub-populations finds that more passive forum attitudes do not necessarily imply less engagement with the course (White & Le Cornu, 2011) and may be indicators of greater self-learning capacity. According to these authors, the passive participant chooses to visit a particular resource to satisfy his or her learning needs and leaves, while the more motivated active participant tries to connect or share with others. In forums, passive behaviour results in the viewing of messages, something that according to Chiu & Hew (2018) requires moderate mental actions and cognitive processes but can still meet the needs of the language learner, something their study verifies by finding a relationship between readings of comments and performance in the proposed activities. The learning expectations of MOOCs linked to self-learning processes make it necessary for users to have easy and fast access to the information reflected in the forums and retrieve information efficiently. It is reasonable that a good organisation of the threads in LMOOC forums benefits the entire population of the course, including the predominantly passive population who, without making a major effort, will be able to find information in line with what they expect from each thread.

Objectives & research questions

The main objective of this research is to observe whether the pragmatic nature of the forum contributions is coherent with the structured threads aimed to contribute to develop participants' self-determination capacities and that every participant gets advantage of the forum content making navigation easy and intuitive. Additionally, this research aims to determine whether the proposed structure stimulates meaningful learning for participants in an LMOOC. Two research questions (RQs) are formulated based on these objectives:

RQ1. What effect does the predefined structure in this LMOOC forum have on promoting self-reflection and ease in accessing specific content?

RQ2. Can participants achieve a meaningful learning based on the predefined structure of the forums?

Methodology

Context

This study analyses the contributions (n = 287) of participants in the forums (11.4% of the those enrolled in the course) of the LMOOC "How to succeed in the English B1 Level Exam" (2021) held in UNED Abierta (https://iedra.uned.es/). The course contained six modules to be completed in six weeks. There was an introductory module, a final module and four modules devoted to language skills (see Figure 1). Each of the skill-based modules contained video-lessons,

reading material, and evaluative activities. Additionally, modules 3 and 4 introduced two external resources for the practice of writing (https://www.grubric.com/) and listening and speaking skills (https://eoral.uned.es/default.aspx) respectively.

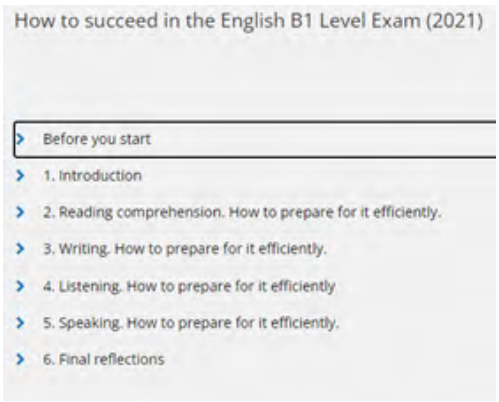

Figure 1. Distribution of the modules in the course

The thematic threads were organized based on the content of each module. Skill-based threads included sub-threads called "Share your learning experiences." These encourage participants to "share their preferred studying strategies, their success and pitfalls during the learning process" (Agonács et al., 2020. p. 1174), and they were intended to be a support for the development of participants' self-reflection strategies. The initial thread was social-oriented, and the final one encouraged participants to share their top tips when preparing for the English B1 Level Exam.

Data collection and analysis

This section specifies the steps in the methodological procedure and illustrates how quantitative and qualitative elements were combined, though the study remained essentially qualitative in its general approach. The analyses carried out were based on the research questions, for which the specific methodology is described below. It must be noted that this research identifies pragmatic intentions in the corpus for answering both research questions, but there exists a difference between the methodologies used for each one. In RQ1 the identification of pragmatic indicators was open to provide more detailed communicative intentions with no theoretical constraints, whereas in RQ2 pragmatic indicators were predefined in the theory and explicitly linked to knowledge construction processes (Díez-Arcón et al., 2021).

Research Question 1. Data collection consisted in the identification and classification of pragmatic speech acts in the specific modules of the forums (see Figure 2). The pragmatic intentions of each term (n = 1604) were classified according to criteria in Table 2.

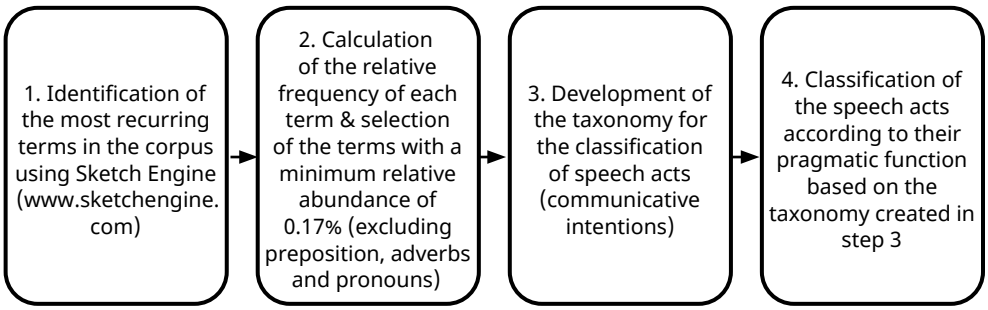

Figure 2. Diagram of the methodological phases for RQ1

Table 2. Description of the criteria applied for each taxonomy

Taxonomy	Criteria
Learning process	Aspects in relation to the learning process within the course: activities, evaluations, and outcomes
English background	Prior experiences with the target language
Feedback	Feedback provision from the aspects of the course or to peers' and facilitators' comments
Reflection	Individuals' reflections on any aspect of the course or the learning process
Intention	Prospects for the course in form of a wish or challenge
Self-evaluation	Reflection on the learning process involving the assessment of personal performance or other course dynamics
Personal	Personal issues unrelated to the course or the target language
Strategy	Learning strategies (own, learnt, or studied) not derived from reflective acts, but personal ones
Technical issues	Report of technical issues

The concurrence of each selected term in the corpus (n = 1604) was associated with a category by two raters. Cohen's Kappa was calculated to assure interrater validity which corrects for chance agreement of descriptive statistics (82.8% interrater agreement) (Table 3). The value of Kappa indicated a strong interrater validity ($\kappa = 0.800$) (Cohen, 1960) (Table 4).

Table 3. Percentage of interrater agreement through the calculation of the differences between raters

Valid	Frequency	Percent	Valid percent	Percent
−7.00	3	.2	.2	.2
−6.00	6	.4	.4	.6
−5.00	21	1.3	1.3	1.9
−4.00	15	.9	.9	2.8
−3.00	19	1.2	1.2	4.0
−2.00	34	2.1	2.1	6.1
−1.00	46	2.9	2.9	9.0
.00	**1328**	**82.8**	**82.8**	**91.8**
1.00	28	1.7	1.7	93.5
2.00	22	1.4	1.4	94.9
3.00	36	2.2	2.2	97.1
4.00	13	.8	.8	97.9
5.00	11	.7	.7	98.6
6.00	14	.9	.9	99.5
7.00	8	.5	.5	100.0
Total	1604	100.0	100.0	

Table 4. Interrater agreement by Cohen's Kappa

	Value	Asymptotic standard error[a]	Approximate T[b]	Approximate significance
Measurement of agreement Kappa	.800	.011	80.592	.000
N of valid cases	1604			

Data analysis was carried out in two phases. First, the percentages of terms in each pragmatic category were calculated to identify their relative abundance. To identify homogeneous clusters of modules according to the absolute frequency of the pragmatic categories, a K-means cluster analysis was applied. For this purpose, it was decided to initially use a two-cluster solution with 10 iterations, using IBMM SPSS 21 software, and preserving the cluster of each module's belonging (interventions in the forums). The execution of an analysis with three solutions did not allow the incorporation of new variables, so it was discarded as a result likely to provide relevant information. The second phase consisted in a descriptive analysis of the relative frequency (%) of the different pragmatic categories in each module to observe which ones stood out. The selection of the highest percentage was specified in the first two values, since there was a marked concentration of pragmatic categories in a limited number of categories. The results obtained from both analyses were qualitatively interpreted to ascertain whether the pragmatic indicators were consistent with the

expected role of each thread in terms of promotion of self-reflection strategies and accessibility and ease of navigation. This way, the relevance of predefined structures was assessed.

Research Question 2. Data collection was carried out by the identification of communicative intentions expressed in the corpus according to the hierarchical model proposed in Díez-Arcón et al. (2021) (see Figure 3). This model has its more abstract dimension in the classification for the mental skills to be achieved using forums: basic and higher order ones. From these, three subcategories emerge to describe the forms of dialogue occurring in forums (Collison, 2000): social, argumentative, and pragmatic. The first two are framed in terms of basic mental capacities. Social dialogue does not necessarily deal with academic content and argumentative dialogue expresses personal reflections on content, which is consistent with the description of the dynamics that occur at this level where a particular topic is defined and explored. The pragmatic dialogue aims at evaluating the content by a more exhaustive analysis of the concepts worked on and the creation of concrete strategies.

The last dimension is aimed to identify text indicators (Rovai, 2003). The posing of new questions and the explanation of ideas belong to argumentative dialogue (Collison, 2000) and, consequently, to Garrison's (1992) basic mental capacities, since through these dynamics the topic is introduced in an exploratory manner. Finally, the indicators responsible for identifying problems and/or proposing solutions and the critical evaluation of comments are part of the pragmatic dialogue (Collison, 2000), which, as indicated above, give rise to the development of the so-called higher order mental capacities. Interventions in each module were, therefore, classified to observe whether the nature of the interventions met an adequate balance (globally and individually) to stimulate both basic and higher order mental abilities, both contributing to meaningful learning in forums (Garrison, 1992).

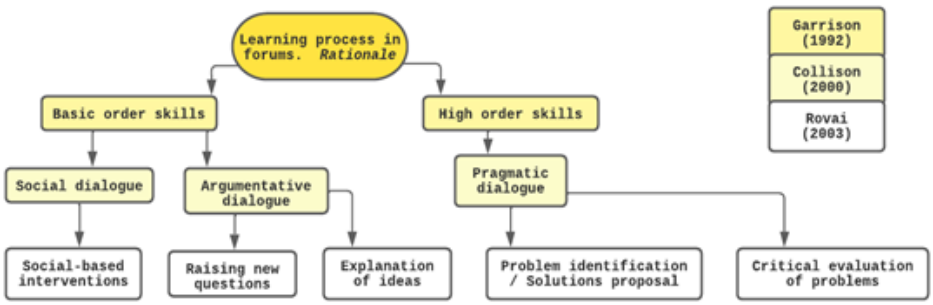

Figure 3. Rationale for the interrelation among dimensions for content analysis in forums (Díez-Arcón et al., 2021)

Results

Research Question 1

Phase 1. The identification of the most recurrent terms resulted in 37 words (see Figure 4) to be pragmatically categorised according to criteria in Table 1. This amount represented a minimum relative abundance of 0.17% for each term, or a minimum recurrence in the text of 20 times per term.

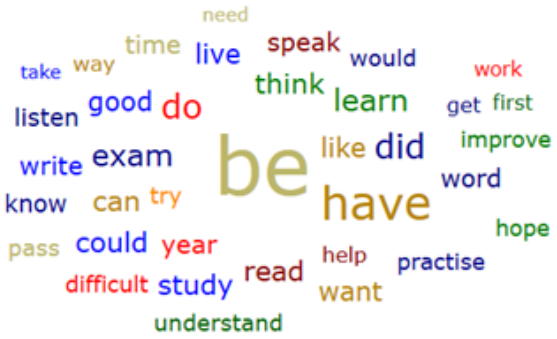

Figure 4. Cloud word of the most recurrent terms in the corpus

The K-means cluster analysis permits to observe the two final clusters (Table 5), where cluster 1 had high values for "English Background," "Personal" and "Intention," while cluster 2 has high, but more discrete values, for the categories "Strategy" and "Reflection." The solution, although not optimal from the perspective of performing standard cluster analysis, highlights the differences between the introductory module and the rest of the modules (see Table 6).

Table 5. Cluster analysis solution

Final cluster centers		
	Cluster	
	1	2
Learning process	2	11
English background	**219**	20
Feedback	11	12
Reflection	40	**27**
Strategy	0	**28**
Intention	**175**	5
Prospects	125	0
Self-evaluation	14	5
Personal	**236**	6
Feeling	10	1
Support	2	3
Tech Issues	10	4

Table 6. Modules differentiation from the cluster analysis

Cluster membership			
Case number	**SET**	**Cluster**	**Distance**
1	**Mod 1. Introduction**	1	**0.000**
2	Mod 2. Reading	2	63.525
3	Mod 2. Reading SLE	2	61.198
4	Mod 3. Writing	2	41.312
5	Mod 3. Writing SLE	2	33.356
6	Mod 4. Listening	2	28.234
7	Mod 4. Listening SLE		
8	Mod 5. Speaking	2	38.186
9	Mod 5. Speaking SLE	2	28.273
10	Mod 6. Final Reflections	2	44.039

Although the lack of correction for cumulative error implies limitations in the ANOVA analysis associated with the K-means clusters, it can be observed that "English Background" and "Personal" stands out as two of the main variables that influences the differentiation of the content in Module 1 with respect to the others (see Table 7).

Table 7. ANOVA analysis for the identification of outstanding variables in Module 1

ANOVA						
	Cluster		**Error**			
	Mean square	***df***	**Mean square**	***df***	***F***	***Sig.***
Learning process	47.125	1	86.41	7	0.588	0.468
English background	**35112.500**	1	156.214	7	224.771	**0.000**
Feedback	5.839	1	89.857	7	0.317	0.591
Reflection	150.222	1	702.000	7	0.214	0.658
Strategy	672.222	1	922.286	7	0.729	0.422
Intention	25613.389	1	35.929	7	712.898	0.000
Prospects	13805.681	1	0.554	7	24939.294	0.000
Self-evaluation	78.125	1	40.268	7	1.940	0.206
Personal	**46971.125**	1	34.696	7	1353.774	**0.000**
Feeling	70.014	1	0.411	7	170.469	0.000
Support	0.681	1	30.125	7	0.023	0.885
Tech issues	33.347	1	103.554	7	0.322	0.588

Phase 2. Figure 5 reflects two most representative categories in each module. "Reflection" stood out for its high frequency in the Speaking Module with more than 50%, and it remained recurrent in most of the skill-based threads. "English

Background" also found its place in more than half of the threads and "Strategy" become especially relevant in the case of Module 6 (Final Reflections). It was also noticeable that modules 2 and 5, which did not offer explicitly language practice, shared strategical speech acts, in contrast with the ones which did not. "Feedback" category only resulted representative in the final module.

"Share your learning experiences" threads, specifically designed to self-reflect about the learning processes occurring in each module, revealed some striking results. "Reflection" taxonomy was particularly high in sub threads 2 and 4, and "English background," although with a lower frequency, remained relevant for sub threads 2 and 3. It was also noteworthy that the so-called categories "Learning Process," "Self-evaluation," and "Intention" became to be relevant for the first time in these specific threads (3, 4, and 5).

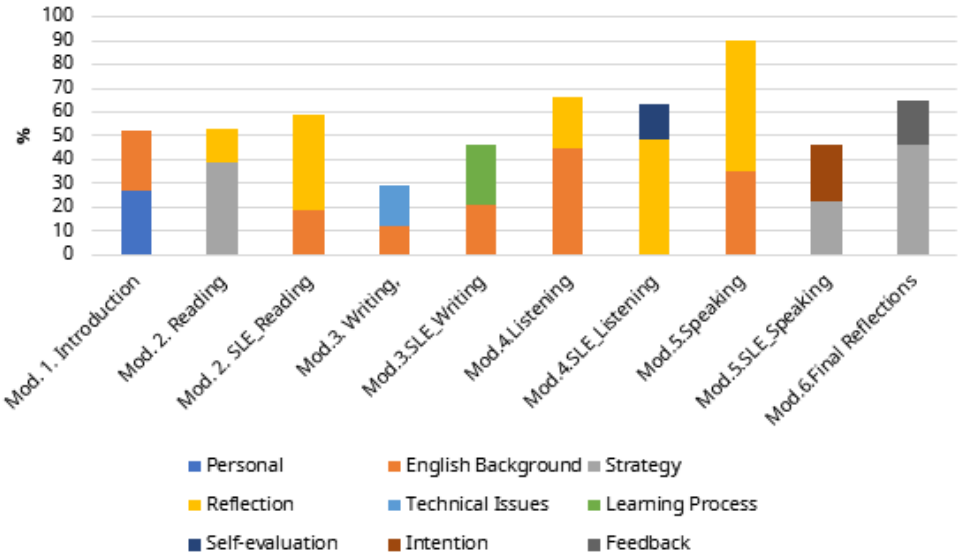

Figure 5. Relevance of speech act categories per module. Representation of the two highest frequencies

Research Question 2

The search for primary indicators in the forum interventions (Rovai, 2003) permitted their association with the mental skills to be fostered using the forums. It can be observed that there is a balance between the basic and higher mental skills (see Figure 6), considering the total number of interventions. Basic ones embraced social-based interventions (46.2%), explanation of ideas (7.1%) and raising new questions (0.2%). With a closely similar percentage, high order skills were the sum of interventions for the identification of problems and proposal of solutions (46.48%). Some examples corresponding to the mentioned categories can be found in Table 8 (it must be noted they can include grammar and spelling mistakes).

Table 8. Textual indicators in the forums (Rovai, 2003)

Student ID	Text indicator (Rovai, 2003)	Comment
103	Social-based interventions	"Good morning everybody. All of your ideas are grate Thank you very much for your help. Im trying to recycling my self cause I didn't study English for decades"
127	Explanation of ideas	"I think that speaking face to face is a form of interact with the other person and you feel more relaxed in this situation"
130	Raising new questions	"I did the writing of tourism...but I don't know how it will be the results or evaluation. Can I know if it is ok or no?
19	Identification of problems or proposal of solutions	"Firstable relax and do not panic. Organice thoughts before began and answer the questions in a structural way, thinking very slowly the best English expressions you know...if you mistake, do not fear to repeat the same in a different way"

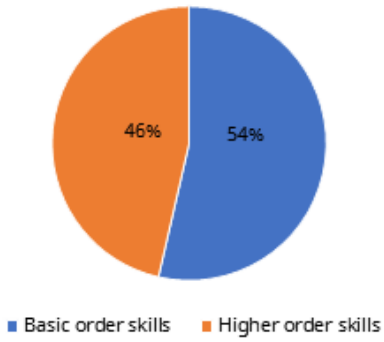

Figure 6. Distribution of forum contributions in terms of mental skills development

The results in Figure 7 show the frequency of basic and higher order interventions disaggregated by the threads and sub-threads associated with each module. It can be observed that, unlike the related global results, there is hardly any module that finds a balance between both skills, with the relative exception of the "Share your experience" (SLE) threads in modules 2, 3, and 4.

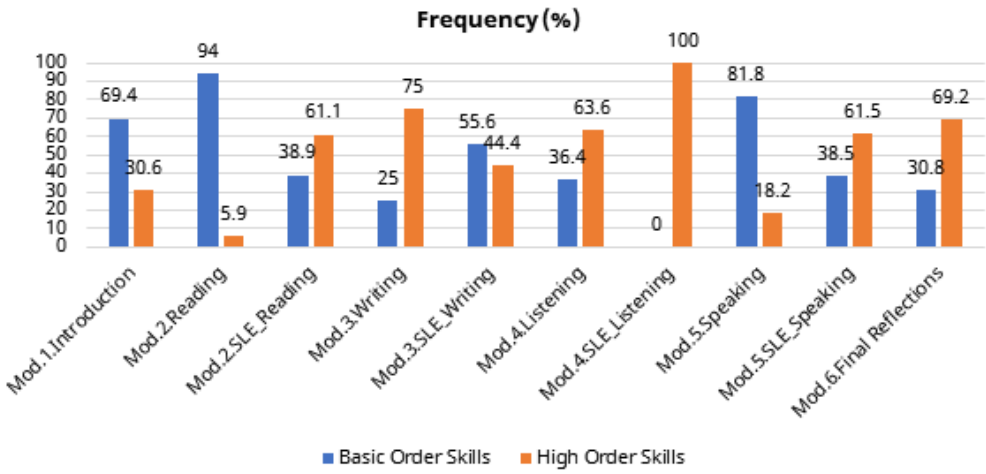

Figure 7. Frequency of basic and higher order interventions in threads and sub threads

Discussion

Keeping structures simple, intuitive, and goal-oriented: A potential key to success in LMOOC forums

The first analysis was carried out to find out the effect of the predefined structures in terms of informative and communicative effectiveness and sufficiency to promote actions that stimulate self-determination. Historically, research in this area has focused on profiles that are more likely to complete the courses, ignoring sub-population's goals (Poquet et al., 2020). This clearly restricts progress in the field of open learning. This study has tried to fill this gap by paying attention to all participants' needs. Therefore, it has considered active and passive behaviours and has assumed the heterogeneity in the engagement with the activity in the forums. In this way, the quality of one of the essential resources in LMOOCs has been monitored in terms of accessibility and meta-learning. Interventions were observed from a naturalistic approach that was not influenced by theories in the didactic use of forums, but observed speech acts to qualitatively interpret their association to the objectives pursued.

The cluster analysis revealed clear differences between two blocks of modules. The first cluster corresponded to the introductory module, where the categories "English Background," "Personal," and "Intention" were the most representative. The second cluster covered the rest of the course modules with more discrete values variables ("Strategy" and "Reflection"), but which nevertheless represent a relevant variability. These results are consistent with previous taxonomies in the literature (Brinton et al., 2014; Cui & Wise, 2015; Tang et al., 2020; Wise et al., 2017) that distinguish between course-related content and the one which is not.

The most representative non-content related pragmatic categories in the first module are perfectly coherent with the formative context, as they meet the social needs of distance learners (Callaghan & Fribbance, 2016). The social nature of this first thread is evidenced by the communicative intentions which are dedicated to sharing information related to personal aspects, experience, and intentions with the language as a way of introducing themselves to the rest of the group. The second cluster, consequently, encompasses all the skill-based threads and the final one which captures the experiences derived from the course activity. According to Brinton et al. (2014) content-related publications are seen as a positive indicator of content use and are directly related to the learning process. It seems evident that one way to promote discussion about the content is the creation of related threads. In the case of LMOOCs, the distribution of the main threads can be perfectly replicable as they are determined by the language skills.

The interventions of the main content-related threads had an expected behaviour according to their objectives. These contain heterogeneous communicative intentions, which may be determined by design factors such as the activities proposed in each module or by the meaning of the facilitators' interventions guiding the discussion. It is noteworthy that the main threads of "Listening" and "Speaking" shared pragmatic categories, since the learning

processes for the acquisition of both skills are closely related (Richards, 2008). In this case, another possible relationship is provided by an element of the design itself, as the course proposed a voluntary activity through an external resource to practise both skills together. It is also salient the strategical and feedback nature of the final module, which is coherent with the possibility of communicating one's own strategies and experiences during the course derived from the activity and which, therefore, can only be expressed a posteriori. This communicative intentionality makes it evident that peer to peer support was not common during the course, as the feedback was directed towards the evaluation of the course.

The strategic nature of the interventions in Module 2 (Reading) was evident only in this main skill-based thread. This fact finds a plausible explanation in the lack of additional activities proposed for working on this competence, which is not the case in the modules that do offer this additional language practice. Strategic comments here replaced those relating to learning experience or reflection. Most of the core modules maintained 'English Background' as a recurrent category in which it can be perceived that the foreign language learner has a need to express their previous experiences with the study or practice of each competence. Whereas in the introductory module these experiences alternated with purely personal information, in the main skill-based threads there was a combination with reflective or strategic interventions. The comments on technical issues in the "Writing" thread were an exception to the above, which can be explained by design issues. The use of an external writing practice tool created ad-hoc for the course led to some incidences which were reflected in the relevance of this category in this specific thread.

The proposal by Agonács et al. (2020) to stimulate self-reflection on learning as a tool to develop self-determination was incorporated due to its connection to how learning is acquired in LMOOCs (Agonács et al., 2020; Beaven et al., 2014). This decision led to the creation of the "Share your learning experiences" sub-threads, and, according to the results, it can be stated that it had the expected effect. The learner-centred approach postulates that learning is a personal experience, and the learner is an active agent in this process (Waard, 2016). Metacognitive reflection on learning is a tool that becomes necessary in environments where participants are responsible for their own learning (Agonács et al., 2020). It is striking that the creation of these sub-threads made visible the categories "Learning Process" and "Self-evaluation", which together with the recurrent "Reflection" showed a clear link to the objectives followed on these threads. The exception to these results can be observed in the "Speaking" sub-thread where "Strategy" and "Intention" were the most representative categories. Once again, the design of the activities was clearly reflected in the forum contributions. Although the course offered an external tool for speaking practice, this was placed in the "Listening" module, and was presented as an additional activity to work both skills together. Intentionality and strategy, therefore, superseded the reflection or learning experience expected in the speech acts in these sub-threads.

The structure proposed for the discussion forums in this LMOOC can be

considered adequate in terms of accessibility, ease of navigation and creation of suitable spaces to develop the necessary skills to learn in LMOOC. The study has attempted to address the needs of the whole course population who do not normally have a high level of engagement with the forums. The basis of organisation and labelling has been clear, simple, and targeted to facilitate communication and information seeking. Inadequate labelling can juxtapose topics, creating access difficulties (Sun et al., 2016), so the design based on categories and subcategories with subject threads allows for a more intuitive distribution (Castrillo, 2015). In this sense, the design adopts a strategy where the threads created have very defined purposes and combine the possibility of social interaction with aspects related to the curriculum, which according to Panagioditis (2019) is evidence of an efficient design. This layout has allowed the user to retrieve the information needed from peers and facilitators' interventions with relative ease. Also, the user finds specific self-reflection spaces in which active participants develop their self-determination skills, and passive ones can learn to develop them through observation (Agonács et al., 2020; Chiu & Hew, 2018).

The results, however, permitted to observe some discrepancies affecting threads and sub-threads that need to be addressed. The lack of correspondence of certain speech acts with their theoretical module(s) needs of a perfect alienation of the topics in forums with the objectives and resources of the modules to avoid confusion among participants, especially passive ones who visit the resources to satisfy very specific needs by minimising the consultation time and cognitive effort employed (Chiu & Hew, 2018; White & Le Cornu, 2011). Forums are dynamic tools (Liu et al., 2022) and this characteristic allows for organic intervention in them. At this point, facilitation in forums should be able to guide the direction of dialogues and become into another resource to be aligned with the specific objectives addressed in each section. Likewise, it should be expected that facilitation will be able to redirect interactions with the same objective.

Meaningful learning in LMOOC forums: Design and beyond

The proposed structure had the capacity to stimulate basic and higher order capabilities in almost equal parts, which is significant from an overall perspective. In this case, however, only active participants who, in addition, stayed in the course on a permanent basis, could benefit from this format. This does not correspond to reality (Liu et al., 2016; Martín-Monje et al., 2017; Onah et al., 2014), nor is it inclusive, as it is not applicable to the most representative population of LMOOCs. A detailed analysis of the concurrence of these capacities in each thread showed that the desirable balance between the different mental capacities is not achieved in practically any thread or sub-thread, except for the "Share your learning experiences" sub-threads where the distances between the two frequencies are shortened. It is understandable, therefore, that it is in these threads that the users can achieve the most significant learning, in accordance with Garrison (1992) and Gorsky and Carspi's theories.

Gorsky and Carspi's "Theoretical Framework of Distance Education" (2005)

explains that learning acquisition is achieved by the interrelation of social and subject matter dialogues. Closest to the context of this study, Garrison (1992) states that, in forums, basic and higher order mental skills can be potentially developed, and their combination results in meaningful learning. It is deduced, therefore, that passive and active forum users can benefit from threads where a coherent balance of the stimulation of both capacities is achieved. A large majority of threads, however, did not reach the expected balance which does not indicate a fruitful use of these tools for the intended purpose. Facilitators should be conscious of these benefits and be the ones guiding the development of both capacities in a balanced way. Nonetheless, it is important to remember that forums provide opportunities for foreign language production and reception (Faiz & Lin, 2016; Meskill & Anthony, 2008), so simply accessing these tools can bring benefits to the language learner.

Limitations & conclusions

This study has aimed to monitor the quality of the design of LMOOC forums in terms of accessibility, ease of navigation, learning assessment, and support for the development of strategies that foster self-determination, a theory that explains the characteristics and skills associated with the acquisition of learning in LMOOCs. To this end, two analyses of the content of the contributions in the forums were carried out using two instruments that permitted to answer to the objectives of the research.

The limitations of the study should be mentioned. One important limitation is that the study has focused on a qualitative interpretation to respond to the research objectives, which can be considered a first step in the evaluation of the design of the forum structure. However, this analysis could be complemented and improved by the participants' evaluation of the elements studied. In LMOOC research, participation is a key element, so it would be desirable to introduce this variable in future related studies. Another limitation is represented by the size of the sample which corresponds to the usual low interaction pattern in LMOOCs. This fact is not extraordinary in this context, so although a larger corpus would have enriched the results, it has not limited the possibility to perform a realistic analysis of forum contributions. This reality provides evidence that can serve as a guide for agents involved in the design and implementation of LMOOCs who value considering efficient designs for all participants.

The inclusive perspective that this study has acquired allows us to take a step forward in LMOOC research by considering the so-called subpopulations that are usually neglected in research. Although their study remains complex in other aspects, the results have permitted to examine whether trainers, designers and researchers are considering layouts that accept the heterogeneity of the population and their way of interacting with the resources of an LMOOC. This first step becomes essential to ensure that designs are efficient and meet the particular needs of different profiles. Once these foundations are laid, further progress can be made with respect to pending challenges, such as

promoting the practice of the language and ensuring that this is understood by participants as a key to success for their language education.

The creation of common analytical frameworks strengthens LMOOC research, and the monitoring of design quality should be considered as an area contributing to this end. Suggestions in the design proposed in this study may be replicated due to their simplicity and concreteness. The design proposal is based on four pillars: 1) granting socialisation spaces that enable dialogue on aspects that are not content-related; 2) including content-related dialogue spaces (threads) that discriminate among the different language skills and which are aligned with the resources included in the corresponding thematic modules; 3) specific spaces that allow for self-reflection in order to train users' self-determination skills; 4) having facilitators aware of participants' needs and capable to intervene to redirect the discussions when appropriate.

Acknowledgments

I would like to thank Dr. Mª Dolores Castrillo for her invaluable help in the origins of this work, and Dr. Elena Martín-Monje for her constant support along the way. Also, a thank you to both for letting me be part of the project on which this research is based. Lastly, I am grateful to Dr. Jorge Mañana-Rodríguez for his methodological advice.

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