

# ***A design layer to support self and social regulation processes of learning in MOOC***

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## **Abstract**

Open, social and networked approaches to learning pose challenges for learners, who must assume the role of actively directing their own learning, in interaction and collaboration with others, in an increasingly complex environment. In this context, concepts such as self-direction and self-regulation of learning have attracted renewed interest as umbrella terms for a skill set and provisions that allow subjects to independently guide their own learning process and assume responsibility for it.

Moreover, many authors have pointed out various problems regarding MOOC design and quality from a pedagogical perspective. This raises the need for a greater and more holistic understanding of learning regulatory processes and for developing models and instruments to support learners in this regard.

This research aims to analyse how to support learning regulation processes as a whole in MOOC environments. This means paying attention to both social and individual dimensions of regulation, by studying how processes of self-regulation, co-regulation and socially shared regulation can be supported and promoted in this type of learning contexts.

To this end, we apply the methodology of design-based research in order to intervene directly in the pedagogical practice through an iterative cycle based on stages of design, intervention, reflection and redesign of a design layer to support learning regulation in a MOOC. In this paper we present the design of the regulation support layer proposed in the first research iteration. We begin by presenting its theoretical foundations and then describe the support layer that has been designed as well as the empirical case of an xMOOC where it has been implemented. Finally, some conclusions and recommendations for the design and practice of learning regulation in MOOC are drawn from the results obtained in the first research iteration.

## **Keywords**

Learning design, learning regulation, self-regulation, co-regulation, socially shared regulation, MOOC

## **Introduction**

### **Learning design challenges and opportunities in MOOC**

In their initial conceptualization, MOOC materialized the principles of connectivism and open education, as networked environments in which people interact with each other and with knowledge objects, learning through these network connections (Powell and Yuan, 2013; Anderson and McGreal, 2012). This type of MOOC, inspired by the connectivist model was called cMOOC. Later the so called xMOOC arose, currently the most widespread, that emphasize individual learning through interactive materials instead of social learning, as would be the case with the cMOOC (Conole, 2015; Daniel, 2012; Guàrdia, Maina, and Sangrà, 2013). We agree with Conole (2015) that establishing a basic dichotomy between cMOOC and xMOOC is excessively reductionist and limited. In recent years multiple hybrid or varied proposals of these two original models have appeared. In fact, according to the pedagogical approach used we could identify many different MOOC models nowadays.

Numerous authors have pointed out various problematic issues with MOOC such as their debatable quality from a techno-pedagogical point of view, low completion and high dropout rates, certification and accreditation issues, among others (Conole, 2015; Littlejohn and Milligan, 2015). According to the analysis by Margaryan, Bianco and Littlejohn (2015), most MOOC are of low quality from the point of view of their instructional

design, for example, by not sufficiently contemplating support for interaction and feedback (Clarà and Barberá, 2013; Clarà and Barberá, 2014).

Conole (2015) proposes a list of twelve dimensions from which to categorize and evaluate the quality of MOOC based on their design: degree of openness, the scope of participation (or level of massification), the level of use of multimedia resources, the level of communication, the degree of collaboration that is proposed, the type of learning itinerary that is proposed to students (from focused on the learner to highly structured by the teacher), the expected quality assurance system, the degree to which student reflection is encouraged, the type of certification offered, the level of formality-informality, autonomy and diversity. It is therefore essential to influence both the design and the implementation of MOOC with the intention of guaranteeing their quality.

### **Self-directed learning and learning regulation in MOOC**

Research has shown that agency and active participation are relevant aspects for actual learning to take place in open, informal and social learning environments. Learners must decide, for example, what tools and resources they use, what connections they are based on to make sense of the information they handle and ultimately how they build their learning itineraries (Maina and Garcia, 2016). Kop and Fournier (2010) analysed the agency and level of autonomy required by the trainees participating in a MOOC, using Bouchard's four-dimensional model of learner control (Bouchard, 2009). This study points to the management of time and information, the formulation of objectives, effective planning—all aspects directly related to the self-regulation of learning—as factors that directly influence participation and the type of activities that learners carry out in MOOC.

Another critical aspect that appears in different investigations is the volume of information circulating in a MOOC, which can easily be disorientating and overwhelming, especially for those students with instructional expectations similar to those of traditional higher education models. Achieving an effective organization of learning and resource management requires a great deal of autonomy and self-organization capacity (Tschofen and Mackness, 2012; McAuley et al., 2010). Additionally, in most MOOC, learning occurs mainly through student-content interaction and not so much through student-student or student-teacher interaction. Therefore, the high level of autonomy offered to learners in MOOC and the fact that learning takes place mostly through self-study, makes indispensable for students to apply learning self-regulation skills in order to be successful (Jansen, van Leeuwen, Janssen, Conijn and Kester, 2020).

The concept of self-regulation of learning (SRL) has been defined as “the set of thoughts, emotions and actions planned and adapted cyclically for the achievement of personal goals” (Zimmerman, 2000: 14). The SRL model proposed by Zimmerman consists of three phases—forethought, performance and self-reflection—, crossed by affective, behavioural, cognitive and metacognitive sub-processes (among them, the formulation of objectives or time management, motivation, self-reflection and self-evaluation, the perception of self-efficacy and self-satisfaction) (Zimmerman, 2000; Fontana, Milligan, Littlejohn and Margaryan, 2015). This approach emphasizes the perspective of individual differences, although the social context is recognized as a component of the SRL process (Schunk and Zimmerman, 1997).

One of the reference works on SRL in MOOC is that presented in Littlejohn, Hood, Milligan, Mustain (2016), Littlejohn and Milligan (2015) and Milligan and Littlejohn (2014). The authors analyse the SRL strategies that learners put into play in MOOC and how they vary depending on different factors related to motivational aspects, such as their perception of the purpose and interest of this type of course. Research on SRL in MOOC during the last decade has mainly made use of questionnaires to show positive correlations between self-reported SRL activity and course completion. Recently, the use of traced data and learning analytics to inform about learners' SRL behaviour as a predictor of learner success has become a new strand of research (Jansen et al., 2020).

However, most MOOC do not have a design that facilitates SRL (Littlejohn and Milligan, 2015). Lately, several studies have started to carry out different types of interventions in order to promote and support SRL processes. The results are still scarce and, in some cases, seemingly contradictory (Jansen et al., 2020). This raises the pressing need to achieve a greater understanding of the processes of learning regulation in order to develop models and support systems for learners in this regard (Bonk, Lee, Kou, Xu and Sheu, 2015). In the same way, it is necessary to examine in depth the pedagogical models on which to base the MOOC, paying special attention to the experiences and motivations of the learners, as well as to the value they attribute to their participation in an open and networked learning environment (McAuley et al., 2010).

## **The social dimension of learning regulation: self-regulation, co-regulation and socially shared regulation processes**

Another line of research in the study of the regulation of learning from the sociocultural approach has focussed on its social dimension, giving rise to new constructs from which to analyse the regulation process, such as co-regulation and socially shared regulation (Hadwin, Järvelä and Miller, 2011).

The concept of co-regulation (CoRL) derives from the Vygotskian consideration of learning, according to which the higher cognitive processes are internalized through social interaction. From this perspective, the emerging social interaction with other subjects in a given context gives rise to the internalization of SRL processes (McCaslin and Good, 1996; McCaslin and Hickey, 2001). Hadwin, Järvelä and Miller (2011) define CoRL as a temporary coordination of the SRL of learning with others, understanding these “others” as equals or peers, the teacher, etc. In processes of social interaction, CoRL involves negotiation processes that reveal the experiences and difficulties of SRL of each participant, thus enhancing the achievement of higher levels of regulation by each individual. The study of CoRL processes is based on the analysis of the interactions or dynamics between the subjects, with respect to or at the service of the processes of learning regulation.

On the other hand, the socially shared regulation of learning (SSRL) takes place in contexts of collaboration and cooperation, in which a group of individuals share their processes of learning regulation (including beliefs, knowledge, strategies, etc.) in an orchestrated way at the service of a common or co-built objective or product (Hadwin, Järvelä and Miller, 2011; Panadero and Järvelä, 2015). Research on SSRL therefore focuses on these shared, co-dependent and co-constructed processes of regulation, in the form of shared planning, shared objectives, shared monitoring and evaluation, shared strategies, etc. which are given in interaction with individual SRL processes. This study has been especially concentrated in the field of CSCL (Computer Supported Collaborative Learning) environments, in the analysis of team regulation processes during collaborative work.

In an extensive review of the topic, Panadero and Järvelä (2015) list several lines of pending research to be addressed regarding SSRL, among which we highlight two: the implementation of interventions to promote or support this type of process, especially with the help of digital technologies, and the study of these processes in interaction with those of SRL and coregulation, since they can be considered as interdependent.

Learning is not generally only individual or collaborative, so we understand that its study must be approached from a more holistic perspective, which takes into account the social component of the three situations (SRL, CoRL and SSRL). This makes special sense in environments such as MOOC, in most of which: a) the SRL capacity of the participant in the course is presupposed, although not necessarily true; b) learning could be facilitated by the CoRL of what is shared, understood as mutual feedback, which is not always effective, and c) the spontaneous generation of learning communities that are collaboratively regulated through their own acquisition of shared knowledge is generally idealized.

Authors such as Hadwin, Järvelä and Miller (2011) or Volet, Summers and Thurman (2009), maintain that, with the right kind of tasks and social conditions, these three forms of learning regulation can manifest simultaneously and therefore be studied. However, there is hardly any research dealing with these three processes (SRL, CoRL and socially shared social regulation) as a whole and much less so in open learning contexts, in which collaboration is articulated in a distributed and emergent manner, without responding clearly to a given formal group organization structure. Precisely for this reason it seems essential to address this gap, with the purpose of identifying how these three processes manifest in contexts such as MOOC and how they can be supported or facilitated by influencing their design.

We are specifically interested in studying how social support can be provided in relation to the processes of regulation of learning within the framework of MOOC. This includes modelling and scaffolding processes (McCalsin and Hickey, 2001), or others that we can identify, whether provided by classmates, by the tutor or mediated by the environment itself, as part of the course design.

This work is guided by the following research questions:

RQ1. What aspects should be considered in the design of a layer to support the social regulation of learning in MOOC?

RQ2. How could a layer to support the social regulation of learning be better integrated into the design of an MOOC?

## The design of a regulation support layer for MOOC

With the purpose of answering the posed questions, a literature review was carried out, first on the analysis of the three mentioned regulatory processes, and then on the use of scaffolding tools to support them in different settings. This review provided us with the conceptual framework and the design elements to be considered in the construction of the regulation support layer.

Next, we briefly present the conceptual basis that articulates our proposal. Then we describe the different elements that constitute the regulation support layer and the way they interact with each other. This part of the work intends to answer the first research question posed.

In order to be able to work on the second research question, we proposed an empirical case of intervention, based on an xMOOC, where we integrated and implemented the designed regulation support layer. The empirical case and the actual integration in the MOOC platform of the regulation support layer is described next, as well as the research design and data gathering instruments that were applied.

### The use of prompts as scaffolding tools for learning regulation processes

The use of tools to scaffold learning regulation, and more specifically the use of prompts, has been studied during the last two decades (Bannert, 2009; Wirth, 2009; Bannert and Reimann, 2012). According to Bannert and Reimann (2012: 195) prompts focus learners' attention on understanding the learning activities they are engaged in. They can be useful to support the recall and execution of knowledge and skills while learning, such as activities, procedures, techniques, or even the use of cognitive and metacognitive strategies.

Instructional prompts take the form of short-term interventions, embedded in a given learning context, as explicit statements that students have to consider during learning. The aim is to focus the student's attention on specific aspects of the learning process. In the case of learning regulation, the use of prompts has consisted mainly in asking students to carry out specific SRL activities, requiring them to explicitly reflect on, monitor and revise their learning process. The assumption is that prompts would allow them to activate their repertoire of metacognitive knowledge and strategies during learning because they already possess them, although they might not recall or execute them spontaneously.

Regulation tools and scaffolds have also been used to promote SSRL in the context of Computer Supported Collaborative Learning. In this case, support has consisted in encouraging students to negotiate and share their goals, plans and strategies, as well as to reflect on the achievement of their goals, or evaluate their plans and strategies (Malmberg, Järvelä, Järvenoja, Panadero, 2015). Järvelä et al. (2016: 267) mention three design principles for supporting SSRL (Järvelä and Hadwin, 2013): (1) increasing learners' awareness of their own and others' learning process, (2) supporting the externalization of students' and others' learning process in a social plane and helping in sharing and interaction, and (3) prompting the acquisition and activation of regulatory processes. Regulation tools could be considered awareness tools, since they help to make the targets of the SRL visible for the group members and in this way increase the possibilities of developing SSRL strategies (Järvelä et al., 2015; Järvelä et al., 2016). Moreover, as Molenaar and Järvelä (2014) point out, another interesting aspect of these tools is that they allow to data to be collected about 'on-the-fly' processes of SSRL that would not be available through other means.

### Description of the regulation support layer

#### *Purpose*

The purpose of the design layer of learning regulation, as it was presented to the MOOC participants and facilitators, is twofold: on the one hand, it intends to help participants to have a more satisfactory learning experience, prevent attrition and explore possibilities to improve the MOOC design by paying attention to both individual and social learning processes. On the other hand, its purpose is to advance the understanding of the way learning regulation processes (SRL, CoRL and SSRL) operate and how they could be better supported in an MOOC environment.

### *Types of prompts*

The basic scaffolding elements that make up the regulation support layer are the following three types of prompts:

- Guiding prompts (GP): guidelines provided to participants where they are invited to perform some actions. Among these actions there are always some that have to do with putting into practice some strategy or procedure, others with sharing and discussing the previous ones with the rest of the coursemates in the forum and others with reflecting on one's own learning process.
- Reflection prompts (RP): reflective questions posed to participants, following the guiding prompts, where they are requested to give a written answer about their own learning experience regarding: the use of some strategy or procedure, the sharing and discussing with other coursemates and the reflective process itself.
- Feedback prompts (FP): at the individual level, forward of own responses to the Reflective prompts by the participants; at the group level, forward of the responses to the Reflective prompts on the shared activity, by the rest of the group members.

Guiding prompts and Feedback prompts intend to act mainly as scaffolds of the regulation process, while Reflection prompts, in addition, allow us to collect 'on-the-fly' qualitative data of the process, as it is being experienced by participants throughout the development of the MOOC.

### *Regulation phases*

We took as a reference and adapted the Barnett and Reimann (2012) prompt proposal. In a similar way, our proposal follows Zimmerman's (2000) three cyclical learning phases —forethought or planning, performance and self-reflection— but we explicitly refer to the processes in each one of them more directly related with the structure and the development of the task. We also subdivide the forethought phase in two —a preliminary one devoted to the task understanding and a second one focussed on planning and goal setting.

In this way, the provision of the three types of prompts is distributed in the four next phases throughout the course.

- Phase 1: Understanding the MOOC learning challenge
- Phase 2: Learning goal setting and planning
- Phase 3: Activity enactment
- Phase 4: Performance evaluation and adaptation

For the specific formulation of the prompts in each phase we followed the Barnett and Reimann (2012) proposal, especially for prompting SRL processes, but we adapted it taking as reference other proposals to support CoRL (Volet, Summers and Thurman, 2009; Kaplan, de Montalembert, Laurent and Fenouillet, 2017) and SSRL (Morris et al., 2010; Järvelä et al., 2016).

### *Regulation targets*

Our aim is to consider the different overlapping dimensions in the regulation of the learning process: cognitive, behavioural, motivational and socio-emotional. This means that the suggested prompts are intentionally meant to activate all four dimensions or regulation targets in participants. In addition, besides metacognitive activity, the purpose is that the prompts should induce every core regulation process in the four mentioned phases: orientation, planning, goal-specification, finding relevant information, monitoring and evaluation.

### *Nature of the task*

Lastly, we also needed to take into account the nature of the task considered in this case. First, we distinguished between two main types of learning activities that participants had to fulfil in the MOOC:

- Individual activity: referring to the general activity in the MOOC that consists in working with the materials and completing the test at the end of each module, as well as optional peer review activities. It also involves non-structured social interaction and exchange with other participants in the forum space.
- Collaborative activity: referring to specific activities that participants have to carry out within a group involving negotiation and sharing. Specifically, for this case, an optional individual peer review activity was redesigned and offered as a collaborative task in order to involve knowledge sharing, goals and procedures negotiation, planning and review of the joint process, etc. so that could lead to SSRL processes.

Differentiating between individual and collaborative activity in the MOOC allowed us to design and provide the most appropriate prompts in each case, in order to stimulate the corresponding regulation processes: in the first

case, those related to SRL and CoRL and in the second case, these same two in addition to those related with SSRL.

In order to not overburden students, we tried to simplify the presentation of prompts as much as possible. Thus, in the case of the individual activity, to structure the presentation of the prompts we decided to consider the whole course as a single task and thus distributed the four regulation phases in which to provide the prompts throughout the 4 + 1 modules of the MOOC, that is, over the 4.5 weeks duration.

The collaborative activity was proposed in the third module, lasting one week, and was considered globally as a task. In this case, the regulation phases and provision of the prompts were simplified even more, considering three regulation stages throughout the week, so that it would not be so intense for the participants.

## The empirical case

### *An xMOOC on Gamification*

The course 'Introduction to gamification through practical cases' was used as the empirical case to design and to implement the regulation support layer. It is a course of the xMOOC type, structured into four modules, with the additional introductory one, and a duration of four and a half weeks. The first two modules are devoted to providing basic knowledge about games and gamification elements as well as design guidelines for gamified learning solutions, and the third and fourth modules focus on practical cases in the fields of health and education, respectively. The structure of each module is the usual one in an xMOOC: the contents are presented through text and videos; there is a multiple choice test at the end of the module as the main assessment tool of the participants' knowledge acquisition in the course; the test provides the participants with a mark and is the only requirement to pass the module and the course. The third and fourth modules also include optional assignments that involve some more written development. These activities are assessed by the participants themselves through a peer review procedure facilitated by the learning platform and must be completed in a specific time period to be taken into account, although they are not considered in the final MOOC grade. The MOOC also presents practical examples of success and proposes the use of a gamified task management tool called *Habítica*. Participants are invited to interact in the forum space but there is no mandatory activity that involves its use to discuss or collaborate. The MOOC is hosted on the *MiriadaX* learning platform, a Telefónica Educación Digital initiative that has been operating in Latin America since 2013.

### *The regulation support layer implementation in MiriadaX*

The design layer in the MOOC was mainly integrated by taking advantage of the functionalities and tools provided by the *MiriadaX* platform. The primary intention was to avoid adding complexity to the learning environment. Only in the case of reflective prompts we used links to external basic Google forms.

A presentation of the regulation support layer was given in Module 0. Participants were invited to use the proposed system to help them direct and improve their learning experience. On a voluntary basis, they could subscribe to the individual activity, the collaborative activity or both, by completing a form. In this way, we maintained some control over who had initially enrolled and were able to monitor continuity. Then we created an itinerary for the individual activity and another one for the collaborative activity. In each case, we embedded the regulation support layer in the MOOC as follows:

- For the individual activity:

- A brief introduction of each regulation phase was given after the presentation of the corresponding module.
- Guiding prompts through the four regulation phases were provided in the platform blog.
- In each phase there were guiding prompts that suggested the participants share and discuss their strategies, reflections, opinions and sensations in the forum throughout the process. The forum was proposed as the main space for open social interaction and discussion. Participants could also comment on the blog posts.
- Reflective and Feedback prompts were provided through links to Google forms in the blog post.

- For the collaborative activity:

- A brief presentation of the collaborative activity was given in the description of the third module.
- A general overview of the collaborative activity was provided in the platform blog.
- Guiding prompts through a simplified proposal of three regulation phases were provided in the wiki space on the platform, where the activity also had to be carried out in groups. Each group had a wiki page to work

through the activity. On the wiki page each group was provided with a template that facilitated the structure of the work and the development of the collaborative activity.

- The forum space was additionally proposed as the place for discussion, negotiation and group decision making.
- Reflective and Feedback prompts were provided through links to Google forms in the wiki.

Since the regulation support system was distributed in different spaces on the platform, we sought to link these spaces to each other as clearly as possible, and to make the structure and internal logic of the regulation support system explicit and understandable.

### *Research design and instrumentation*

The design-based research model is applied with the aim of generating and analysing changes in the learning regulation practices in MOOC through the development of a design intervention and in parallel to advance the theory on the support of learning regulation processes. With this twofold purpose, research and development form a continuous cycle of intervention design, analysis, evaluation, reflection and re-design. For the collection, analysis and interpretation of the data, a mixed approach is used, although with preeminence of the qualitative approach. Quantitative data are collected from the participation statistics generated by the MiriadaX platform, but most sources of information are of a qualitative type: semi-structured interviews with MOOC participants, responses obtained through the reflective prompts in the different phases of the regulation support layer and, finally, records of the interaction between the participants in the platform (forum, wiki and blog). The data of the survey of general satisfaction of the participants with the MOOC is also available. Data collection is carried out in each of the modules through the aforementioned instruments, except in the case of interviews and the survey carried out at the end of the MOOC.

## **Conclusions**

After an initial exploratory implementation of the design layer to support learning regulation, we can offer some first reflections on the two research questions posed:

Regarding the first question: What aspects should be considered in the design of a layer to support the social regulation of learning in MOOC?

The use of prompts seems appropriate to induce and support regulation processes in a sustained way. However, the low follow-up of the system by the participants, as well as the interviews carried out, lead us to think that the presentation of the Guiding prompts as well as that of the Reflection prompts should be improved and simplified in order to become more "transparent" to participants throughout the MOOC. In the case of Reflective prompts, the "questionnaire effect" seems to have had a discouraging impact. In this sense, a possibility would be to raise this type of prompts more along the lines of a functionality to take notes as a reflective journal, similar to that of the NoteMyProgress tool (Pérez-Álvarez et al., 2017). Another possibility would be to keep the Reflective prompts but to make public the answers for all participants, anonymously, so that everyone could benefit from the responses of others. This could reduce the feeling of responding to a machine and the perception of lack of utility of these responses reported by some participants. It would work, in fact, as a different type of Feedback prompts. Testing the use of targeted prompts that provide learners with expert models of reflective thinking that can work as behavioural references, could be a different approach interesting to explore (Ifenthaler, 2012).

One aspect that clearly determines the use of the system is the way in which the participants position themselves and orient their learning on the MOOC since the beginning. In many cases it tends to be superficial, intermittent and intensive. It is difficult for regulatory processes, especially those of the metacognitive type, to be activated within such a fragmented approach. In this regard, the regulatory support system should help sustain a more continuous, progressive and meaningful journey within the MOOC.

On the other hand, the collaborative activity must be presented and encouraged from the beginning and perhaps not presented to the participants as an itinerary other than the individual, but as another element of the same itinerary, which as the rest can optionally be carried out. In order to make its implementation feasible and at the same time make it possible to monitor the phases of support regulation, a longer period of time must be considered. The fact that it is an optional activity in the third module greatly reduces participation, which is already scarce in individual P2P activities. Something similar occurs with any form of social interaction in the

forum, as a prerequisite for CoRL and SSRL processes to occur. Therefore, it is necessary to deepen the reasons for low participation and generate mechanisms in the first modules to make social interaction and collaboration in the MOOC more attractive, productive and rewarding.

Regarding the second question: How could a layer to support the social regulation of learning be better integrated in the design of a MOOC?

The way in which this layer of regulation support is integrated into the MOOC design seems to be an essential factor in order to achieve its optimum use by the participants. In this case, the characteristics and the way the platform operates do not facilitate an organic and at the same time attractive integration. It is an unfeasible platform and with few tools and functionalities designed to facilitate social interaction and collaboration.

Although efforts were made to trace the itinerary of the support system in the MOOC environment, the disintegration of the different components caused the participants to get lost frequently and not fully understand the proposal. In the interviews the participants found it difficult to place clearly the aspects related to the regulation support layer. In this sense, although we believe that this layer of support should be more transparent for the participants, at the same time it should draw a path that is recognizable and understandable. It should help to become aware of the process of learning regulation within the MOOC and of the sense and utility of making an appropriate and continued use of prompts (Bannert and Reimann, 2012). This implies looking for strategies to better embed the system into the contents and the learning activity of the MOOC (considering the goals of the module, contents, activities and tools) (Jansen et al., 2020). Specifically, prompts, instead of being presented as a block, could be administered more gradually into the contents of the MOOC. In this case, perhaps even trying to give them a gamified treatment by taking advantage of the course contents would help.

Just as Bannert and Reimann (2012) state, offering prompts to improve learning regulation may not be sufficient. In further research we will attempt to analyse why students did not use prompts more frequently and in the intended manner. In this sense, it may be interesting to analyze to what extent these students have the SRL skills that we are trying to activate or encourage. Another possibility is that certain additional guidelines are necessary to "train" proper use of the system.

The conclusions drawn in the first iteration of the research offer some guidelines on how to propose mechanisms to support regulatory processes in a broad sense, within a general approach to learning design in MOOC.

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