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# Better e-Learning for Innovation in Education


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# The Regulation of Learning Effort in Online Environments

## *The Role of Interdisciplinary Articulation*

*Nuno Queirós Rodrigues and*
*José Alberto Lencastre*
*University of Minho, Portugal*

### Introduction

The incessant evolution of Information and Communication Technologies has changed in a truly disruptive way the mode and the means by which we communicate and access information that is increasingly more horizontal and dispersed. The communication provided by the *network society* became global and free (Castells, 2007) – a circumstance that facilitated the emergence of new paradigms and emphasised the importance that lies in the permanent learning of new skills and abilities (Meirinhos & Osório, 2014). In fact, we have to learn throughout life, obtaining digitally stored information, recombining it and using it to produce knowledge for the desired purpose in each moment (Castells, 2007). Education has become a strategic asset, truly capable of ensuring our survival in a global market that is increasingly more volatile and competitive.

Aware of this new reality, most higher education institutions have sought to engage new public communities – more heterogeneous, geographically distant and temporally diverse between themselves and the *campus*, through the increasing offer of undergraduate and postgraduate courses conducted partly or entirely at a distance (Costa, 2012), thus providing truly ubiquitous and transversal learning.

Higher education teachers have therefore been assuming new roles in the teaching and learning process; immersed in a technological environment increasingly more inseparable from their lives and the lives of their students. On the other hand, students have also assumed new behaviours and responsibilities in this field. With more and better access to information, today's students prefer to work and reflect on real-world problems, actively cooperating and collaborating in environments permanently mediated by technology. In this context, teachers began to assume increasingly the role of facilitators and moderators of their students' learning, becoming more centred and self-regulated by them.

This chapter presents a currently active project that is reflecting on the role of interdisciplinary articulation in the regulation of the learning effort by higher education students in online environments. The authors present the research problem, the questions and the goals, as well as the adopted methodology. The results and the concluding remarks will be published at a later stage.

## Background

In this new technological and educational paradigm, teachers tend to adopt new pedagogical models facilitated by digital technologies, proposing to their students the accomplishment of tasks outside the formal context of the classroom. This is an example of a flipped learning model, which inverts the method traditionally used in the teaching and learning process, aiming to promote the students' prior reflection and autonomous learning of the contents later addressed in the different subjects.

The project researchers (henceforth, the 'researchers') know, however, that the majority of these activities are nowadays based on researches conducted on the Internet. This should imply additional concerns from the students, particularly regarding the validation and the confirmation of all the data obtained online (Hargittai, Fullerton, Menchen-Trevino, & Thomas, 2010). Indeed, the work conducted in online environments requires from today's students the possession of new abilities, attitudes and literacies, either in the development of their critical

thinking, or in their self-regulation, self-motivation and time management skills. As Meirinhos and Osório (2014, p. 49) illustrate, *the online student becomes a non-linear sailor in an endless information sea.*

In this context, *time* has assumed a truly fundamental role, capable of conditioning, both positively and negatively, the learning strategies adopted by students (Bowyer, 2012; Thorpe, 2006). As Meyer (2003, p. 57) explains, "it is obvious that thinking and time are related, since thinking occurs in time and for some, the passage of time is crucial to improving one's thinking". Karjalainen, Alha, and Jutila (2006) also highlight this relationship in one of their statements: "learning inevitably takes place in time, in the student's time" (p. 13). Students appreciate online learning environments, "as they allowed [them] to reflect on what was said and to take their time to develop a useful response" (Meyer, 2003, p. 61), and recognise that asynchronous methods "have the advantage of providing time for reflection essential for higher order cognitive thinking" (Barber, 2011, p. 2). In spite of this, several studies seem to conclude that in these new scenarios some students need more time to reflect and deepen their learning (Fabro & Garrison, 1998; Shearer, Gregg, & Joo, 2015). Metzger (2007) also emphasises the role of time in the consolidation of students learning, affirming that while recognising that "they 'should' critically analyse the information they obtain online, yet rarely have the time or energy to do it" (p. 2087).

Based on this problem, we designed a conceptual framework that proposes a sequential relationship between the dimensions of Time, Reflection and Deep learning[1] in online environments (Figure 1).

[1] In this chapter, we consider *Deep learning* as the grounded consolidation of students' learning and the inherent solid construction of their knowledge.

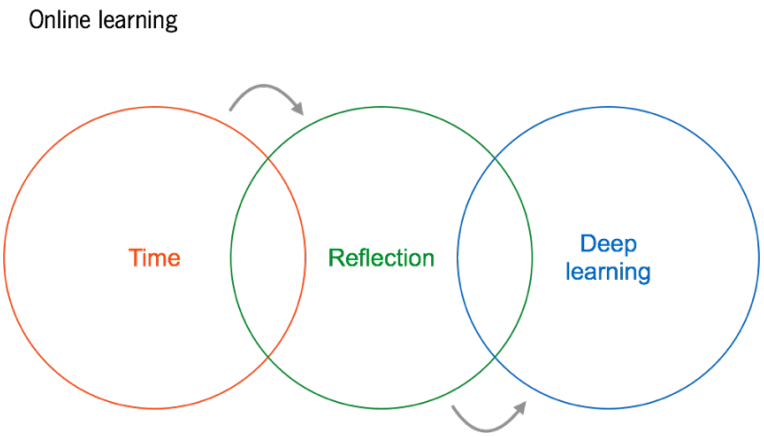


**Figure 1. Sequential relation between dimensions Time, Reflection and Deep learning in online environments.**

All tasks comprise a certain learning effort and a given schedule. However, we know that these tasks – especially when involved in a continuous assessment model – are often proposed by class teachers in an isolated manner, without realising that in that moment they are competing for the same resource: their students, or more precisely, the *time* of their students. In fact, *students are a resource shared by class teachers* (Figure 2).

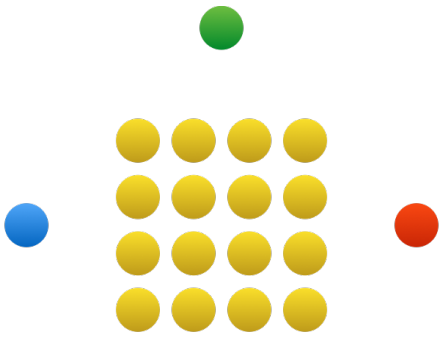

**Figure 2. Students are a resource shared by class teachers.**

Yet, as questioned by Lublin (2003, p. 6):

> *You know what you expect of a student in this class, but do you know what all the other teachers this student encounters in the semester require of that student? For instance, do you know the total assessment requirements this student must undertake in all their subjects during the semester?*
>
> Jackie Lublin

In this context, if the proposal and the schedules of tasks are planned by class teachers in an isolated, concurrent, and non-articulated manner (Figure 3), we believe that the potential for a (frequently unnecessary) high simultaneity of tasks may demand an excessive learning effort from *some students*[2] (Figure 4), restricting their necessary time to research and validate the reliability of all online sources consulted.

This situation may naturally influence the quality of the rationale and the depth of their participation in these activities (Baeten, Kyndt, Struyven, & Dochy, 2010; Bowyer, 2012; Karjalainen et al., 2006), defrauding their own and their teachers' expectations, as well as conditioning the consolidation of their learning, and inherently, the solid construction of their knowledge. As referred by Karjalainen et al. (2006, p. 13), "if a student is given a learning assignment and no time to do it, it would be absurd to even talk about learning or teaching".

Teachers frequently only become aware of this situation after communicating the tasks and schedules to the students in the classroom – often through feedback from the students leading to an evaluation in that moment whether or not they agree to change the proposed deadlines.

In this context, we believe that class teachers' prior knowledge of the schedule of all tasks proposed by their peers (Figure 5), could promote and facilitate the regulation of their students' learning effort, namely by allowing teachers to analyse and eventually adjust the schedule for those activities, even before announcing it formally (Figure 6).

[2] These students appear symbolically highlighted in the following figures.

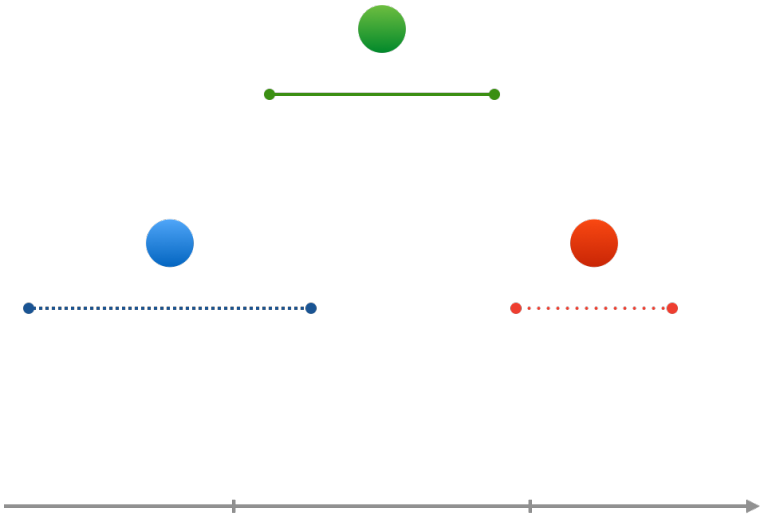

**Figure 3. Class teachers scheduling their tasks in an isolated manner**

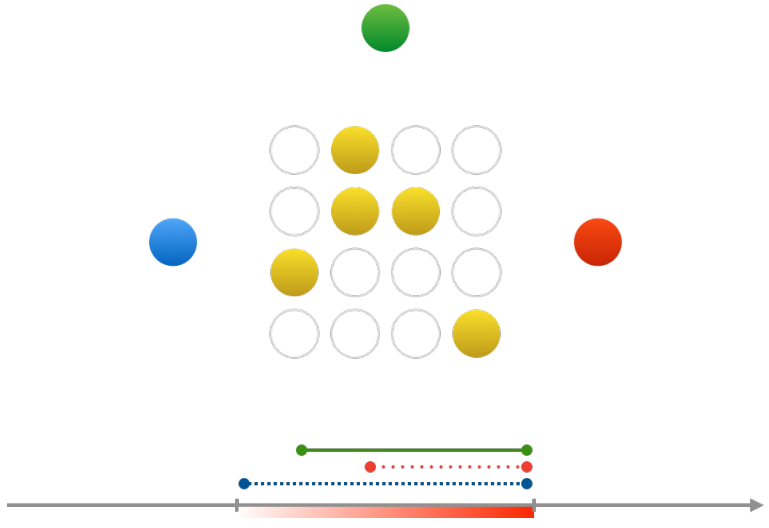

**Figure 4. Excessive learning effort for some students due to a high simultaneity of tasks.**

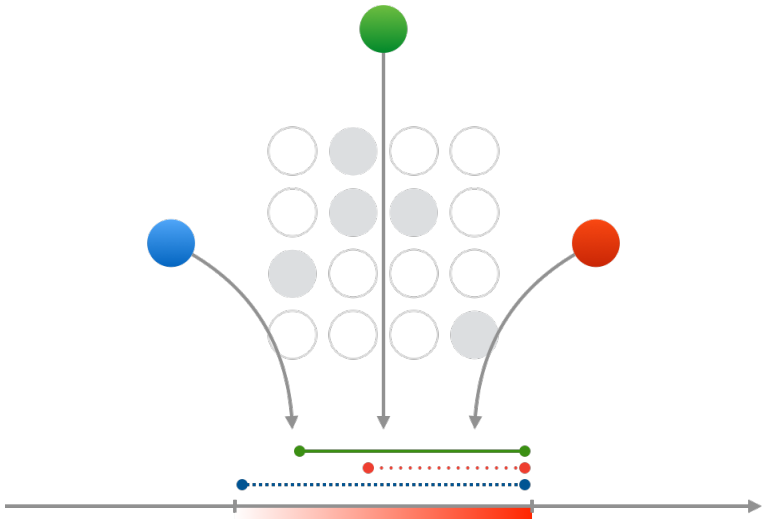

**Figure 5. Prior knowledge of the schedule of all tasks proposed by class teachers.**

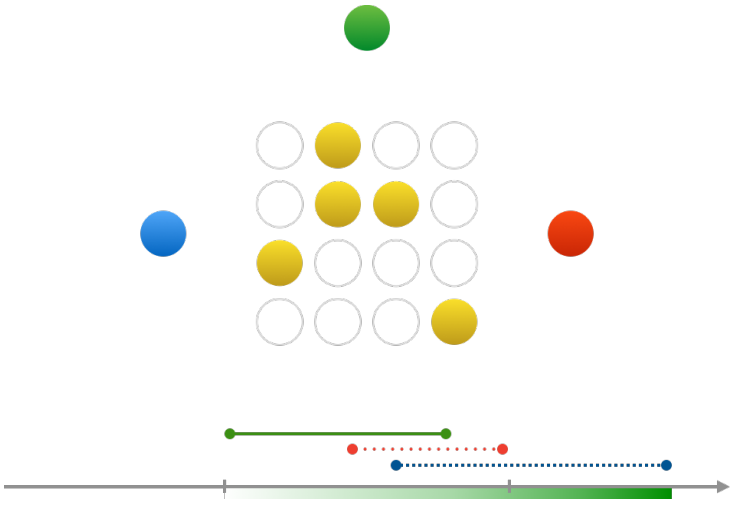

**Figure 6. Learning effort regulation by adjusting the schedules.**

## Method

We believe that the involvement of teachers, namely through the analysis and identification of possible solutions capable of providing an adequate and efficient response to the raised problem, ensures more guarantees of success. We consider that the best way to solve a problem is strongly dependent on its recognition and early acceptance. Such approval can only be achieved if we obtain the receptivity and active support of its key stakeholders (Scaife, Rogers, Aldrich, & Davies, 1997): in this case, the stakeholders would be higher education teachers. It was therefore in this context that the researchers decided to conduct a set of focus group interviews with a group of teachers and students seeking answers to the following question: *What is the perception held by higher education teachers and students on this problem?*

### *Participants*

The definition of the criteria for the selection of the participants in the present study resulted from an objective and systematic process based on three fundamental principles: (a) the objectives of the study, (b) the specific characteristics of the participants, and (c) the time and resources available (Krueger & Casey, 2015). Table 1 presents the selection criteria of the three categories of participants considered: 'MSc teachers', 'Teachers' and 'Students'.

In the process of selecting the participants, it was our concern to assure their homogeneity, "but with sufficient variation among participants to allow for contrasting opinions" (Krueger & Casey, 2015, p. 81). We also sought to make sure that teachers did not have any hierarchical ascendancy as a part of their group, to avoid possible institutional constraints and to promote the free sharing of perspectives and experiences on the subject under study (Krueger & Casey, 2015; Morgan, 1997). On the other hand, considering the nature of the problem, the researchers also found an evident need to invite teachers with experience in multi-teacher courses conducted in blended learning format (Lencastre, 2013; Lencastre & Coutinho, 2015) since only in this

specific context teachers would be able to perceive an effective competition for the same resource – the students. Finally, it was fundamental for us that the invited teachers and students had not been approached by the first researcher about the problem under study before the respective interviews (with the exception of the MSc teachers, who for this reason assumed a very particular role in this research[3]).

**Table 1. Selection criteria of the three categories of participants.**

| Category | Selected criterion |
|---|---|
| **MSc Teachers** | • Teachers of the Masters in Educational Sciences – Field of Educational Technology, Institute of Education of the University of Minho.<br>• Teachers with no hierarchical ascendancy among themselves.<br>• Teachers approached by the first researcher on the problem under study before the interview. |
| **Teachers** | • Teachers of post-graduation courses.<br>• Teachers with no hierarchical relation to one another.<br>• Teachers experienced in multi-teacher courses using *blended learning* methods.<br>• Teachers involved in the initial and continuous teacher training.<br>• Teachers not approached by the researcher about the issued matter before conducting the interviews. |
| **Students** | • Students of post-graduation courses using *blended learning* methods in the Institute of Education of the University of Minho, in the school year of 2015/2016.<br>• Students who could be in person in the University of Minho.<br>• Students not approached by the first researcher on the problem under study before the interview. |

Based on the above-mentioned criteria, five teachers participated in this study from the Masters in Educational Sciences – Educational

[3] However not addressed in this chapter due to text length constraints.

Technology programme at the Institute of Education at University of Minho, along with a further thirteen teachers from four higher education institutions (Polytechnic Institute of Porto, University Portucalense, University of Aveiro, and University of Minho), and two students from the University of Minho (Table 2).

**Table 2. Number of participants sorted by category and higher education institution.**

| **Category** | **Institution** | **Abbreviation** | **Nº Part.** |
|---|---|---|---|
| **MSc Teachers** | University of Minho | UMinho | 5 |
| | | Total | 5 |
| **Teachers** | Polytechnic Institute of Porto | P.Porto | 3 |
| | University Portucalense | UPT | 3 |
| | University of Aveiro | UA | 4 |
| | University of Minho | UMinho | 3 |
| | | Total | 13 |
| **Students** | University of Minho | UMinho | 2 |
| | | Total | 2 |

## *Data collection*

Given the nature of the problem under study, we applied the survey method implemented using focus-group interviews as a technique. This type of interview seemed to be the most appropriate data-collection technique for this study, as it promotes interaction and free sharing of perspectives and experiences among all participants on the problem presented (Courage & Baxter, 2005; Morgan, 1997). This interaction was an excellent opportunity to observe and gather evidence about how all participants became involved and aware of their similarities and differences in relation to various topics of mutual interest (Morgan, 1997; Morgan & Spanish, 1984).

The design of the focus group sessions was based on the Multiple-Category Design model, proposed by Krueger and Casey (2015) because the researchers considered three categories of participants. This model allows the realisation of a different number of interviews in each category according to its relevance for the study (Krueger & Casey, 2015). In this sense, as teachers represented our main source of data and the time available for organising and conducting focus group sessions was given, the researchers decided to make as many interviews as possible with these participants (Krueger & Casey, 2015). Figure 7 presents the scheduling of the five focus group sessions conducted between March and July 2016.

| **Group** | MSc Teachers | Teachers | | | Students |
|---|---|---|---|---|---|
| **Session** | 1st session | 1st session | 2nd session | 3rd session | 1st session |
| **Institution** | UMinho | P.Porto & UPT | UA | UMinho | UMinho |
| **Date** | 3-Mar-2016 | 21-Mar-2016 | 7-Apr-2016 | 16-May-2016 | 12-Jul-2016 |

**Figure 7. Scheduling of focus group sessions.**

Based on the proposals of Krueger and Casey (2015) and Morgan (1997), we always sought to have a minimum of five participants in each interview. However, we were not always able to meet this purpose: in the case of teachers, due to various schedule constraints and last-minute contingencies, and in the case of students as a result of simply not responding to invitations, there was a natural limitation to the amount of material available for later analysis and interpretation. Table 3 presents the number of teachers and students invited and the number of those effectively present in each focus group session.

Focus group sessions were highly exploratory, relatively unstructured (Morgan, 1997; Morgan & Spanish, 1984) and were conducted with a semi-directive format: it was our purpose to enable

interviewees to freely develop their discourse about the topics that we were addressing (Esteves, 2006). In this sense, the focus group moderator sought to minimise his involvement in the discussion, conceding to the participants so they had sufficient opportunities to engage and discuss the topics that most interested them. This tactic also promoted free interaction among all participants, while the moderator refocused discussions when they became irrelevant, and resumed the debate whenever themes seemed to be running out (Morgan, 1997).

**Table 3. Number of teachers and students invited and present in each session.**

| Category | Focus Group Session | Invited | Present |
|---|---|---|---|
| MSc Teachers | 1st session | 5 | 5 |
| Teachers | 1st session | 6 | 6 |
| | 2nd session | 7 | 4 |
| | 3rd session | 5 | 3 |
| Students | 1st session | 24 | 2 |

## *Data analysis*

In the analysis of the collected data, we undertook a content analysis based on the proposals of Bardin (2014) and Ghiglione and Matalon (1997), as well as in the texts by Esteves (2006) and Vala (2009). Given the nature of the study, it seemed to us especially appropriate to use this technique of data analysis as the researchers intended to gain understanding beyond the immediate meanings of communications. The researchers also intended to discover units of meaning in the messages that could lead us to a description of mechanisms that *a priori* we did not understand (Bardin, 2014).

Based on the objectives of the study and the nature of the collected data, we decided to conduct a content analysis of a *categorical* (Bardin, 2014) or *thematic* (Ghiglione & Matalon, 1997) type, adopting as a unit of registration each *theme* or opinion, independent of the word or words used to express it in the message (Esteves, 2006). Also referred to in

the literature as 'unit' or 'element of meaning', the theme is commonly used in content analysis, namely in the analysis of group interviews to study the motivations of opinions, attitudes, values, beliefs, tendencies, etc. (Bardin, 2014).

The thematic analysis combined both quantitative and qualitative approaches with distinct purposes. In the quantitative approach, we chose the frequency of appearance of each theme in the *corpus* (Bardin, 2014) as an enumeration rule. In turn, in the qualitative approach, we privileged the presence of the theme and not the frequency of its appearance, as we did not consider relevant the measurement and the interpretation of this parameter.

On the other hand, the thematic analysis assumed the *administrative proof* and *heuristic* functions described by Bardin (2014). In the first case, this was because we proposed to verify two initial hypotheses formulated in the form of provisional statements from our intuition (Table 4). In the second, this was because we have also developed an exploratory essay explicitly focused on the free discovery of patent or latent themes in the messages, excluding any preconceived ideas from the outset.

**Table 4. Initial hypotheses formulated from our intuition.**

| **Category** | **Initial Hypothesis** |
|---|---|
| Teachers | Class teachers plan their activities without knowing the schedule of the tasks proposed by their peers in the same period. |
| Students | Students find more difficult to consolidate their learning when they face a high simultaneity of activities proposed by their teachers. |

In accordance with the intended directions for the analysis, the definition of the category system, along with its systematic organisation into precise and secure indicators (Bardin, 2014), were developed following a *closed* and then an *open* (or *exploratory*) set of procedures (Bardin, 2014; Ghiglione

& Matalon, 1997). Indeed, the researchers initially defined *a priori* a set of dimensions, categories and indicators based on the conceptual framework of the study, on the questions and the objectives of the research, on the formulated hypotheses, as well as on other variables that we intended to investigate (Miles & Huberman, 1994). As a response to this, the researchers prioritised the construction of new hypotheses (Bardin, 2014). At this stage, the categories emerged from the texts without referring to any pre-established theoretical or empirical framework (Ghiglione & Matalon, 1997), remaining provisional or unstable until all relevant data had been apprehended (Esteves, 2006) as the researchers incorporated new material.

When categorising, we isolate the meaningful units in the transcripts to classify them before placing them within categories that were either defined *a priori* or taken from the corpus (Bardin, 2014; Ghiglione & Matalon, 1997). At the end of this process, we extracted from the texts a set of indicators that helped us to understand better the meaning of each category (Esteves, 2006). We then proceeded to its operational definitions, seeking to write a precise and objective explanation of the criteria used in the assignment of the different units of meaning in each category of analysis.

The final setting of the categorisation came after a long and complex process, and it was essential to reread the material, create new interpretations when appropriate, and distrust the evidence, operating by successive approximations (Bardin, 2014), until it was possible to obtain its final version.

### *Reliability and validity of the content analysis*

According to Ghiglione and Matalon (1997), the reliability of a content analysis is associated with the coding process, which is why reliability tests should be based primarily on the coder and the categories of analysis used by them. Based on this assumption, the researchers sought to determine the intra- and inter-coder reliability indexes, as well as to evaluate the reliability of the defined categories.

In the calculation of the intra-coder reliability index, we obtained a reliability index of 89.3%. This result came after discovering the total number of units of meaning classified in the same (432) and in distinct categories (52) in the coding and recoding operations conducted by the first researcher on November 2016 and February 2017 respectively. The researchers consider this value to be highly positive considering that following a first attempt the reliability index should be close to 80% (Miles & Huberman, 1994).

On the other hand, in the determination of the inter-coder reliability index, after randomly selecting one of the three interviews conducted with the teachers[4], the second researcher codified the 146 units of meaning identified[5] in the selected transcription in an independent way and using the same category framework. After finding the total number of agreements (123) and disagreements (23), we obtained a first value for the inter-coder reliability index of 84.2%. This value can be considered highly satisfactory, especially regarding how difficult it is to obtain inter-coder reliability indexes above 70% in a first exercise (Miles & Huberman, 1994).

We analysed the 23 divergences found, trying to interrogate the causes of this disagreement and take the necessary actions. Such actions could include an improvement of the code itself (Ghiglione & Matalon, 1997), as well as the elimination of possible ambiguities, and/or the redefinition of some of the categories of analysis (Esteves, 2006). In this way, it would be possible to aim at obtaining an inter-coder reliability index equal to or greater than 90% (Miles & Huberman, 1994). After this second exercise, we obtained an index of 97.3%, corresponding to 142 agreements against only four disagreements.

According to Esteves (2006), the reliability of the categories of analysis is more probable when these are operationally defined in an explicit, objective, and most of all, unambiguous way, allowing the

[4] We decided to exclude the interview conducted with the students considering the small number of units of meaning codified.
[5] Corresponding to 32.2% of the total units of meaning codified in the three interviews conducted with the teachers.

classification of the units of meaning without major difficulty (Ghiglione & Matalon, 1997). In this context, the researchers believe they have ensured the reliability of the categories used, a reliability that may have contributed to the intra- and inter-coder reliability indexes obtained.

Finally, the problem of validity must follow all phases of the content analysis process, from the constitution of the *corpus* to the choice of the units of analysis and the enumeration system (Vala, 2009). According to Vala, there are no problems of validity specifically related to content analysis, only reminding us that as in any research procedure, including this one, the researcher must be sure and must assure their readers that they measured what they intended to measure. In this sense, the researchers also consider the validity of this thematic analysis to be assured, as they believe that they have measured what they were really trying to measure.

## Preliminary Remarks

The preliminary reading of the literature seems to suggest a positive correlation between time, reflection and deep learning in online environments, which is in line with the studies of Barber (2011), Meyer (2003), and Shearer et al. (2015). Besides that, we also found evidence that the regulation of students' learning effort seems to have a positive influence on their learning outcomes (Karjalainen, Silvén, & Wennström, 2008; Kyndt, Dochy, Struyven, & Cascallar, 2011).

Based on the analysis of the collected representations, we observed that the generality of teachers understood the rationale and the relevance of the presented problem (*I wanted to start by saying that I think the theme is very pertinent* [T6]; or *This worries me very much because there is a whole logic here that is relevant* [T12]). We also obtained explicit references where teachers emphasised the role of time for reflection in the consolidation of students' learning (*We know that they ... need to think, to reflect, to reformulate and this requires time* [T12]; or *There is no way to understand anything without time* [T8]), especially in online environments where *this problem of time almost hyperbolises, becomes denser, more complex* [T6].

Most teachers have admitted that students are effectively a shared resource (*We are actually sharing a resource there* [T6]), although they do not always perceive this condition (*From the teacher's point of view, I think we do not have this perception* [T3]). In addition, the analysis of representations made by teachers and students also seems to confirm our initial hypotheses (*It's often true, it's a bit in the dark, each one in his discipline* [T8]; or *It is very difficult for me to manage and make the opportunity to dedicate myself in the most convenient way that I might need* [StB]).

Lastly, several teachers recognised that the prior knowledge of the schedule of all tasks proposed to class students *is absolutely crucial, and I do not know any online tool that help us with that vision* [T12]. As mentioned before, the analysis and interpretation of all the data, as well as the conclusions and final reflections of this study, will be published at a later date.

## Conclusions

In online environments, students need more time to read critically and validate the credibility of all consulted sources. However, if the class teachers conduct the proposal of the tasks in an isolated way, the potential high simultaneity of activities may require an excessive learning effort from some students, limiting their time to reflect, deepen and consolidate their learning.

This study aims to contribute to the understanding that *students are a resource shared by class teachers*. In this sense, we believe that class teachers could promote the regulation of their students' learning effort if they knew in advance the schedule of all tasks proposed by their peers. Supported by a set of focus group interviews conducted with higher education teachers and students, we sought to validate this issue at the start of the project. From the analysis of the interviews, we verified that the majority of the teachers understood and confirmed the pertinence and relevance of this problem.

During the interviews, teachers proposed some possible communication channels capable of providing the prior knowledge of the schedule of all tasks proposed to students in the different subjects. For this

reason, in a later stage of this project, the researchers aim to materialise a solution capable of providing class teachers with this global vision.

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